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Final Report

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Preble's Meadow Jumping Mouse Study a
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Preble's Meadow Jumping Mouse Study at Rocky Flats Environmental Technology Site, Spring 1996

Prepared for

Kaiser-Hill Company LLC

Golden, Colorado

PTI

PTI

ENVIRONMENTAL SERVICES

4940 Pearl East Circle, Suite 300, Boulder, Colorado 80301

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Study at Rocky Flats Environmental
Technology Site, Spring 1996**

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Kaiser-Hill Company LLC
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Golden, Colorado 80402-0464

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PREBLE'S MEADOW JUMPING MOUSE STUDY AT ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE, SPRING 1996

INTRODUCTION

Trapping of the Preble's meadow jumping mouse and habitat characterization of successful trap sites at the Rocky Flats Environmental Technology Site (the Site) have been conducted previously only in the summer and fall. No information was available for spring season conditions. Because Preble's mice hibernate, conditions surrounding hibernation emergence dates and numbers of individuals surviving hibernation needed to be documented. Other unknown conditions include time of breeding and habitats used during the spring season. These site-specific conditions must be known to properly preserve the populations of this rare mammal and its associated habitat at the Site.

A study was undertaken during the spring of 1996 in previously identified Preble's mouse capture locations. The intent of the study was to investigate the location and status of populations during springtime conditions and compare them to fall 1995 conditions. This information can be used to produce a detailed guideline for trapping and relocating populations of the Preble's meadow jumping mouse from areas that will be disturbed or destroyed to undisturbed areas of suitable habitat.

OBJECTIVES

The objectives of the field study were to trap in areas where Preble's mice had been captured during the preceding active season (fall 1995) and thus document emergence dates, describe successful capture locations, gain insights into their over-winter survival rates, and determine the timing of the initial breeding period. Additionally, by characterizing the habitat surrounding capture locations, biologists can compare spring habitat conditions to fall conditions, and describe habitat use during the early breeding period.

This study provides the relative number of individuals surviving the winter hibernation by age and sex classes as a function of trapping results and was not designed to quantify the abundance of mice. Additionally, no statistical analysis was employed to estimate population or to quantify Preble's mouse habitat. With the low number of captures of this rare rodent and, correspondingly, the small number of trap sites to characterize, statistical analysis is not feasible. Therefore, only ranges of values and percentages are used to

describe spring habitat, and only relative numbers of individuals based on trap nights are used to describe populations.

ASSUMPTIONS AND UNCERTAINTIES

Three basic assumptions were made for this study. First, it was assumed that the Preble's mouse uses riparian (stream-side) areas in the springtime. Second, it was assumed that trapping would begin before the Preble's mice had emerged from hibernation. Third, the mice were assumed to be found in the same general areas as those captured in the fall of 1995.

Trapping success has associated uncertainties inherent with efforts to capture this rare, small mammal. Uncertainties exist in descriptions of population size and suitable habitat. More individuals may inhabit trapped areas than are reflected in the trapping results. However, the relative number of traps used and the number of nights when traps were set approximate the efforts of past years; therefore, trap results are comparable from year to year, especially between fall 1995 and spring 1996.

The possibility exists that Preble's mice emerged from hibernation after unsuccessful transects trapped during the pre-emergence period were abandoned. The first three sites where emergence occurred were the sites carried forward into the latter stages of the study. It was not the intention of the study to document all areas on site where emergence occurred. Instead, the study chose the first areas of emergence to collect habitat and trapping data in a timely manner.

Sites to be trapped were chosen based on preliminary assumptions of what constitutes likely Preble's mouse habitat. Additionally, habitat descriptions are based on single-point trap locations, as opposed to continuous observation or tracking of mice. And in turn, the habitat surrounding those traps with captures was characterized as Preble's mouse habitat. The placement of individual traps clearly influences the habitat described. The possibility exists that a slightly different placement of traps would have yielded different results, or that an individual mouse's choice of one trap over another was strictly due to chance. Some of this uncertainty was mitigated by the use of grids during the post-emergence period, where traps were placed uniformly within not only presumed appropriate habitat, but also in adjacent wetland and grassland areas.

STUDY AREA

The study area included sites in Rock Creek and Walnut Creek (Figure 1). Four trapping transects were established in the Rock Creek drainage: upper, middle, confluence, and lower Rock Creek. Six transects were established in the Walnut Creek drainage: A-1 Pond,

B-4 Dam (two sites), middle Walnut Creek, and lower Walnut Creek (two sites). Hectare grids were used at Lower Rock Creek (LRC-1) and the B-4 Dam site (WBP-2). Hibernation was documented previously at the B-4 Dam sites.

STUDY QUESTIONS

The following questions were addressed utilizing the data collected during this study:

1. Can a capture date earlier than May 5th be documented? Prior to this study, May 5th was the earliest capture date documented on the Site.
2. Have individual (marked) mice survived the winter hibernation period?
3. Do the surviving marked individuals that were captured in the fall occur in the same geographic area in the spring?
4. Do Preble's mice use side slopes (topographic positions) in the spring (in addition to the lower riparian topographic areas)?
5. How does spring habitat compare to fall habitat?

METHODS

Trapping

Spring trapping was conducted for five weeks from 22 April to 24 May 1996. Each week consisted of three or four nights of trapping. The entire trapping session was scheduled into two periods, trapping for first emergence (period 1) and post-emergence (period 2). During the first period, traps were spaced 5–10 m apart along transects. During the second period, 1-hectare grids were used, and traps were spaced 10 m apart where the 100×100 m grid lines intersected. Purina Sweet Feed[®] was used for bait in Longworth small mammal live traps. In past efforts, raccoons have raided small mammal traps on the Site. Where there was evidence of offending raccoons in the trapping area, these raccoons were trapped, using bait consisting of oatmeal, raisins, and peanut butter. Once trapped, the raccoons were relocated.

Each small mammal captured was identified as to species; then each was aged and sexed. Notations were made relating to evidence of breeding activity, such as lactation or pregnancy in females, or males in breeding condition. Each Preble's mouse was aged, sexed, and measured for key identifying characteristics, including head and body length, ear length, tail length, hind foot length, and body weight. Digits were checked on each Preble's

mouse to determine if individuals were marked the previous fall season or were new captures. If the individual was marked, the identifying code was recorded. New captures were marked by toe clipping, using the same system as during the 1995 fall season. Tissues (toes) collected were preserved and sent to the Colorado Division of Wildlife. These samples were included in a genetic study sponsored by the Division of Wildlife. Only Preble's mice were marked and tracked on an individual level. All data were recorded on approved field data sheets, entered into the Ecology database, verified, and validated. Weather conditions were recorded at the time the traps were checked.

Time of First Emergence from Hibernation—Period 1

Five to ten groups of 25 traps each were run along seeps, upper reaches of creek drainages, and sites where Preble's mice were captured prior to hibernation. Trap-line locations and site identifiers are as follows:

Trap-Line Location	Site Identifier
Upper Rock Creek	Z96-10A
Middle Rock Creek	Z96-30A
Lower Rock Creek	Z96-09A
Rock Creek Confluence	Z96-23A
Walnut Creek A-1 Pond East	Z96-04A
Walnut Creek A-1 Pond West	Z96-05A
Walnut Creek B-4 Pond North	Z96-41A
Walnut Creek B-4 Pond South	Z96-43A
Middle Walnut Creek	Z96-21A
Lower Walnut Creek	Z96-20A

Trapping began April 22nd and continued until several mice were captured, documenting the early hibernation emergence dates for 1996. Sites were abandoned, and others from the above list established, as determined by the field crew leader, providing the previous site was trapped for at least four days prior. This provided the field crew leader the ability to concentrate trapping efforts in the most likely areas, given the current field conditions.

Post-Hibernation Trapping

One grid of 130 traps was established in each of the A- and B- series pond drainages of Walnut Creek, and one in Lower Rock Creek. The grids exactly duplicated grids used during the 1995 fall trapping effort. After emergence dates were determined, trapping continued until 24 May.

Grid Location	Site Identifier
Lower Rock Creek	LRC-1
Walnut Creek A-1	WAP-1
Walnut Creek B-4	WBP-2

The goal of this task was to document whether spring habitat use coincides with the pre-hibernation habitats utilized in the fall, and to determine what slope positions are used in the spring. This task also was intended to reveal information about spring population density, individual survivability, breeding, and spring age and sex ratios of the Preble's mouse.

Habitat Characterization

Habitat characterization was conducted on both microsite and macrosite levels. At the microsite level, all plant species within a 3-m radius of the trap station were identified and recorded. Woody stems occurring in this circle were counted and recorded by species. The distance to the nearest tree or shrub canopy was estimated, and the primary species making up this canopy were identified. Slope aspect, angle, and position of the trap site were recorded. Distances to the stream and embankment, and burrowing opportunities, were estimated. Canopy, foliar, and basal cover were estimated. Percent cover of the four major habitat types (see vegetation tables in Results Section and Habitat Codes in Appendix B) in the designated circular trap station were estimated, giving 100 percent total cover. An equal number of unsuccessful trap sites were also characterized.

Macrosite habitat characterization was conducted as soon as possible after the trapping session had ended. At the macrosite level, the entire trapping area (up to 2 hectares) was described based on the differing vegetation strata at the site. The results of this effort were sketched overlays of the different strata and their vegetation types, heights, and densities (where appropriate). These overlays are being digitized into the GIS system using State Plane coordinates.

The goal of the macrosite habitat exercise was to describe the multi-strata habitat in areas where Preble's mice are captured in terms of area (polygons) and to relate the capture data to these maps. This will allow biologists to compare these trapping areas to others in the

future, such as sites where a Preble's mouse population is present to a site of similar habitat without a population. No results for macrosite habitat characterization are presented here.

A data management and quality assurance discussion is provided in Appendix A.

Analysis

Densities of Preble's mice, based on suitable habitat within a 1-hectare grid, were calculated for the LRC-1 and WBP-2 grids. The total area that all Preble's mice utilized on the grid was determined and converted to a hectare value. This value was then divided into the number of individuals captured on the grid (excluding recaptures), giving the estimated number of individuals per hectare.

Habitat variables for microsite characterization were broken into two groups: physical parameters (abiotic) and vegetation parameters. Physical parameters measured at successful trap location plots at both the B-4 Dam trapping grid and Lower Rock Creek trapping grid included slope, aspect, slope position, distance to stream, distance to nearest embankment, distance to nearest continuous canopy edge, and canopy edge species. Vegetation parameters measured at successful trap location plots at both the B-4 Dam trapping grid and Lower Rock Creek trapping grid included species richness, woody plant and cacti stem densities, cover estimates of the (up to) four dominant habitat types present, and estimates of tree cover, shrub cover, foliar cover, ground cover, and litter cover. Habitat variables were described from successful trap sites. Additionally, spring 1996 Preble's mouse capture sites were compared to fall 1995 successful sites by comparing habitat variables from microsite characterization.

RESULTS

Small Mammal Trapping: Capture Data

Seventeen nights were spent in both the Rock Creek and Walnut Creek drainages, resulting in a total of 3,553 trap nights. Biologists captured 437 and 583 small mammals in Rock Creek and Walnut Creek, respectively. Table 1 summarizes the trapping results for all small mammal species. Preble's mice were captured in both creeks, with 10 captures in Rock Creek and 19 in Walnut Creek.

In retrospect, the five-week trapping session can be divided into three periods, as determined by the event of hibernation emergence: pre-emergence, emergence, and post-emergence. The pre-emergence period fell during the first two weeks of trapping, from 23 April to 9 May, when no Preble's mice were captured; the emergence period during the

third and fourth weeks, from 10 May to 20 May; and the post-emergence period during the last week of trapping through 24 May.

The first individual observed was an adult male captured on 10 May (week 3) in Lower Rock Creek. This was the only capture through the third week. Females were not captured until 21 May, and may have emerged over the preceding weekend. During the final three weeks, the number of Preble's mice increased dramatically (Figure 2), with captures increasing from 1 to 8 to 20 during respective weeks. Even when adjusted to an equal number of trap nights, the number of captures increased from approximately 1 to 10 over the 3-week period.

Trapping grids were established after the third week (see methods) at LRC-1 and after the fourth week at WBP-2 in Walnut Creek. Although a third grid was to have been used above the A-1 (WAP-1) pond after running an initial transect, nesting Swainson's hawks precluded work at the grid. Site policies prohibit personnel from conducting work within 200 feet of nesting raptors, to protect the birds. Therefore, all capture information for the spring trapping comes from the lower Rock Creek and B-4 dam sites, except for three captures of male Preble's mice from the initial transect above the A-1 pond during the fourth week.

Small Mammal Trapping: Information on Individual Preble's Mice

A total of 29 captures were recorded during the emergence and post-emergence periods (Table 2). Table 3 contains details for these 29 captures and every other capture within the Site Buffer Zone, including the fall 1995 trapping records. The 1995 information has not been presented in a finalized Site report and is included here to document the presence of individual Preble's mice in fall 1995 and their recurrence in spring 1996.

The 10 captures in Rock Creek represent cumulative captures of five individuals over the last two periods. As stated earlier, one adult male mouse was captured in Lower Rock Creek during the third week. During the next week, this male was the only individual captured at the site. The final week's effort yielded an additional adult male and three adult females, bringing the total to five Preble's mice at the Lower Rock Creek site. The females were unmarked, but both male mice were marked from previous years. The first male captured was marked no. 31 and was captured at the same general location in August 1995. The other male was marked no. 04 and was captured generally within the same site, but in July 1994. During the final week of trapping, the two males were observed in breeding condition, indicating the beginning of the breeding season.

The 19 captures in Walnut Creek included three captures of two individuals above the A-1 pond (both recaptures from fall 1995), and 16 captures of six individuals below the B-4 dam (three recaptures from fall 1995). The following results are only from the B-4 dam trapping effort, because the site above the A-1 pond was discontinued. The first Preble's mouse

captured in the Walnut Creek drainage was an adult male at the B-4 dam site on 14 May, during the emergence period. During this week, four more individuals were trapped: three adult males and one juvenile male. During the post-emergence period, an additional adult male and two adult females were captured. One recapture, an adult female, had three digits missing, recorded as 24/44 with the second digit (20th position), possibly indicating an injury instead of a marking. Although this observation is inconclusive, this may be the individual that was dug out of hibernation (no. 44) on 11 October 1995.

Densities based on 1-hectare grids were calculated for the LRC-1 and WBP-2 grid sites. At LRC-1, the cumulative captures of five individuals resulted in an estimated density during the spring sampling of 13.7 individuals per hectare. The WBP-2 dam grid was higher than LRC-1, with a density of 25.3 individuals per hectare. The WBP-2 grid densities were based on the capture of six individuals.

Habitat Characterization

Lower Rock Creek Grid (LRC-1) Results: Physical Parameters

Preble's mouse captures at LRC-1 were located on slopes ranging from 1 to 12°, with over 80 percent occurring on slopes of 0–10 degrees (Table 4). Over 88 percent of Preble's mouse captures occurred on north-facing slopes with aspects between 270° and 90° (Table 5 and Figure 3). Captures were located at riparian (mostly level areas next to streams) and bottom-slope positions (Table 6). For a diagram of slope positions, see Appendix B. Almost 90 percent of the captures were located in the riparian position. All of the captures were located within 15 m of the stream (Table 7), and more than 77 percent were located in the range of 1 to 5 m, with an overall mean distance of 5 m (Table 8). All of the captures were located within 10 m of an embankment (Table 9), with a mean distance of 4.3 m (Table 8). The mean distance from a capture location to a continuous canopy edge was 1.2 m (Table 8), with 100 percent of the captures occurring within 0–5 m (Table 10). The canopy species most often encountered in the continuous canopy edge was Coyote Willow (*Salix exigua*) (46 percent, Table 11).

B-4 Dam Grid (WBP-2) Results: Physical Parameters

Preble's mouse captures at B-4 were located on slopes ranging from 1 to 40°, with more than 50 percent occurring on slopes of 0–10 degrees (Table 4). More than 92 percent of Preble's mouse captures occurred on north-facing slopes, with most occurring at aspects between 270° and 45° (Table 5 and Figure 3). Captures were located at riparian (mostly level areas next to stream), bottom-slope, and middle-slope positions (Table 6). Equal numbers of captures (five) were made in the riparian and middle slope positions, with three occurring in the bottom position. Seventy-nine percent of the captures were located within

15 m of the stream (Table 7) with a mean distance of 11.5 m (Table 8). More than 76 percent of the captures were located within 15 m of an embankment (Table 9), with a mean distance of 9.3 m (Table 8). The mean distance from a capture location to a continuous canopy edge was 4.4 m (Table 8), with more than 76 percent occurring within a range of 0 to 5 m (Table 10). The canopy species most often encountered in the continuous canopy edge was Choke Cherry (*Prunus virginiana*) (46 percent, Table 11).

All Spring 1996 Capture Locations: Physical Parameters

Spring 1996 Preble's mouse trapping was conducted not only at the LRC-1 and WBP-2 grids, but also along trap lines following stream channels at other locations on the Site. Habitat was characterized at all Preble's mouse capture locations. The following presents data from all spring 1996 Preble's mouse capture locations combined. Spring 1996 Preble's mouse captures were located on slopes ranging from 1 to 40°, with over 62 percent occurring on slopes of 0–10° (Table 4). More than 86 percent of Preble's mouse captures occurred on north-facing slopes between 270° and 90° (Table 5 and Figure 3). The highest percentage (34 percent) occurred between 316° and 360°. Captures were located at riparian (mostly level areas next to stream), bottom (bottom of slope), and middle slope positions (Table 6). Fifty-five percent of the captures were located in the riparian position. The second highest position capture location was the middle slope, with 31 percent. All of the captures were located within 25 m of the stream (Table 7), with 48 percent located in the range of 1 to 5 m, and an overall mean distance of 9.5 m (Table 8). All the captures were located within 25 m of an embankment (Table 9), with a mean distance of 8 m (Table 8). The mean distance from a capture location to a continuous canopy edge was 2.3 m (Table 8), with 90 percent of the captures occurring within a range of 0 to 5 m (Table 10). The most commonly encountered canopy species in the continuous canopy edge were Coyote Willow (31 percent), Choke Cherry (28 percent), and Western Snowberry (*Symphoricarpos occidentalis*) (28 percent, Table 11).

Lower Rock Creek Grid (LRC-1) Results: Vegetation Parameters

A total of 80 plant species were recorded at LRC-1 Preble's mouse capture locations (Table 12). Of these, approximately 60 percent were native species. The shrub species with the highest occurrences in plots were Western Snowberry (78 percent), Coyote Willow (78 percent), Prairie Wild Rose (*Rosa arkansana*; 67 percent), Leadplant (*Amorpha fruticosa*; 67 percent), and Choke Cherry (33 percent). The most frequent graminoids in plots were Japanese Brome (*Bromus japonicus*; 100 percent), Western Wheatgrass (*Agropyron smithii*; 78 percent), Kentucky Bluegrass (*Poa pratensis*; 78 percent), Smooth Brome (*Bromus inermis*; 56 percent), and Canada Bluegrass (*Poa compressa*; 56 percent). Prairie Goldenrod (*Solidago missouriensis*; 54 percent), Western Yarrow (*Achillea millefolium*; 78 percent), Catchweed Bedstraw (*Galium aparine*; 78 percent), Common Wild Geranium

(*Geranium caespitosum*; 78 percent), Field Pepperweed (*Lepidium campestre*; 78 percent), and Goat's Beard (*Tragopogon dubius*; 78 percent) were the most frequent forbs in plots. No tree species were rooted within the plots.

Woody plant and cacti stem density values for LRC-1 are presented in Table 13. The woody species with the highest stem densities were Western Snowberry (3.71 stems/m²), Coyote Willow (3.61 stems/m²), Prairie Wild Rose (1.31 stems/m²), and Leadplant (0.51 stems/m²).

Up to four community types, based on the 1996 Site Vegetation Map, were recorded as associated with each capture location plot (Table 14). For a complete listing of community types, see Appendix B. Overall, mesic mixed grassland occurred most often, including primary, secondary, tertiary, and quaternary communities, in 89 percent of the plots at LRC-1. The most common primary community was Riparian Shrubland, which occurred about 56 percent of the time at LRC-1. However, in terms of coverage, Riparian Shrubland, which occurred in 67 percent of the plots, had the greatest amount of coverage (43 percent). Mesic Mixed Grassland contributed 36 percent of the coverage at Lower Rock Creek. The combined amounts of tree and shrub community cover at Lower Rock Creek plots provided approximately 68 percent of the cover for the primary community types and almost 61 percent overall cover for capture locations. The combined amounts of grassland community cover provided approximately 32 percent of the primary and 37 percent of the overall cover at the capture locations.

Tree, shrub, foliar, and ground cover estimates for the Preble's mouse capture location plots at Lower Rock Creek are presented in Table 15. One plot had a measurable tree canopy of two-tenths percent (mean=0.22 percent, s.d.=0.67). One-hundred percent of the plots had a measurable shrub canopy present. It ranged from 30 to 100 percent, with a mean of 61 percent (s.d.=24). All the plots also had measurable foliar and ground cover. Foliar cover averaged 65 percent (s.d.=16.6), and groundcover averaged 15 percent (s.d.=12.5).

B-4 Dam Grid (WBP-2) Results: Vegetation Parameters

A total of 58 plant species were recorded at the Preble's mouse capture locations at WBP-2 (Table 16). Of these, 67 percent were native species. The shrub species with the highest occurrences in plots were Western Snowberry (77 percent), Prairie Wild Rose (38 percent), Coyote Willow (23 percent), and Choke Cherry (23 percent). The most frequent graminoids in plots were Smooth Brome (77 percent), Kentucky Bluegrass (69 percent), and Western Wheatgrass (46 percent). Canada Thistle (*Cirsium arvense*; 77 percent), Prairie Goldenrod (54 percent), Pliant Milk-vetch (*Astragalus flexuosus*; 46 percent), and Purple Peavine (*Lathyrus eucosmus*; 46 percent) were the most frequent forbs in plots. Although a canopy was present, no tree species were rooted within the plots.

Woody plant and cacti stem density values for B-4 are presented in Table 13. The woody species with the highest stem densities are Western Snowberry (7.8 stems/m²), Coyote Willow (0.56 stems/m²), and Prairie Wild Rose (0.34 stems/m²).

Up to four community types were recorded as associated with each capture location plot (Table 17). Short Upland Shrubland and Reclaimed Grassland were the most commonly associated primary communities, each occurring about 31 percent of the time at WBP-2, with Short Upland Shrub occurring in 92 percent of the plots. However, in terms of coverage, Reclaimed Grassland, which occurred in 77 percent of the plots, had the greatest amount of coverage with 33 percent. Short Upland Shrubland contributed 22 percent of the coverage. The combined amounts of tree and shrub community cover at WBP-2 plots provided approximately 47 percent of the cover, both as primary community types and as overall cover for capture locations. The combined amounts of grassland community cover provided approximately 53 percent of the primary and overall cover at the capture locations.

Tree, shrub, foliar, and groundcover estimates for the Preble's mouse capture location plots are presented in Table 15. Three plots (23 percent) had a measurable tree canopy. Tree canopy cover estimates ranged from 0 to 40 percent (mean=4.6 percent, s.d.=11.3). One-hundred percent of the plots had a measurable shrub canopy present. It ranged from 10 to 75 percent, with a mean of 40 percent (s.d.=21). All of the plots also had measurable foliar and ground cover. Foliar cover averaged 64 percent (s.d.=16), and ground cover averaged 51 percent (s.d.=25).

All Spring 1996 Capture Locations: Vegetation Parameters

A total of 112 plant species were recorded at Preble's mouse capture locations (Table 18). Of these, 70 percent were native species. The shrub species with the highest occurrences in plots were Western Snowberry (76 percent), Prairie Wild Rose (52 percent), Coyote Willow (45 percent), Choke Cherry (35 percent), and Leadplant (24 percent). The most frequent graminoids in plots were Kentucky Bluegrass (69 percent), Smooth Brome (66 percent), Western Wheatgrass (62 percent), and Japanese Brome (41 percent). Canada Thistle (76 percent), Prairie Goldenrod (66 percent), Western Yarrow (55 percent), Yellowrocket Wintercress (*Barbarea orthoceras*; 45 percent), and Catchweed Bedstraw (45 percent) were the most frequent forbs in plots. Plains Cottonwood (*Populus deltoides*; 3 percent) and Peachleaf Willow (*Salix amygdaloides*; 3 percent) were the only trees recorded that were rooted in the plots.

Woody plant and cacti stem density values are presented in Table 13. The woody species with the highest stem densities are Western Snowberry (6.61 stems/m²), Coyote Willow (1.61 stems/m²), and Prairie Wild Rose (0.70 stems/m²).

Up to four community types were recorded as associated with each capture location plot (Table 19). Short Upland Shrubland and Riparian Shrubland community types were the

most commonly associated primary communities, occurring about 31 and 28 percent of the time, respectively. Short Upland Shrubland was the most frequently occurring community type, occurring in 76 percent of the capture plots. However, in terms of coverage, Mesic Mixed Grassland, which occurred in 69 percent of the plots, had the greatest amount of overall coverage with 29 percent. Short Upland Shrubland contributed 24 percent of the coverage at capture plots. The combined amounts of tree and shrub community type cover at all capture location plots provided approximately 62 percent of the cover for the primary community types and 55 percent of the overall cover for capture locations. The combined amounts of grassland community cover provided approximately 38 percent of the primary and 44 percent of the overall cover at the capture locations.

Tree, shrub, foliar, and groundcover estimates for the Preble's mouse capture location plots are presented in Table 15. Five plots (17 percent) had a measurable tree canopy present. Tree canopy cover estimates ranged from 0 to 40 percent (mean=2.2 percent, s.d.=7.7). One-hundred percent of the plots had a measurable shrub canopy present. It ranged from 10 to 100 percent, with a mean of 51 percent (s.d.=22). Foliar cover averaged 65 percent (s.d.=15.4), and groundcover averaged 31 percent (s.d.=26). A general description of spring habitat and a list of habitat parameters is provided in Attachment A.

DISCUSSION

The populations at Lower Rock Creek and below the B-4 dam in Walnut Creek have survived through the winter and are persisting over time, as seen from the three years of capture data at LRC-1 and two years of data from the B-4 dam area. Individuals captured both in the fall of 1995 and the spring of 1996 use the same general area and habitat. All 1996 individuals were captured in the same geographic areas as in 1995, prior to the hibernation period. Apparently, individuals leave these riparian areas to hibernate and then return in the spring, perhaps only traveling a minimal distance to hibernate above the floodplain. Survival of the Lower Rock Creek population after a large 1995 spring flood event lends credence to this hypothesis. The fact that individuals return seasonally to the same site emphasizes the importance of specific geographic areas in the preservation of small populations.

Overwinter survival, as determined by comparing fall and spring density results, seems adequate. Density calculations from trapping-grid information showed similar numbers of individuals from year to year for LRC-1, with some fluctuation at WBP-2. Two years of fall trapping efforts at Lower Rock Creek revealed six individuals captured in 1994 (estimated density of 26.1 individuals/hectare) and five individuals captured in 1995 (estimated density of 21.7 individuals/hectare). Again in spring 1996, five individuals were captured, but the females were different individuals than in fall 1995. The estimated density during the spring sampling is somewhat lower (approximately 14 individuals/hectare) than in the fall, presumably because the captures were within a larger area.

No trapping was conducted in 1994 in the B-series of Walnut Creek, so a three-year comparison is not possible. A minimum of eight individuals was captured in 1995 (estimated density of 36.3 individuals/hectare). In 1996, only six individuals were captured, and the density based on these captures was correspondingly lower. The decreased density could be attributed to a number of factors, such as winter/hibernation mortality, impact effects from the B-4 dam toe project in the fall of 1995, or natural dispersal of individuals away from the study site (K-Hill 1996). Caution should be taken, though, because of the low number of individuals captured, which is a characteristic of Preble's mouse trapping in general. A small change in the capture data can result in a large change in the density calculation.

From this comparison of densities, a baseline level of number of individuals at a certain density can be established for future monitoring. The numbers from LRC-1 and WBP-2 in Walnut Creek provide a baseline level of the population densities and number of individuals needed for these populations to survive through the winter hibernation period. This information, coupled with physiological information on pre-hibernation fat reserves, gives a complete picture of pre-hibernation conditions needed to sustain the small populations at the Lower Rock Creek and Walnut Creek sites.

The capture of a two-year-old individual in LRC-1 gives an indication of the longevity of this species, indicating that Preble's mice can live for at least two seasons. More captures of two-year-old mice are needed to confirm this fact. The fact that meadow jumping mice are relatively long-lived (D.M. Armstrong, pers. comm.) emphasizes the importance of marking individuals in a permanent fashion.

Emergence dates for spring 1996 were comparable to those in other years. The earliest calendar date for a Preble's mouse capture from the Site Buffer Zone remains at 5 May 1993. An earlier date was not documented. We can conclude that Preble's mice emerge from hibernation in early May. Therefore, May should be considered the calendar month that begins their active period when planning for projects that may affect Preble's mouse habitat. The hibernation period is approximately mid-September to early May, or about eight months. Previous studies at the Site have shown that adults will enter hibernation in early September, needing two weeks prior to gain the proper fat reserves (K-Hill 1996). Juveniles apparently need a longer period to gain fat reserves and correspondingly start hibernation later, from mid-September to late October.

Observations at both Rock Creek and Walnut Creek indicate that the adult male Preble's mice emerge first. Only one juvenile was captured during this study, so conclusions about juvenile emergence are not possible. However, four of the seven recaptures were recorded as juveniles in fall 1995, and as adults in spring 1996. The ability of juveniles to mature into adults while in hibernation is unknown. It would seem unlikely, from an energetics viewpoint, that a mouse could survive the additional demands of growth and maturation during the hibernating period. Therefore, the differences in appearance may be due to a pelage molt just prior to or during hibernation. Breeding activity was confirmed at LRC-1,

with the observation of males in breeding condition. However, breeding success was not confirmed.

Based on the spring habitat characterization of Preble's mouse capture locations conducted during 1996, a number of generalizations can be made to further define our understanding of Preble's mouse habitat requirements. Some qualifications must first be stated to put this information into perspective. First, the generalizations apply specifically to the Site. How far they can be inferred to represent suitable habitat elsewhere is not yet known. Second, this sampling represents the results of spring trapping and habitat characterization. It is not yet known how much, if any, difference may exist in habitat use during different seasons. One of the goals is that this information will help further define the habitat use of the mouse and will help in setting criteria for determining whether or not an untrapped area may contain suitable habitat for the Preble's mouse.

The habitat characterization data from B-4 and Lower Rock Creek, and the overall combined capture data, show a number of similarities for the spring Preble's mouse captures. Most captures occurred on slopes of less than 10°. At B-4, over 50 percent; at Lower Rock Creek, over 80 percent; and overall, over 62 percent of captures occurred on slopes of less than 10° (Table 4). This is not unexpected, as most of the captures have been located along the stream channels and on alluvial terraces, which generally slope gently. These results agree with those reported for Preble's mouse captures by the Pawnee Natural History Society (PNHS) for trapping conducted during 1995 on the Site (Table 4; DOE 1996). More than 70 percent of the captures were made on slopes of less than 10° during the fall of 1995.

Over 86 percent of captures at all sites occurred on northern aspects (271–90°, Table 5). As all the stream channels on the Site generally flow in a west-to-east direction, the high percentage of captures on the northern slopes seems to be significant. Potential reasons could have to do with cooler soil temperatures, increased soil moisture, or generally higher shrub cover or easier burrowing opportunities possibly associated with the first two factors, all of which are more typical of slopes with northern aspects. These results contrast with the results obtained during Preble's mouse trapping in the fall of 1995 (Table 5, Figure 3; DOE 1996). Those data show a much larger capture rate for the southern aspects than was found during the spring 1996 trapping. Captures in the fall of 1995 occurred only 40 percent of the time on northern aspects, while 60 percent of the time they occurred on southern aspects (91–270°). What accounts for these large differences is currently unknown. One possible explanation may be that at different times of the year the mouse uses different areas along the stream. The one known hibernaculum occurs at WBP-2 on the northern aspect. During the spring 1996 sampling, trapping was done at the time the mice came out of hibernation, so perhaps most of the captures occurred on the northern aspect because the mice had not had much time to disperse throughout their habitat.

Captures occurred primarily at the riparian slope position, although some were made at the bottom- and middle-slope positions as well (Table 6). However, with the exception of one bottom-slope capture in LRC-1, all other bottom-slope position captures and all the middle-

slope position captures took place at the WBP-2 area. In four of the five cases where captures were made on the middle-slope of the WBP-2 grid, the shrub canopy present in each plot was greater than 40 percent (Table 20). In addition, the four middle-slope position captures made along the trap line at the B-4 dam also had at least 40 percent shrub cover in each plot (Table 20). Of the nine middle-slope captures in the B-4 dam area, five were within the edge of the canopy present on the hillsides, three were within 5 m of the canopy, and one outlier occurred 11 m from the nearest canopy (Table 20). This seems to indicate that the Preble's mouse will utilize middle-slopes if adequate shrub cover is present. If shrub cover is not present on middle slopes, however, then the Preble's mouse does not utilize the middle-slope position, as shown by the lack of trapping success on middle-slopes in Lower Rock Creek, where no middle-slope shrub community was present and no captures were made outside the riparian slope position there. These results generally agree with those from 1995 (K-Hill 1996).

All captures at all sites were made within 25 m of the stream and within 25 m of an embankment, indicating a strong association with the stream channels and the proximity of embankments for potential hibernacula (Tables 7 and 9). These results generally agree with those found during trapping in fall 1995 (Tables 7 and 9; DOE 1996). All captures from 1995 occurred within 20 m of an embankment, and 90 percent of the captures occurred within 25 m of the stream.

Twenty-six of the 29 capture locations occurred at or within 5 m of the edge of a continuous shrub canopy (Table 10), with all but one of these canopies composed of either Coyote Willow, Choke Cherry, or Western Snowberry (Table 11). The three captures beyond 5 m took place at the B-4 dam site, including WBP-2. This affinity for shrub patches with a certain amount of surrounding grassland along the streams seems to be an important factor influencing the Preble's mouse distribution on the Site. The data from all capture plots combined indicate that the captures generally occurred in multi-strata vegetation with an overall combined tree and shrub cover component ranging from approximately 46 to 68 percent and a grassland/herbaceous cover component ranging from 32 to 53 percent (Tables 14, 17, and 19). The tree canopy component alone did not seem to be an important factor, however, as tree canopy was only present at five of the 29 capture locations (Table 20). Rather, the presence of a shrub component in addition to the herbaceous layer seems to be the determining factor. The shrub species with the highest occurrences in plots were Western Snowberry, Prairie Wild Rose, Coyote Willow, Choke Cherry, and Leadplant (Tables 12, 16, and 18), which are the commonly encountered shrub species along the riparian corridors on the Site. Western Snowberry had the highest frequency and had the highest stem densities at all sites. Prairie Wild Rose and Coyote Willow occurred second and third in terms of frequency and stem densities, although depending on site locality, their order may be reversed. However, because the most commonly encountered canopy species in the continuous canopy edge were Coyote Willow (31 percent), Choke Cherry (28 percent), and Western Snowberry (28 percent, Table 11), there seems to be no particular affinity for any one given woody species. Rather, it is probable that the presence of a shrub canopy layer, composed of any one or combination of the more common woody species found at the Site, is the critical factor in determining Preble's mouse habitat at the Site.

These results generally agree with those found during the 1995 field season (K-Hill 1996), which indicated that the captures generally occurred in multi-strata vegetation with an overall combined tree and shrub cover component of approximately 70 percent and a grassland herbaceous cover component of about 30 percent.

CONCLUSIONS

Preble's mice were observed, through trapping data, to have emerged from hibernation in Lower Rock Creek and the A- and B-series drainages of Walnut Creek. Many individuals captured in fall 1995 survived the winter hibernation period. After emergence, Preble's mice used approximately the same geographic area and habitat as they used prior to hibernation. Breeding activity was observed in Lower Rock Creek, indicating that breeding occurs soon after emergence from hibernation, as suggested by other studies (Quimby 1951; Whitaker 1963). Densities at LRC-1 were lower than fall, although the number of individuals present and the sex ratio were the same. Density at WBP-2 was similar, although the number of individuals was less. Overall, Preble's mice populations at LRC-1 and WBP-2 are sustaining themselves, based on the spring capture data.

Spring 1996 Preble's mouse captures occurred generally on north-facing aspects with slopes of 0–10°. Most captures occurred along streams in riparian vegetation, although some side-slope (bottom- and middle-slope positions) captures did occur where an adequate shrub canopy layer was present. The most commonly associated shrub canopy species were Coyote Willow, Choke Cherry, and Western Snowberry. Although upland grasslands were included in the trapping effort, captures were generally within 25 m of the stream and embankments, and in close proximity to a canopy edge and the cover it provided.

Preble's mice use the riparian areas during their active period (May through September). Yet, this study shows that if side-slope (middle-slope) areas with dense woody vegetation (shrubs) are available near riparian areas, these areas will also be used by Preble's mice and may be favored as hibernation sites. Therefore, side slopes may be used in the spring. For this reason, side slopes, especially north-facing slopes adjacent to streams with woody vegetation, as well as riparian areas, should be protected to conserve Preble's mouse populations at the Site.

Further Questions

Based on these results, the following questions can be proposed for further study, to provide data for management decisions concerning the Preble's mouse at the Site:

- What is the smallest shrubland patch along a stream corridor within a grassland matrix that can support a population of Preble's mouse?

- What is the maximum distance that shrubland patches of various sizes can be spaced apart within a riparian zone and still support Preble's mouse populations?
- Do Preble's mice occur in middle-slope conditions at other locations on the Site besides the B-4 area, where shrub canopy is present on the hillsides?
- Can a description of Preble's mouse habitat be better oriented through the use of telemetry equipment, as opposed to trap locations (i.e., the mouse in nature versus the mouse at a trap site.)

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Whitaker, J.O., Jr. 1963. A study of the meadow jumping mouse, *Zapus hudsonius* (Zimmermann), in central New York. Ecol. Monogr. 33:215-254.



USFWS (U.S. Fish and Wildlife Service). 1995. Interim survey guidelines for Preble's Meadow Jumping Mouse. Denver Field Office, Lakewood, Colorado. June.

Figures and Tables









Locations of Preble's Meadow Jumping Mouse Trap Sites Spring 1996

Figure 1

EXPLANATION

-  Successful Trap Locations
-  Non-Successful Trap Locations

Standard Map Features

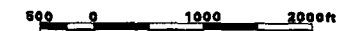
-  Buildings or other structures
-  Lakes and ponds
-  Streams, ditches, or other drainage features
-  Fences
-  Contours (20' intervals)
-  Rocky Flats boundary
-  Paved roads
-  Dirt roads

DATA SOURCE:
 Buildings, roads, and fences provided by
 Facility Eng.
 EG&G Rocky Flats, Inc. - 1991.
 Hydrology provided by
 USGS - (data unknown)
 Preble's Meadow Jumping Mouse data
 provided by PFI Environmental Services
 Ecology Group - 1996.

Disclaimer: These are Preble's Meadow Jumping Mouse successful and non-successful trapping locations for spring 1996. This map is not to be interpreted as a Preble's Meadow Jumping Mouse habitat map.



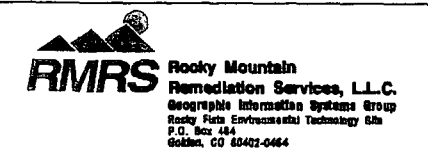
Scale = 1 : 21330
 1 inch represents approximately 1778 feet



State Plane Coordinate Projection
 Colorado Central Zone
 Datum: NAD27

U.S. Department of Energy
 Rocky Flats Environmental Technology Site

Prepared by:



MAP ID: 0002

October 02, 1996

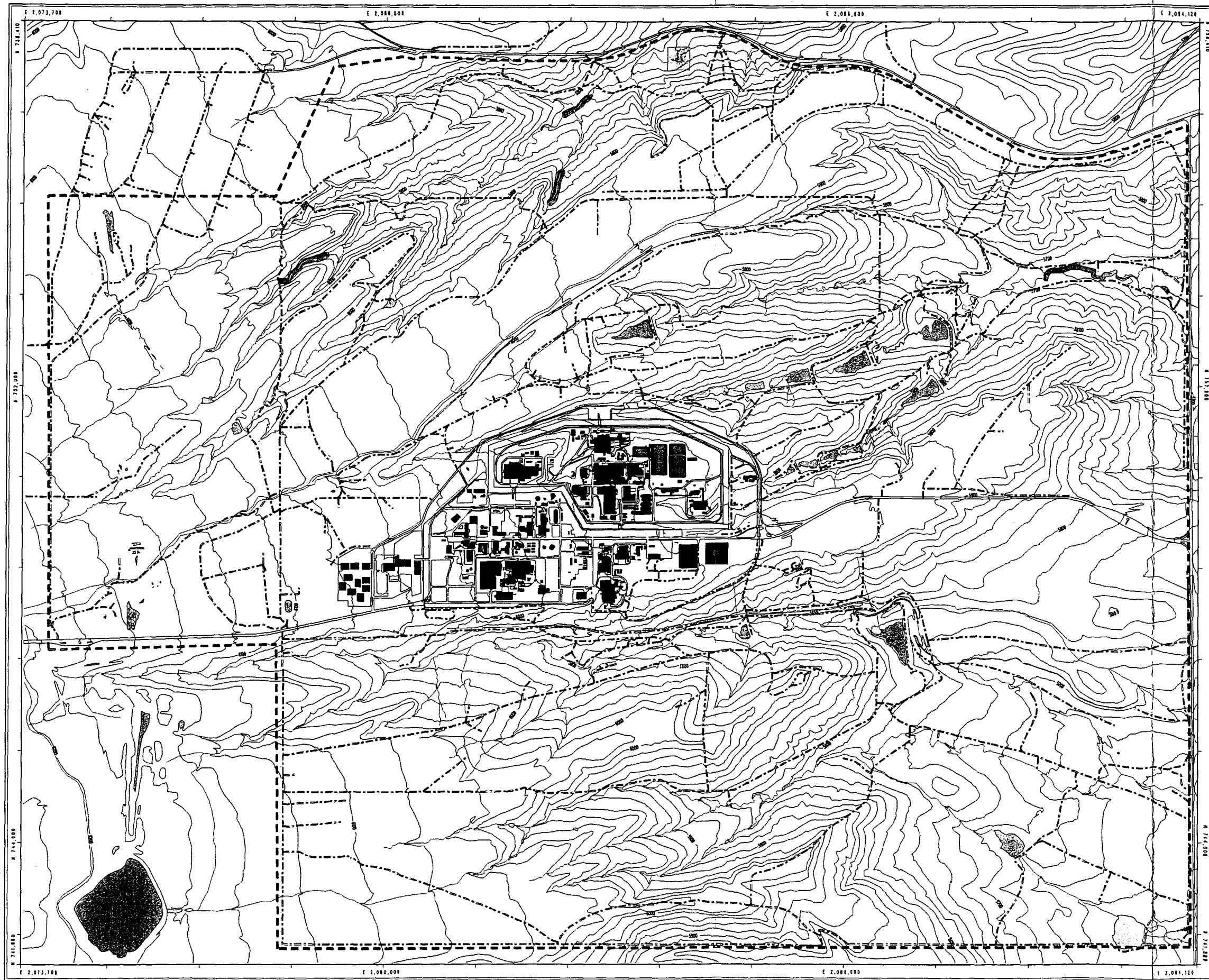


Table 1. Capture Summary, Spring *Zapus* Trapping, 1996

Species	Common Name	Number	Percent
<i>Peromyscus maniculatus</i>	Deer Mouse	716	70.2%
<i>Microtus pennsylvanicus</i>	Meadow Vole	142	13.9%
<i>Reithrodontomys montanus</i>	Plains Harvest Mouse	48	4.7%
<i>Reithrodontomys megalotis</i>	Western Harvest Mouse	35	3.4%
<i>Microtus ochrogaster</i>	Prairie Vole	34	3.3%
<i>Zapus hudsonius</i>	Preble's Meadow Jumping Mouse	29	2.8%
<i>Chaetodipus hispidus</i>	Hispid Pocket Mouse	12	1.2%
<i>Reithrodontomys</i> sp.	unknown Harvest Mouse	4	0.4%
Total		1020	100.0%

Table 2. Preble's Meadow Jumping Mice (*Zapus hudsonius preblei*) Individuals Captured during Spring Trapping, 1996

Status	Pre-emergence		Pre-emergence		Emergence		Emergence		Post-emergence		TOTAL	
	Week 1: April 23 - 26		Week 2: April 30 - May 2		Week 3: May 7 - 10		Week 4: May 14 - 16		Week 5: May 21 - 24		All Weeks	
	Rock Creek	Walnut Creek	Rock Creek	Walnut Creek	Rock Creek	Walnut Creek	Rock Creek	Walnut Creek	Rock Creek	Walnut Creek	Rock Creek	Walnut Creek
Male	0	0	0	0	1	0	1	4	2	4	2	5
Female	0	0	0	0	0	0	0	0	3	2	3	2
Juvenile	0	0	0	0	0	0	0	1	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	1	0	1	0
Total Captures*	0	0	0	0	1	0	2	6	7**	13	10	19

* Includes individuals captured more than once. For example, week 4 in Walnut Creek had five individuals captured. One individual was captured twice, for a total of six captures.

** The seven captures comprised two males in breeding condition.

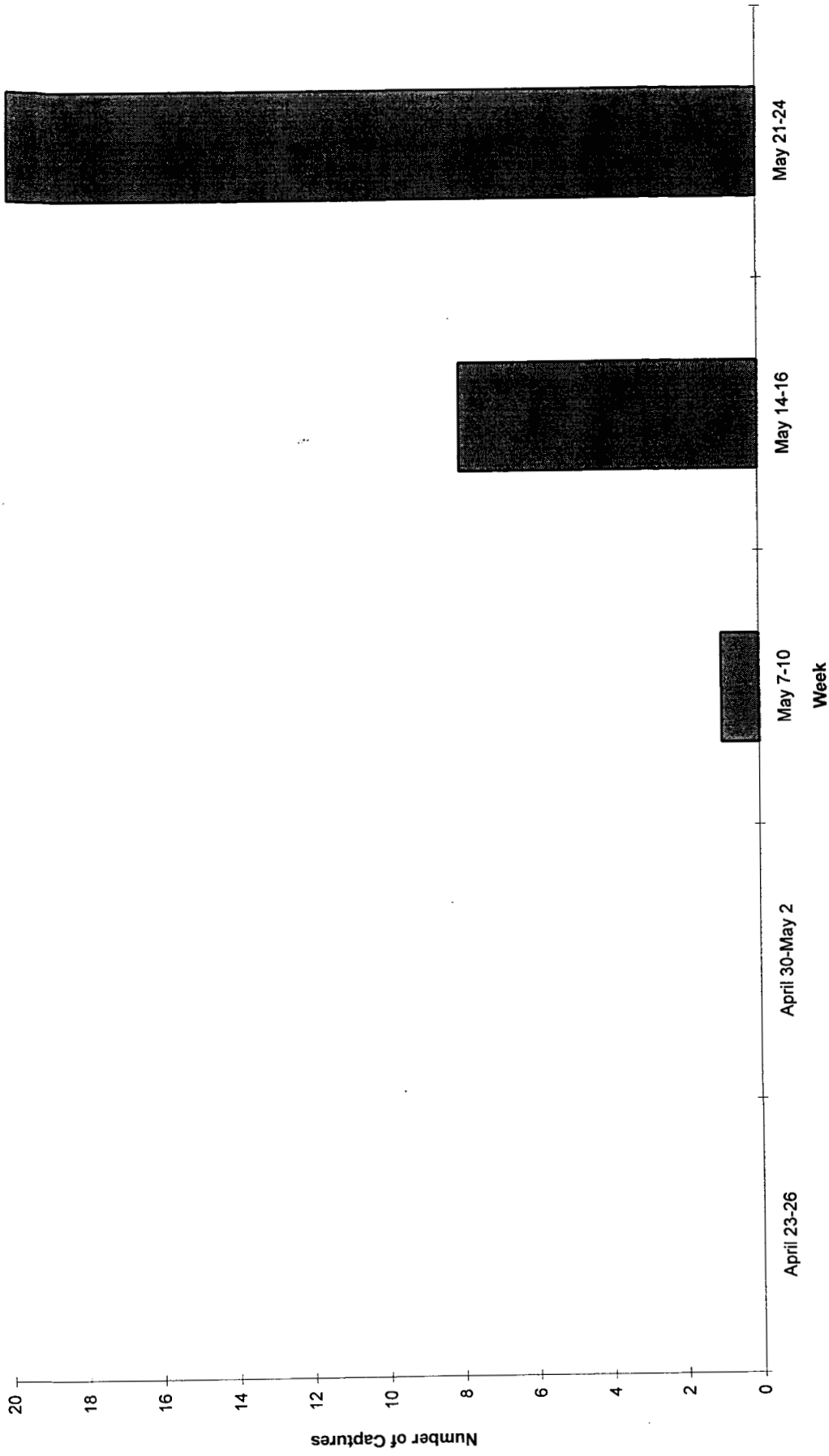


Figure 2. Preble's Mouse Captures by Week, Spring 1996

Table 3. Preble's Meadow Jumping Mouse Records from the Rocky Flats Environmental Technology Site, 1995 - 1996.

Date	Individual Identifier	Collected By	Sampling Location	Trap Number	Age	Sex	Weight (g)	Measurements** (mm)	Comments
1995									
23-May-95	ZAHU-95-2	AD/MEB	Z95-09A	12	Adult	F	22	74-97-30-10	Tail Shortened
23-May-95	ZAHU-95-22	AD/MEB	Z95-30A	37	Adult	M	21	75-138-30-10	
24-May-95	ZAHU-95-2	AD/TRR	Z95-09A	4	Adult	F	22	74-97-30-10	Tail Shortened
24-May-95	ZAHU-95-22	AD/TRR	Z95-30A	32	Adult	M	21	75-138-30-10	
25-May-95	ZAHU-95-2	AD/TRR	Z95-09A	11	Adult	F	22	74-97-30-10	Tail Shortened
20-Jun-95	ZAHU-95-23	AD/SCM	Z95-41A	6	Adult	F	22	72-122-28-9	Between Ponds B-4 and B5
2-Aug-95	ZAHU-95-24	FAH/BJB	Z95-03A	43	Adult	-	-	-	Escaped before processed
3-Aug-95	ZAHU-95-25	FAH/BJB	MWC-1	F6	Adult	M	22	83-104-28-9	
8-Aug-95	ZAHU-95-26	FAH/BJB	Z95-04A	7	Adult	F	24	84-124-28-10	Pregnant and Lactating, Red
9-Aug-95	ZAHU-95-27	FAH/BJB	Z95-05A	10	Subadult	M	22	84-109-29-9	Blue
10-Aug-95	ZAHU-95-27	FAH/BJB	Z95-04A	8	Subadult	M	22	84-109-29-9	Blue
15-Aug-95	ZAHU-95-28	FAH/BJB	LRC-1	E8	Juvenile	M	15	72-102-25-10	Expired
15-Aug-95	ZAHU-95-38	FAH/BJB	WAP-1	CC3,3	Adult	F	21	83-114-28-10	Missing #8 digit, Yellow
17-Aug-95	ZAHU-95-29	FAH/BJB	LRC-1	HH6,6	Juvenile	M	14	72-104-25-9	White
17-Aug-95	ZAHU-95-30	FAH/BJB	WAP-1	I6	Juvenile	M	15	75-113-26-9	White
18-Aug-95	ZAHU-95-31	FAH/BJB	LRC-1	H7	Juvenile	M	14	75-104-26-9	Red
18-Aug-95	ZAHU-95-38	FAH/BJB	WAP-1	G6	Adult	F	25	83-114-28-10	Yellow
22-Aug-95	ZAHU-95-38	FAH/BJB	WAP-1	G6	Adult	F	27	83-114-28-10	Yellow
22-Aug-95	ZAHU-95-32	FAH/BJB	WAP-1	HH3,3	Subadult	F	22	81-109-29-9	Not Colored
22-Aug-95	ZAHU-95-27	FAH/BJB	WAP-1	J4	Adult	M	21	84-109-29-9	Blue
22-Aug-95	ZAHU-95-33	BJB/AKB	Z95-06A	6	Subadult	F	15	76-113-27-9	Not Colored
23-Aug-95	ZAHU-95-32	FAH/BJB	WAP-1	G3	Subadult	F	22	81-109-29-9	Not Colored
23-Aug-95	ZAHU-95-27	FAH/BJB	WAP-1	J5	Adult	M	21	84-109-29-9	Blue
23-Aug-95	ZAHU-95-38	FAH/BJB	WAP-1	JJ3,3	Adult	F	27	83-114-28-10	Yellow
24-Aug-95	ZAHU-95-32	FAH/BJB	WAP-1	GG5,5	Subadult	F	24	81-113-27-10	Not Colored
24-Aug-95	ZAHU-95-38	FAH/BJB	WAP-1	G6	Adult	F	23	83-114-28-10	Yellow
24-Aug-95	ZAHU-95-34	FAH/BJB	WAP-1	II6,6	Adult	M	27	85-126-28-10	Not Colored
24-Aug-95	ZAHU-95-31	FAH/AKB	LRC-1	F8	Juvenile	M	16	75-104-26-9	Red
25-Aug-95	ZAHU-95-27	FAH/BJB	WAP-1	EE4,4	Adult	M	20	84-109-29-9	Blue
25-Aug-95	ZAHU-95-35	FAH/BJB	WAP-1	J4	Juvenile	F	17	75-103-26-9	Not Colored
29-Aug-95	ZAHU-95-38	FAH/MEB	WAP-1	EE6	Adult	F	26	83-114-28-10	Yellow
29-Aug-95	ZAHU-95-36	TRR/JKN	Z95-41B	21	Adult	M	30	86-119-26-7	Not Colored
29-Aug-95	ZAHU-95-37	TRR/JKN	Z95-41B	64	Adult	M	34	85-126-28-10	Not Colored

** Measurements taken are length of: head and body -tail - hind foot - ear

Table 3. Preble's Meadow Jumping Mouse Records from the Rocky Flats Environmental Technology Site, 1995 - 1996.

Date	Individual Identifier	Collected By	Sampling Location	Trap Number	Age	Sex	Weight	Measurements	Comments
30-Aug-95	ZAHU-95-38	FAH/MEB	WAP-1	H6	Adult	F	26	83-114-28-10	Yellow
30-Aug-95	ZAHU-95-35	FAH/MEB	WAP-1	J5	Juvenile	F	17	75-103-26-9	Not Colored
30-Aug-95	ZAHU-95-38	FAH/MEB	WAP-1	K4	Adult	F	26	83-114-28-10	Yellow, recaptured after 15 min.
31-Aug-95	ZAHU-95-38	FAH/MEB	WAP-II	D4	Adult	F	26	83-114-28-10	Yellow
31-Aug-95	ZAHU-95-35	FAH/MEB	WAP-II	J5	Juvenile	F	14	75-103-26-9	Not Colored
31-Aug-95	ZAHU-95-39	TRR/MBM	Z95-41B	21	Juvenile	M	18	75-124-30-8	Expired
31-Aug-95	ZAHU-95-X1	TRR/MBM	Z95-41B	35	Juvenile	F	18	70-115-29-10	Not marked, Not colored
31-Aug-95	ZAHU-95-X2	TRR/MBM	WAP-6	21	Juvenile	F	13	67-105-27-7	Not marked, Not colored
1-Sep-95	ZAHU-95-40	FAH/MEB	WAP-II	A5	Juvenile	F	13	73-100-25-7	Not Colored
1-Sep-95	ZAHU-95-41	FAH/MEB	WAP-II	DD5,5	Juvenile	M	14	74-108-26-7	Not Colored
1-Sep-95	ZAHU-95-32	FAH/MEB	WAP-II	I6	Subadult	F	22	81-113-27-10	Not Colored
1-Sep-95	ZAHU-95-38	FAH/MEB	WAP-II	JJ6,6	Adult	F	26	83-114-28-10	Yellow
1-Sep-95	ZAHU-95-X3	MBM/JKN	Z95-41B	25	Subadult	F	14	68-111-28-8	Red
1-Sep-95	ZAHU-95-X4	MBM/JKN	Z95-41B	2	Adult	F	20	84-128-29-10	Red
1-Sep-95	ZAHU-95-X4	MBM/JKN	Z95-41B	37	Adult	ND	22	ND-131-ND-ND	Not marked, Not colored
5-Sep-95	ZAHU-95-42	AD/BJB	MRC-II	B8	Adult	M	22	84-124-28-9	Red
5-Sep-95	ZAHU-95-35	FAH/MEB	WAP-II	I6	Juvenile	F	15	75-103-26-9	Not Colored
5-Sep-95	ZAHU-95-40	FAH/MEB	WAP-II	II6,6	Juvenile	F	15	73-100-25-7	Not Colored
5-Sep-95	ZAHU-95-43	FAH/MEB	Z95-10A	23	Adult	M	21	83-123-28-8	Red
6-Sep-95	ZAHU-95-35	FAH/MEB	WAP-II	F5	Juvenile	F	16.6	75-103-26-9	Not Colored
6-Sep-95	ZAHU-95-44	TRR/MMF	Z95-41B	31	Juvenile	F	16.8	80-120-28-13	Blue
7-Sep-95	ZAHU-95-X6	TRR/AD	Z95-41B	49	ND	ND	ND	ND	Escaped before processing
8-Sep-95	ZAHU-95-45	AD/BJB	MRC-I	DD5,5	Adult	F	25.4	87-125-29-13	Blue
8-Sep-95	ZAHU-95-46	AD/BJB	MRC-I	E2,2	Subadult	M	18.9	82-132-30-14	Yellow
12-Sep-95	ZAHU-95-35	FAH/MEB	WAP-VII	H4	Juvenile	F	16	75-103-26-9	Not Colored
12-Sep-95	ZAHU-95-47	AD/BJB	MRC-I	E4,4	Juvenile	F	15.5	74-128-27-9	White
13-Sep-95	ZAHU-95-35	FAH/MEB	WAP-VII	DD5,5	Juvenile	F	17	75-103-26-9	Not Colored
13-Sep-95	ZAHU-95-40	FAH/MEB	WAP-VII	DD3,3	Juvenile	F	15.3	73-100-25-7	Not Colored
13-Sep-95	ZAHU-95-48	BJB/AD	MRC-I	E4,4	Subadult	M	19	85-131-30-13	Not Colored
14-Sep-95	ZAHU-95-47	BJB/AD	MRC-I	EE3,3	Juvenile	F	14.9	74-128-27-9	White
15-Sep-95	ZAHU-95-40	FAH/BAW	WAP-VII	H4	Juvenile	F	15.8	73-100-25-7	Not Colored
19-Sep-95	ZAHU-95-35	FAH/MEB	WAP-VII	C4	Juvenile	F	17	75-103-26-9	Telemetered, Not Colored
19-Sep-95	ZAHU-95-49	AD/BJB	Z95-17A	1	Juvenile	M	15.5	76-126-30-14	Telemetered, Found Dead
19-Sep-95	ZAHU-95-50	AD/BJB	MRC-II	BB8,8	Juvenile	M	16.9	81-126-30-13	Not Colored

** Measurements taken are length of: head and body -tail - hind foot - ear

Table 3. Preble's Meadow Jumping Mouse Records from the Rocky Flats Environmental Technology Site, 1995 - 1996.

Date	Individual Identifier	Collected By	Sampling Location	Number	Age	Sex	Weight	Measurements	Comments
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20-Sep-95	ZAHU-95-51	AD/BJB	Z95-17A	10	Juvenile	F	14.5	75-119-29-13	Telemetered, Released 9/27
26-Sep-95	ZAHU-95-52	TRR/MMF	WBP-I	F2	Juvenile	F	14.6	79-118-30-13	Expired after enethelization
26-Sep-95	ZAHU-95-50	AD/BJB	MRC-I	D7	Juvenile	M	18.9	81-126-30-13	Not Colored
26-Sep-95	ZAHU-95-53	AD/BJB	MRC-I	E2	Juvenile	M	19.5	83-129-30-13	Not Colored
26-Sep-95	ZAHU-95-48	BJB/AD	MRC-I	E6,6	Subadult	M	29.6	85-131-30-13	Telemetered, Not Colored
27-Sep-95	ZAHU-95-40	FAH/MEB	WAP-II	I15,5	Juvenile	F	21.5	86-114-28-13	Telemetered, Not Colored
27-Sep-95	ZAHU-95-54	FAH/MEB	WAP-II	I6	Juvenile	F	16.1	78-102-27-12	Red
27-Sep-95	ZAHU-95-55	AD/BJB	MRC-I	HH4,4	Juvenile	F	17.8	84-129-30-14	Not Colored
27-Sep-95	ZAHU-95-44	TRR/MMF	WBP-I	J3	Juvenile	F	26.9	80-120-28-13	Telemetered
28-Sep-95	ZAHU-95-35	FAH/MEB	WAP-II	F6	Juvenile	F	25.7	75-103-26-9	Transmitter gone, not marked
28-Sep-95	ZAHU-95-53	AD/BJB	MRC-I	E2,2	Juvenile	M	21	83-129-30-13	Not Colored
28-Sep-95	ZAHU-95-48	BJB/AD	MRC-I	EE2,2	Subadult	M	28	85-131-30-13	Transmitter gone, not marked
28-Sep-95	ZAHU-95-56	TRR/MMF	WBP-I	H2	Juvenile	F	15.4	81-126-29-13	Not Colored
29-Sep-95	ZAHU-95-48	BJB/AD	MRC-I	EE2,2	Subadult	M	31.5	85-131-30-13	Not marked
29-Sep-95	ZAHU-95-40	FAH/MEB	Z95-13A	4	Juvenile	F	22	86-114-28-13	Transmitter gone, marked blue
29-Sep-95	ZAHU-95-57	TRR/MMF	WBP-I	EE3	Juvenile	F	16.8	80-131-31-13	Yellow
4-Oct-95	ZAHU-95-53	AD/BJB	MRC-I	HH4,4	Juvenile	M	19.9	83-129-30-13	Not Colored
4-Oct-95	ZAHU-95-58	AD/BJB	MRC-I	K3	Subadult	F	25.2	85-113-20-14	Telemetered
4-Oct-95	ZAHU-95-56	FAH/MEB	WBP-I	HH2,2	Juvenile	F	19.2	81-126-29-13	Telemetered, White
5-Oct-95	ZAHU-95-55	AD/BJB	MRC-I	JJ3,3	Juvenile	F	20.5	84-129-30-14	Not Colored
6-Oct-95	ZAHU-95-59	AD/BJB	MRC-I	E1,1	Juvenile	M	14.1	79-116-29-12	Not Colored
10-Oct-95	ZAHU-95-56	FAH/MEB	WBP-I	GG2,2	Juvenile	F	16.4	81-126-29-13	Transmitter gone, marked white
11-Oct-95	ZAHU-95-54	FAH/MEB	WAP-II	JJ6,6	Juvenile	F	22.5	78-102-27-12	Telemetered, Red
11-Oct-95	ZAHU-95-55	AD/BJB	MRC-I	K4	Juvenile	F	23.8	84-129-30-14	Not Colored
11-Oct-95	ZAHU-95-44	BAW/MEB	WBP-I	G3	Juvenile	F	24.1	80-120-28-13	Dug out of Hibernaculum
12-Oct-95	ZAHU-95-60	FAH/MEB	Z95-19A	21	Juvenile	F	22	86-123-30-13	Tail damaged, not marked
17-Oct-95	ZAHU-95-58	FAH/MEB	MRC-I	JJ4,4	Subadult	F	24.4	85-113-20-14	Transmitter gone, not marked
19-Oct-95	ZAHU-95-58	FAH/MEB	MRC-I	I13,3	Subadult	F	26.4	85-113-20-14	Not marked
19-Oct-95	ZAHU-95-60	FAH/MEB	Z95-19A	20	Juvenile	F	24.4	86-123-30-13	Tail damaged, not marked
20-Oct-95	ZAHU-95-54	FAH/MEB	WAP-II	K5	Juvenile	F	ND	78-102-27-12	Transmitter gone, not marked
26-Oct-95	ZAHU-95-54	BJB/AD	WAP-II	F6	Juvenile	F	20.3	78-102-27-12	Not marked
26-Oct-95	ZAHU-95-59	AD/BJB	MRC-I	EE3,3	Juvenile	M	24.6	79-116-29-12	Not Colored

** Measurements taken are length of head and body - tail - hind foot - ear

TRAP_SUM.XLS tm

10/2/96

Table 3. Preble's Meadow Jumping Mouse Records from the Rocky Flats Environmental Technology Site, 1995 - 1996.

Date	Individual Identifier	Collected By	Sampling Location	Trap Number	Age	Sex	Weight	Measurements	Comments
27-Oct-95	ZAHU-95-58	AD/BJB	MRC-1	HH4,4	Subadult	F	28	85-113-20-14	Not marked

1996									
10-May-96	ZAHU-96-31	TRR/WSB	Z96-09A	1	Adult	M	19	78-112-29-9	First male emergence record in Rock Creek
14-May-96	ZAHU-96-37	MBM/TRR	Z96-43A	7	Adult	M	22	80-129-30-10	First male emergence record in Walnut Creek
14-May-96	ZAHU-96-71	MBM/WSB	Z96-43A	8	Adult	M	23	94-134-30-9	
14-May-96	ZAHU-96-31	TRR/MMF	LRC-1	13	Adult	M	16	78-112-29-9	
14-May-96	ZAHU-96-41	MBM/TRR	Z96-05A	22	Adult	M	17	80-115-31-9	
15-May-96	ZAHU-96-77	MBM/WSB	Z96-43A	5	Adult	M	20	75-135-29-10	
15-May-96	ZAHU-96-41	MBM/WSB	Z96-05A	1	Adult	M	??	85-120-27-9	Escaped before weighing
15-May-96	ZAHU-96-31	MBM/WSB	LRC-1	12	Adult	M	16	78-112-29-9	
16-May-96	ZAHU-96-54	MBM/WSB	Z96-05A	1	Juvenile	M	12	62-116-28-9	Lethargic behavior
21-May-96	ZAHU-96-XX	TRR/MMF	LRC-1	H3	ND	U	??	??????	Escaped before processing
21-May-96	ZAHU-96-71	MBM/WSB	WBP-2	C3	Adult	M	18	85-120-28-9	
21-May-96	ZAHU-96-62	TRR/WSB	WBP-2	D3	Adult	M	20	81-117-30-10	
21-May-96	ZAHU-96-37	TRR/WSB	WBP-2	J4	Adult	M	19	76-124-29-10	
21-May-96	ZAHU-96-24/44	TRR/WSB	WBP-2	C4	Adult	F	15	79-121-28-10	First female emergence record in Walnut Creek
21-May-96	ZAHU-96-56	TRR/WSB	WBP-2	D5	Adult	F	17	75-124-28-9	
21-May-96	ZAHU-96-77	TRR/WSB	WBP-2	E5	Adult	M	18	85-120-28-10	
22-May-96	ZAHU-96-71	TRR/WSB	WBP-2	J3	Adult	M	18	85-120-28-9	
22-May-96	ZAHU-96-24/44	TRR/WSB	WBP-2	B4	Adult	F	15	79-121-28-10	
22-May-96	ZAHU-96-37	TRR/MMF	WBP-2	E5	Adult	M	19	76-124-29-10	
23-May-96	ZAHU-96-63	TRR/MMF	LRC-1	G5	Adult	F	19	82-121-28-10	First female emergence record in Rock Creek
23-May-96	ZAHU-96-64	TRR/MMF	LRC-1	E8	Adult	F	16	82-132-30-10	
23-May-96	ZAHU-96-65	TRR/MMF	LRC-1	C10	Adult	F	16	79-126-28-9	
23-May-96	ZAHU-96-31	TRR/WSB	LRC-1	C9	Adult	M	16	78-112-29-9	Now in breeding condition
24-May-96	ZAHU-96-37	WSB/MMF	WBP-2	F4	Adult	M	19	76-124-29-10	
24-May-96	ZAHU-96-24/44	WSB/MMF	WBP-2	B4	Adult	F	15	79-121-28-10	
24-May-96	ZAHU-96-71	WSB/MMF	WBP-2	D5	Adult	M	18	85-120-28-9	
24-May-96	ZAHU-96-77	WSB/MMF	WBP-2	H5	Adult	M	18	85-120-28-10	
24-May-96	ZAHU-96-65	TRR/MBM	LRC-1	G9	Adult	F	16	79-126-28-9	
24-May-96	ZAHU-96-04	TRR/MBM	LRC-1	J3	Adult	M	21	85-105-29-11	Now in breeding condition

** Measurements taken are length of: head and body - tail - hind foot - ear
TRAP_SUM.XLS tm

10/2/96

1996 All Sites		1996 B-4 Dam		1996 Lower Rock Creek		1995 Capture Sites	
Range (degrees)	n	Percent	n	Percent	n	Percent	n
0-5	14	48.28	5	38.46	6	66.67	50
6-10	4	13.79	2	15.38	2	22.22	21
11-15	2	6.90	1	7.69	1	11.11	7
16-20	2	6.90	2	15.38	0	0.00	7
21-25	4	13.79	0	0.00	0	0.00	1
26-30	2	6.90	2	15.38	0	0.00	8
31-35	0	0.00	0	0.00	0	0.00	1
36-40	1	3.45	1	7.69	0	0.00	2
41-45	0	0.00	0	0.00	0	0.00	3
46-50	0	0.00	0	0.00	0	0.00	0
51-55	0	0.00	0	0.00	0	0.00	0
56-60	0	0.00	0	0.00	0	0.00	0
61-65	0	0.00	0	0.00	0	0.00	1
Total	29		13		9		101

Table 4. Summary of Slope Angle Measurements Associated with Preble's Mouse Records

Table 5. Summary of Slope Aspect Measurements Associated with Preble's Mouse Records

Range (degrees)	Direction	1996 All Sites		1996 B-4 Dam		1996 Lower Rock Creek		1995 Capture Sites	
		n	96AS%	n	96B4%	n	96LRC1%	n	95S %
001-045	N	6	20.69	4	30.77	2	22.22	17	16.83
046-090	NE	5	17.24	1	7.69	3	33.33	10	9.90
091-135	E	1	3.45	0	0.00	0	0.00	32	31.68
136-180	SE	2	6.90	1	7.69	0	0.00	12	11.88
181-225	S	1	3.45	0	0.00	1	11.11	12	11.88
226-270	SW	0	0.00	0	0.00	0	0.00	4	3.96
271-315	W	4	13.79	2	15.38	2	22.22	7	6.93
316-360	NW	10	34.48	5	38.46	1	11.11	7	6.93
Total		29		13		9		101	

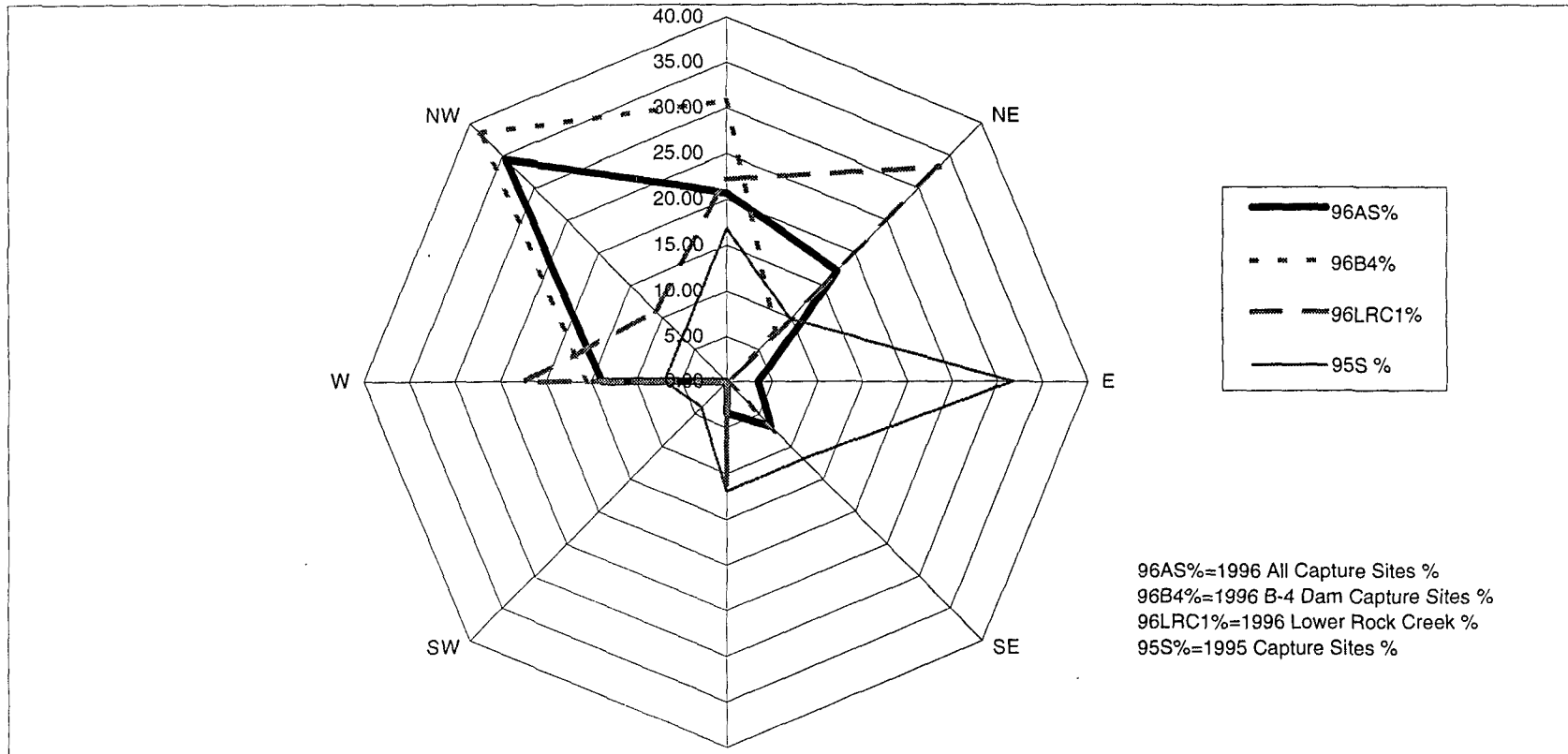


Figure 3. Summary of Slope Aspect Measurements Associated with Preble's Mouse Records

Table 6. Occurrence of Preble's Mouse in Association with Slope Position

Slope Position	1996 All Sites		1996 B-4 Dam		1996 Lower Rock Creek		1995 Capture Sites	
	n	Percent	n	Percent	n	Percent	n	Percent
Riparian	16	55.17	5	38.46	8	88.89	72	71.29
Bottom	4	13.79	3	23.08	1	11.11	22	21.78
Middle Slope	9	31.03	5	38.46	0	0.00	7	6.93
Upper Slope	0	0.00	0	0.00	0	0.00	0	0.00
Top	0	0.00	0	0.00	0	0.00	0	0.00
Pediment	0	0.00	0	0.00	0	0.00	0	0.00
Total	29		13		9		101	

Table 7. Occurrence of Preble's Mouse with Respect to Stream Distance

Range (m)	1996 All Sites		1996 B-4 Dam		1996 Lower Rock Creek		1995 Capture Sites	
	n	Percent	n	Percent	n	Percent	n	Percent
0-5	14	48.28	4	30.77	7	77.78	59	58.42
6-10	3	10.34	2	15.38	1	11.11	19	18.81
11-15	4	13.79	3	23.08	1	11.11	10	9.90
16-20	6	20.69	2	15.38	0	0.00	5	4.95
21-25	2	6.90	2	15.38	0	0.00	2	1.98
26-30	0	0.00	0	0.00	0	0.00	5	4.95
31-35	0	0.00	0	0.00	0	0.00	1	0.99
Total	29		13		9		101	

Table 8. Distance Measurements - Canopy Edge, Stream, and Embankment

	1996 All Sites			1996 B-4 Dam			1996 Lower Rock Creek			1995 Capture Sites		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Distance to Canopy Edge (m)	29	2.34	3.45	13	4.38	4.15	9	1.22	1.64	101	1.28	11.06
Distance to Stream (m)	29	9.52	7.62	13	11.46	8.24	9	5	4.5	101	7.4	8.03
Distance to Embankment (m)	29	8	7.77	13	9.31	9.21	9	4.33	3.04	101	3.94	4.29

Table 9. Occurrence of Preble's Mouse with Respect to Embankment Distance

Range (m)	1996 All Sites		1996 B-4 Dam		1996 Lower Rock Creek		1995 Capture Sites	
	n	Percent	n	Percent	n	Percent	n	95S %
0-5	15	51.72	7	53.85	5	55.56	70	69.31
6-10	5	17.24	1	7.69	4	44.44	21	20.79
11-15	4	13.79	2	15.38	0	0.00	9	8.91
16-20	3	10.34	1	7.69	0	0.00	1	0.99
21-25	2	6.90	2	15.38	0	0.00	0	0.00
Total	29		13		9		101	

Table 10. Summary of Distance to Canopy Edge Measurements for Preble's Mouse Records

Range (m)	1996 All Sites		1996 B-4 Dam		1996 Lower Rock Creek	
	n	Percent	n	Percent	n	Percent
0-5	26	89.66	10	76.92	9	100.00
6-10	1	3.45	1	7.69	0	0.00
11-15	2	6.90	2	15.38	0	0.00
Total	29		13		9	

Table 11. Primary Canopy Species Associated with Trap Sites

Canopy Species	1996 All Sites		1996 B-4 Dam		1996 Lower Rock Creek		1995 Capture Sites	
	n	Percent	n	Percent	n	Percent	n	Percent
<i>Salix exigua</i>	9	31.03	2	0.15	6	0.67	64	63.37
<i>Prunus virginiana</i>	8	27.59	6	0.46	1	0.11	1	0.99
<i>Symphoricarpos occidentalis</i>	8	27.59	3	0.23	1	0.11	4	3.96
<i>Rhus aromatica</i>	2	6.90	1	0.08	0	0.00	2	1.98
<i>Amorpha fruticosa</i>	1	3.45	0	0.00	1	0.11	21	20.79
<i>Populus deltoides</i>	1	3.45	1	0.08	0	0.00	1	0.99
<i>Crataegus erythropoda</i>	0	0.00	0	0.00	0	0.00	6	5.94
<i>Salix amygdaloides</i>	0	0.00	0	0.00	0	0.00	2	1.98
Total	29		13		9		101	

Table 12. 1996 Preble's Mouse Spring Vegetation Species Richness and Frequency at LRC-1 Capture Sites

Scientific Name	Species Code	Count	Frequency of Occurrence (Percent)
Shrubs			
<i>Salix exigua</i> Nutt. ssp. interior (Rowlee) Cronq.	SAEX1	7	77.78
<i>Symphoricarpos occidentalis</i> Hook.	SYOC1	7	77.78
<i>Amorpha fruticosa</i> L.	AMFR1	6	66.67
<i>Rosa arkansana</i> Porter	ROAR1	6	66.67
<i>Prunus virginiana</i> L.	PRVI1	3	33.33
<i>Crataegus erythropoda</i> Ashe	CRER1	1	11.11
<i>Prunus americana</i> Marsh.	PRAM1	1	11.11
<i>Ribes odoratum</i> Wendl.	RIOD1	1	11.11
<i>Salix irrorata</i> Andersson	SAIR1	1	11.11
Graminoids			
<i>Bromus japonicus</i> Thunb. ex Murr.	BRJA1	9	100.00
<i>Agropyron smithii</i> Rydb.	AGSM1	7	77.78
<i>Poa pratensis</i> L.	POPR1	7	77.78
<i>Bromus inermis</i> Leyss. ssp. inermis	BRIN1	5	55.56
<i>Poa compressa</i> L.	POCO1	5	55.56
<i>Agropyron repens</i> (L.) Beauv.	AGRE1	4	44.44
<i>Festuca pratensis</i> Huds.	FEPR1	2	22.22
<i>Juncus balticus</i> Willd.	JUBA1	2	22.22
Poaceae sp.	PO1	1	11.11
<i>Bouteloua gracilis</i> (H. B. K.) Lag ex Griffiths	BOGR1	1	11.11
<i>Bromus tectorum</i> L.	BRTE1	1	11.11
<i>Buchloe dactyloides</i> (Nutt.) Engelm.	BUDA1	1	11.11
<i>Carex eleocharis</i> Bailey	CAEL1	1	11.11
<i>Carex vulpinoides</i> Michx.	CAVU1	1	11.11
<i>Eleocharis macrostachya</i> Britt.	ELMA1	1	11.11
<i>Scirpus</i> sp.	SCI1	1	11.11
Forbs			
<i>Solidago missouriensis</i> Nutt.	SOMI1	8	88.89
<i>Achillea millefolium</i> L. ssp. lanulosa (Nutt.) Piper	ACMI1	7	77.78
<i>Galium aparine</i> L.	GAAP1	7	77.78
<i>Geranium caespitosum</i> James ssp. caespitosum James	GECA1	7	77.78
<i>Lepidium campestre</i> (L.) R. Br.	LECA1	7	77.78
<i>Tragopogon dubius</i> Scop.	TRDU1	7	77.78
<i>Alyssum minus</i> (L.) Rothmaler	ALMI1	6	66.67
<i>Ambrosia psilostachya</i> DC.	AMPS1	6	66.67
<i>Cirsium arvense</i> (L.) Scop.	CIAR1	6	66.67
<i>Artemisia ludoviciana</i> Nutt.	ARLU1	5	55.56
<i>Barbarea orthoceras</i> Ledeb.	BAOR1	5	55.56
<i>Monarda fistulosa</i> L.	MOFI1	5	55.56
<i>Plantago lanceolata</i> L.	PLLA1	4	44.44
<i>Rumex crispus</i> L.	RUCR1	4	44.44
<i>Taraxacum officinale</i> Weber	TAOF1	4	44.44
<i>Verbascum blattaria</i> L.	VEBL1	4	44.44
<i>Verbascum thapsus</i> L.	VETH1	4	44.44
<i>Grindelia squarrosa</i> (Pursh.) Dun.	GRSQ1	3	33.33
<i>Nasturtium officinale</i> R. Br.	NAOF1	3	33.33

Table 12. 1996 Preble's Mouse Spring Vegetation Species Richness and Frequency at LRC-1 Capture Sites (cont.)

Scientific Name	Species Code	Count	Frequency of Occurrence (Percent)
<i>Nepeta cataria</i> L.	NECA1	3	33.33
<i>Scrophularia lanceolata</i> Pursh.	SCLA2	3	33.33
<i>Veronica anagallis-aquatica</i> L.	VEAN1	3	33.33
<i>Carduus nutans</i> L.	CANU1	2	22.22
<i>Centaurea diffusa</i> Lam.	CEDI1	2	22.22
<i>Convolvulus arvensis</i> L.	COAR1	2	22.22
<i>Glycyrrhiza lepidota</i> Pursh.	GLLE1	2	22.22
<i>Hypericum perforatum</i> L.	HYPE1	2	22.22
<i>Lomatium orientale</i> Coult. & Rose	LOOR1	2	22.22
<i>Medicago lupulina</i> L.	MELU1	2	22.22
<i>Oenothera biennis</i> L.	OEBI1	2	22.22
<i>Onosmodium molle</i> Michx.	ONMO1	2	22.22
<i>Plantago major</i> L.	PLMA1	2	22.22
<i>Thermopsis rhombifolia</i> var. <i>divaricarpa</i> (Nels.) Isely	THRH1	2	22.22
<i>Thlaspi arvense</i> L.	THAR1	2	22.22
<i>Artemisia dracunculus</i> L.	ARDR1	1	11.11
<i>Aster laevis</i> L.	ASLA1	1	11.11
<i>Chrysopsis villosa</i> Pursh.	CHVI1	1	11.11
<i>Cynoglossum officinale</i> L.	CYOF1	1	11.11
<i>Descurainia pinnata</i> (Walt.) Britt.	DEPI1	1	11.11
<i>Epilobium ciliatum</i> Raf.	EPCI1	1	11.11
<i>Epilobium paniculatum</i> Nutt.	EPPA1	1	11.11
<i>Equisetum laevigatum</i> A. Br.	EQLA1	1	11.11
<i>Erigeron divergens</i> T. & G.	ERDI1	1	11.11
<i>Geum macrophyllum</i> Willd.	GEMA1	1	11.11
<i>Hydrophyllum fendleri</i> (Gray) Heller	HYFE1	1	11.11
<i>Lactuca serriola</i> L.	LASE1	1	11.11
<i>Mentha arvensis</i> L.	MEAR1	1	11.11
<i>Osmorhiza longistylis</i> (Torr.) DC var. <i>longistylis</i>	OSLO1	1	11.11
<i>Oxalis dillenii</i> Jacq.	OXDI1	1	11.11
<i>Phacelia heterophylla</i> Pursh.	PHHE1	1	11.11
<i>Potentilla gracilis</i> Dougl. ex Hook.	POGR1	1	11.11
<i>Scorzonera laciniata</i> L.	SCLA1	1	11.11
<i>Sonchus arvensis</i> L. ssp. <i>uglinosus</i> (Bieb.) Nyman	SOAR2	1	11.11
<i>Sphaeralcea coccinea</i> (Pursh.) Rydb.	SPCO1	1	11.11
Cacti			
<i>Opuntia humifusa</i> (Raf.) Raf.	OPHU1	5	55.56

Table 13. Preble's Mouse Capture Location Woody Plant Stem Densities

Scientific Name	Species Code	1996 All Sites		1996 B-4 Dam		1996 Lower Rock Creek	
		Total Number	Stem Density (stems/m ²)	Total Number	Stem Density (stems/m ²)	Total Number	Stem Density (stems/m ²)
<i>Symphoricarpos occidentalis</i> Hook.	SYOC1	5419	6.61	2876	7.83	943	3.71
<i>Salix exigua</i> Nutt. ssp. interior (Rowlee) Cronq.	SAEX1	1318	1.61	204	0.56	919	3.61
<i>Rosa arkansana</i> Porter	ROAR1	574	0.7	126	0.34	334	1.31
<i>Prunus virginiana</i> L.	PRVI1	162	0.2	59	0.16	49	0.19
<i>Amorpha fruticosa</i> L.	AMFR1	140	0.17			129	0.51
<i>Rhus aromatica</i> Ait. var. trilobata (Nutt.) A. Gray	RHAR1	97	0.12	33	0.09		
<i>Opuntia humifusa</i> (Raf.) Raf.	OPHU1	31	0.04	4	0.01	24	0.09
<i>Prunus americana</i> Marsh.	PRAM1	24	0.03			24	0.09
<i>Crataegus erythropoda</i> Ashe	CRER1	18	0.02			18	0.07
<i>Salix irrorata</i> Andersson	SAIR1	16	0.02			16	0.06
<i>Ribes odoratum</i> Wendl.	RIOD1	7	0.01			7	0.03
<i>Yucca glauca</i> Nutt.	YUGL1	4	0	1	0		
<i>Populus deltoides</i> Marsh. var. occidentalis Rydb.	PODE1	1	0				
<i>Salix amygdaloides</i> Anderss.	SAAM1	1	0	1	0		

Blank cells had no counts of stem densities for that species. Cells with 0 (zero) for stem densities were beyond the 3rd decimal place.

Table 14. Vegetation Community Tabular Summary - 1996 Lower Rock Creek Capture Site Spring Data

	Community Type												Total
	10	20	30	40	110	210	220	230	322	323	324	400	
Primary Community													
Count						5	1		3				9
Percent Counts						55.56	11.11		33.33				
Sum Cover						350	45		185				580
Percent Cover						60.34	7.76		31.90				
Secondary Community													
Count						1	3		4				8
Percent Counts						12.50	37.50		50.00				
Sum Cover						40	90		110				240
Percent Cover						16.67	37.50		45.83				
Tertiary Community													
Count				1				2	1		1		5
Percent Counts				20.00				40.00	20.00		20.00		
Sum Cover				20				23	30		5		78
Percent Cover				25.64				29.49	38.46		6.41		
Quarternary Community													
Count											1		1
Percent Counts											100.00		
Sum Cover											2		2
Percent Cover											100.00		
Totals													
Count				1		6	4	2	8		2		23
Percent A				4.35		26.09	17.39	8.70	34.78		8.70		
Percent B				11.11		66.67	44.44	22.22	88.89		22.222		
Sum				20		390	135	23	325		7		900
Percent C				2.22		43.33	15.00	2.56	36.11		0.78		

For explanation of community type numbers see Appendix B.

Count: Total number of occurrences of community type at this level.

Percent Counts: Percent of total classifications at this level.

Sum Cover: Total sum of cover amounts for this community type at this level.

Percent Cover: Overall percent cover of this community type at this level.

Percent A: Percent of total classifications.

Percent B: Percent occurrence in lots; e.g. 210 occurred in 67 percent of successful plots.

Percent C: Percent of area; e.g. 210 covered 43 percent of the surface area of successful plots.

Table 15. Preble's Mouse Canopy and Cover Summary

Canopy Type	1996 B-4 Dam				1996 Lower Rock Creek			
	n	Range	Mean	SD	n	Range	Mean	SD
Tree Canopy	13	0-40	4.62	11.27	9	0-1	0.22	0.67
Shrub Canopy	13	10-75	40	20.92	9	30-100	60.56	23.51
Foliar Cover	13	30-90	64.23	16.05	9	40-85	65	16.58
Ground Cover	13	10-84	51.31	24.94	9	5-40	15	12.5

Canopy Type	1996 All Sites				1995 Capture Sites			
	n	Range	Mean	SD	n	Range	Mean	SD
Tree Canopy	29	0-40	2.17	7.72	101	0-70	5.61	12.66
Shrub Canopy	29	10-100	51.03	22.42	101	0-90	40.9	23.59
Foliar Cover	29	30-90	65.34	15.41	101	10-90	47.97	18.03
Ground Cover	29	0-84	31.28	25.82	101	5-60	29.55	11.38

Range and mean values are in percent.

Table 16. 1996 Preble's Mouse Spring Vegetation Species Richness and Frequency at B-4 Dam Capture Sites

Scientific Name	Species Code	Count	Frequency of Occurrence (Percent)
Shrubs			
<i>Symphoricarpos occidentalis</i> Hook.	SYOC1	10	76.92
<i>Rosa arkansana</i> Porter	ROAR1	5	38.46
<i>Salix exigua</i> Nutt. ssp. <i>interior</i> (Rowlee) Cronq.	SAEX1	3	23.08
<i>Prunus virginiana</i> L.	PRVI1	3	23.08
<i>Rhus aromatica</i> Ait. var. <i>trilobata</i> (Nutt.) A. Gray	RHAR1	1	7.69
<i>Yucca glauca</i> Nutt.	YUGL1	1	7.69
Trees			
<i>Salix amygdaloides</i> Anderss.	SAAM1	1	7.69
Graminoids			
<i>Bromus inermis</i> Leyss. ssp. <i>inermis</i>	BRIN1	10	76.92
<i>Poa pratensis</i> L.	POPR1	9	69.23
<i>Agropyron smithii</i> Rydb.	AGSM1	6	46.15
<i>Stipa viridula</i> Trin.	STVI1	3	23.08
<i>Bromus japonicus</i> Thunb. ex Murr.	BRJA1	2	15.38
<i>Bromus tectorum</i> L.	BRTE1	2	15.38
<i>Koeleria pyramidata</i> (Lam.) Beauv.	KOPY1	2	15.38
<i>Agropyron repens</i> (L.) Beauv.	AGRE1	1	7.69
<i>Poa compressa</i> L.	POCO1	1	7.69
<i>Typha latifolia</i> L.	TYLA1	1	7.69
Forbs			
<i>Cirsium arvense</i> (L.) Scop.	CIAR1	10	76.92
<i>Solidago missouriensis</i> Nutt.	SOMI1	7	53.85
<i>Astragalus flexuosus</i> (Hook.) G. Don	ASFL1	6	46.15
<i>Lathyrus eucosmus</i> Butters and St. John	LAEU1	6	46.15
<i>Achillea millefolium</i> L. ssp. <i>lanulosa</i> (Nutt.) Piper	ACMI1	5	38.46
<i>Aster ericoides</i> L.	ASER1	5	38.46
<i>Barbarea orthoceras</i> Ledeb.	BAOR1	5	38.46
<i>Linaria dalmatica</i> (L.) Mill.	LIDA1	5	38.46
<i>Lomatium orientale</i> Coult. & Rose	LOOR1	5	38.46
<i>Senecio integerrimus</i> Nutt.	SEIN1	4	30.77
<i>Taraxacum officinale</i> Weber	TAOF1	4	30.77
<i>Artemisia ludoviciana</i> Nutt.	ARLU1	3	23.08
<i>Carduus nutans</i> L.	CANU1	3	23.08
<i>Galium aparine</i> L.	GAAP1	3	23.08
<i>Linum perenne</i> L. var. <i>lewisii</i> (Pursh.) Eat. & Wright	LIPE1	3	23.08
<i>Melilotus</i> sp.	MEL1	3	23.08
<i>Alyssum minus</i> (L.) Rothmaler	ALMI1	2	15.38
<i>Asclepias speciosa</i> Torr.	ASSP1	2	15.38
<i>Mertensia lanceolata</i> (Pursh.) A. DC.	MELA1	2	15.38
<i>Nepeta cataria</i> L.	NECA1	2	15.38
<i>Psoralea tenuiflora</i> Pursh.	PSTE1	2	15.38
<i>Rumex crispus</i> L.	RUCR1	2	15.38
<i>Antennaria microphylla</i> Rydb.	ANMI1	1	7.69
<i>Arnica fulgens</i> Pursh.	ARFU1	1	7.69
<i>Artemisia frigida</i> Willd.	ARFR1	1	7.69
<i>Astragalus drummondii</i> Dougl. ex Hook.	ASDR1	1	7.69

Table 16. 1996 Preble's Mouse Spring Vegetation Species Richness and Frequency at B-4 Dam Capture Sites (cont.)

Scientific Name	Species Code	Count	Frequency of Occurrence (Percent)
<i>Camelina microcarpa</i> Andr. ex DC.	CAMI1	1	7.69
<i>Comandra umbellata</i> (L.) Nutt.	COUM1	1	7.69
<i>Convolvulus arvensis</i> L.	COAR1	1	7.69
<i>Erigeron divergens</i> T. & G.	ERDI1	1	7.69
<i>Eriogonum alatum</i> Torr.	ERAL1	1	7.69
<i>Geum macrophyllum</i> Willd.	GEMA1	1	7.69
<i>Grindelia squarrosa</i> (Pursh.) Dun.	GRSQ1	1	7.69
<i>Gutierrezia sarothrae</i> (Pursh.) Britt. & Rusby	GUSA1	1	7.69
<i>Medicago lupulina</i> L.	MELU1	1	7.69
<i>Musineon divaricatum</i> (Pursh.) Nutt. ex T. & G.	MUDI1	1	7.69
<i>Oenothera brachycarpa</i> Gray	OEBR1	1	7.69
<i>Penstemon secundiflorus</i> Benth.	PESE1	1	7.69
<i>Thlaspi arvense</i> L.	THAR1	1	7.69
Cacti			
<i>Opuntia humifusa</i> (Raf.) Raf.	OPHU1	1	7.69
Vines			
<i>Toxicodendron rydbergii</i> (Small ex Rydberg) Greene	TORY1	1	7.69

Table 17. Vegetation Community Tabular Summary - 1996 B-4 Dam Capture Site Spring Data

	Community Type												Total
	10	20	30	40	110	210	220	230	322	323	324	400	
Primary Community													
Count						2	4	1	2		4		13
Percent Counts						15.38	30.77	7.69	15.38		30.77		
Sum Cover						100	215	60	115		300		790
Percent Cover						12.66	27.22	7.59	14.56		37.97		
Secondary Community													
Count					3		4	1	3		2		13
Percent Counts					23.08		30.77	7.69	23.08		15.38		
Sum Cover					80		50	45	120		60		355
Percent Cover					22.54		14.08	12.68	33.80		16.90		
Tertiary Community													
Count						1	1		1		4		7
Percent Counts						14.29	14.29		14.29		57.14		
Sum Cover						25	10		30		56		121
Percent Cover						20.66	8.26		24.79		46.28		
Quarternary Community													
Count							3						3
Percent Counts							100.00						
Sum Cover							9						9
Percent Cover							100.00						
Totals													
Count					3	3	12	2	6		10		36
Percent A					8.33	8.33	33.33	5.56	16.67		27.78		
Percent B					23.08	23.08	92.31	15.38	46.15		76.92		
Sum					80	125	284	105	265		416		1275
Percent C					6.27	9.80	22.27	8.24	20.78		32.63		

For explanation of community type numbers see appendix B.

Count: Total number of occurrences of community type at this level.

Percent Counts: Percent of total classifications at this level.

Sum Cover: Total sum of cover amounts for this community type at this level.

Percent Cover: Overall percent cover of this community type at this level.

Percent A: Percent of total classifications.

Percent B: Percent occurrence in lots; e.g. 210 occurred in 23 percent of successful plots.

Percent C: Percent of area; e.g. 210 covered 10 percent of the surface area of successful plots.

Table 18. 1996 Preble's Mouse Capture Site Vegetation Species Richness and Frequency Data

Scientific Name	Species Code	Count	Frequency of Occurrence (Percent)
Shrubs			
<i>Symphoricarpos occidentalis</i> Hook.	SYOC1	22	75.86
<i>Rosa arkansana</i> Porter	ROAR1	15	51.72
<i>Salix exigua</i> Nutt. ssp. interior (Rowlee) Cronq.	SAEX1	13	44.83
<i>Prunus virginiana</i> L.	PRVI1	10	34.48
<i>Amorpha fruticosa</i> L.	AMFR1	7	24.14
<i>Rhus aromatica</i> Ait. var. <i>trilobata</i> (Nutt.) A. Gray	RHAR1	3	10.34
<i>Yucca glauca</i> Nutt.	YUGL1	2	6.9
<i>Crataegus erythropoda</i> Ashe	CRER1	1	3.45
<i>Prunus americana</i> Marsh.	PRAM1	1	3.45
<i>Ribes odoratum</i> Wendl.	RIOD1	1	3.45
<i>Salix irrorata</i> Andersson	SAIR1	1	3.45
Trees			
<i>Populus deltoides</i> Marsh. var. <i>occidentalis</i> Rydb.	PODE1	1	3.45
<i>Salix amygdaloides</i> Anderss.	SAAM1	1	3.45
Graminoids			
<i>Poa pratensis</i> L.	POPR1	20	68.97
<i>Bromus inermis</i> Leyss. ssp. <i>inermis</i>	BRIN1	19	65.52
<i>Agropyron smithii</i> Rydb.	AGSM1	18	62.07
<i>Bromus japonicus</i> Thunb. ex Murr.	BRJA1	12	41.38
<i>Poa compressa</i> L.	POCO1	6	20.69
<i>Agropyron repens</i> (L.) Beauv.	AGRE1	5	17.24
<i>Koeleria pyramidata</i> (Lam.) Beauv.	KOPY1	5	17.24
<i>Stipa viridula</i> Trin.	STVI1	5	17.24
<i>Bromus tectorum</i> L.	BRTE1	3	10.34
<i>Juncus balticus</i> Willd.	JUBA1	3	10.34
<i>Buchloe dactyloides</i> (Nutt.) Engelm.	BUDA1	2	6.9
<i>Festuca pratensis</i> Huds.	FEPR1	2	6.9
Poaceae sp.	PO1	1	3.45
<i>Bouteloua gracilis</i> (H. B. K.) Lag ex Griffiths	BOGR1	1	3.45
<i>Carex eleocharis</i> Bailey	CAEL1	1	3.45
<i>Carex vulpinoidea</i> Michx.	CAVU1	1	3.45
<i>Eleocharis macrostachya</i> Britt.	ELMA1	1	3.45
Scirpus sp.	SCI1	1	3.45
<i>Typha latifolia</i> L.	TYLA1	1	3.45
Forbs			
<i>Cirsium arvense</i> (L.) Scop.	CIAR1	22	75.86
<i>Solidago missouriensis</i> Nutt.	SOMI1	19	65.52
<i>Achillea millefolium</i> L. ssp. <i>lanulosa</i> (Nutt.) Piper	ACMI1	16	55.17
<i>Barbarea orthoceras</i> Ledeb.	BAOR1	13	44.83
<i>Galium aparine</i> L.	GAAP1	13	44.83
<i>Artemisia ludoviciana</i> Nutt.	ARLU1	11	37.93
<i>Lepidium campestre</i> (L.) R. Br.	LECA1	10	34.48
<i>Lomatium orientale</i> Coult. & Rose	LOOR1	10	34.48
<i>Alyssum minus</i> (L.) Rothmalder	ALMI1	9	31.03
<i>Astragalus flexuosus</i> (Hook.) G. Don	ASFL1	9	31.03
<i>Lathyrus eucosmus</i> Butters and St. John	LAEU1	9	31.03

Table 18. 1996 Preble's Mouse Capture Site Vegetation Species Richness and Frequency Data (cont.)

Scientific Name	Species Code	Count	Frequency of Occurrence (Percent)
<i>Taraxacum officinale</i> Weber	TAOF1	9	31.03
<i>Geranium caespitosum</i> James ssp. <i>caespitosum</i> James	GECA1	8	27.59
<i>Linaria dalmatica</i> (L.) Mill.	LIDA1	8	27.59
<i>Nepeta cataria</i> L.	NECA1	8	27.59
<i>Rumex crispus</i> L.	RUCR1	8	27.59
<i>Ambrosia psilostachya</i> DC.	AMPS1	7	24.14
<i>Aster ericoides</i> L.	ASER1	7	24.14
<i>Carduus nutans</i> L.	CANU1	7	24.14
<i>Senecio integerrimus</i> Nutt.	SEIN1	7	24.14
<i>Tragopogon dubius</i> Scop.	TRDU1	7	24.14
<i>Verbascum thapsus</i> L.	VETH1	7	24.14
<i>Linum perenne</i> L. var. <i>lewisii</i> (Pursh.) Eat. & Wright	LIPE1	5	17.24
<i>Monarda fistulosa</i> L.	MOFI1	5	17.24
<i>Thlaspi arvense</i> L.	THAR1	5	17.24
<i>Grindelia squarrosa</i> (Pursh.) Dun.	GRSQ1	4	13.79
<i>Melilotus</i> sp.	MEL1	4	13.79
<i>Nasturtium officinale</i> R. Br.	NAOF1	4	13.79
<i>Plantago lanceolata</i> L.	PLLA1	4	13.79
<i>Verbascum blattaria</i> L.	VEBL1	4	13.79
<i>Veronica anagallis-aquatica</i> L.	VEAN1	4	13.79
<i>Centaurea diffusa</i> Lam.	CEDI1	3	10.34
<i>Comandra umbellata</i> (L.) Nutt.	COUM1	3	10.34
<i>Convolvulus arvensis</i> L.	COAR1	3	10.34
<i>Cynoglossum officinale</i> L.	CYOF1	3	10.34
<i>Geum macrophyllum</i> Willd.	GEMA1	3	10.34
<i>Glycyrrhiza lepidota</i> Pursh.	GLLE1	3	10.34
<i>Medicago lupulina</i> L.	MELU1	3	10.34
<i>Mertensia lanceolata</i> (Pursh.) A. DC.	MELA1	3	10.34
<i>Psoralea tenuiflora</i> Pursh.	PSTE1	3	10.34
<i>Scrophularia lanceolata</i> Pursh.	SCLA2	3	10.34
<i>Thermopsis rhombifolia</i> var. <i>divaricarpa</i> (Nels.) Isely	THRH1	3	10.34
<i>Arnica fulgens</i> Pursh.	ARFU1	2	6.9
<i>Artemisia frigida</i> Willd.	ARFR1	2	6.9
<i>Asclepias speciosa</i> Torr.	ASSP1	2	6.9
<i>Descurainia pinnata</i> (Walt.) Britt.	DEPI1	2	6.9
<i>Epilobium ciliatum</i> Raf.	EPCI1	2	6.9
<i>Erigeron divergens</i> T. & G.	ERDI1	2	6.9
<i>Hypericum perforatum</i> L.	HYPE1	2	6.9
<i>Mentha arvensis</i> L.	MEAR1	2	6.9
<i>Oenothera biennis</i> L.	OEBI1	2	6.9
<i>Oenothera brachycarpa</i> Gray	OEBR1	2	6.9
<i>Onosmodium molle</i> Michx.	ONMO1	2	6.9
<i>Plantago major</i> L.	PLMA1	2	6.9
<i>Antennaria microphylla</i> Rydb.	ANMI1	1	3.45
<i>Artemisia dracunculus</i> L.	ARDR1	1	3.45
<i>Aster laevis</i> L.	ASLA1	1	3.45
<i>Astragalus drummondii</i> Dougl. ex Hook.	ASDR1	1	3.45

Table 18. 1996 Preble's Mouse Capture Site Vegetation Species Richness and Frequency Data (cont.)

Scientific Name	Species Code	Count	Frequency of Occurrence (Percent)
<i>Camelina microcarpa</i> Andr. ex DC.	CAMI1	1	3.45
<i>Chrysopsis villosa</i> Pursh.	CHVI1	1	3.45
<i>Epilobium paniculatum</i> Nutt.	EPPA1	1	3.45
<i>Equisetum laevigatum</i> A. Br.	EQLA1	1	3.45
<i>Erigeron flagellaris</i> A. Gray	ERFL1	1	3.45
<i>Eriogonum alatum</i> Torr.	ERAL1	1	3.45
<i>Erysimum asperum</i> (Nutt.) DC.	ERAS1	1	3.45
<i>Gutierrezia sarothrae</i> (Pursh.) Britt. & Rusby	GUSA1	1	3.45
<i>Hydrophyllum fendleri</i> (Gray) Heller	HYFE1	1	3.45
<i>Lactuca serriola</i> L.	LASE1	1	3.45
<i>Musineon divaricatum</i> (Pursh.) Nutt. ex T. & G.	MUDI1	1	3.45
<i>Osmorhiza longistylis</i> (Torr.) DC var. <i>longistylis</i>	OSLO1	1	3.45
<i>Oxalis dillenii</i> Jacq.	OXDI1	1	3.45
<i>Penstemon secundiflorus</i> Benth.	PESE1	1	3.45
<i>Phacelia heterophylla</i> Pursh.	PHHE1	1	3.45
<i>Potentilla gracilis</i> Dougl. ex Hook.	POGR1	1	3.45
<i>Ranunculus macounii</i> Britt.	RAMA1	1	3.45
<i>Scorzonera laciniata</i> L.	SCLA1	1	3.45
<i>Sonchus arvensis</i> L. ssp. <i>uglinosus</i> (Bieb.) Nyman	SOAR2	1	3.45
<i>Sphaeralcea coccinea</i> (Pursh.) Rydb.	SPCO1	1	3.45
Cacti			
<i>Opuntia humifusa</i> (Raf.) Raf.	OPHU1	7	24.14
Vines			
<i>Toxicodendron rydbergii</i> (Small ex Rydberg) Greene	TORY1	1	3.45

Table 19. Vegetation Community Tabular Summary - 1996 Spring Capture Site Data

	10	20	30	40	110	Community Type						Total	
						210	220	230	322	323	324	400	
Primary Community													
Count						8	9	2	6		4		29
Percent Counts						27.59	31.03	6.90	20.69		13.79		
Sum Cover						500	480	110	360		300		1750
Percent Cover						28.57	27.43	6.29	20.57		17.14		
Secondary Community													
Count					3	2	7	2	12		2		28
Percent Counts					10.71	7.14	25.00	7.14	42.86		7.14		
Sum Cover					80	60	165	85	425		60		875
Percent Cover					9.14	6.86	18.86	9.71	48.57		6.86		
Tertiary Community													
Count	1			1		2	3	2	2		7		18
Percent Counts	5.56			5.56		11.11	16.67	11.11	11.11		38.89		
Sum Cover	10			20		45	35	23	60		71		264
Percent Cover	3.79			7.58		17.05	13.26	8.71	22.73		26.89		
Quarternary Community													
Count							3				1		4
Percent Counts							75.00				25.00		
Sum Cover							9				2		11
Percent Cover							81.82				18.18		
Totals													
Count	1			1	3	12	22	6	20		14		79
Percent A	1.27			1.27	3.80	15.19	27.85	7.59	25.32		17.72		
Percent B	3.44828			3.44828	10.3448	41.3793	75.8621	20.6897	68.9655		48.2759		
Sum	10			20	80	605	689	218	845		433		2900
Percent C	0.34			0.69	2.76	20.86	23.76	7.52	29.14		14.93		

For explanation of community type numbers see Appendix B.

Count: Total number of occurrences of community type at this level.

Percent Counts: Percent of total classifications at this level.

Sum Cover: Total sum of cover amounts for this community type at this level.

Percent Cover: Overall percent cover of this community type at this level.

Percent A: Percent of total classifications.

Percent B: Percent occurrence in lots; e.g. 210 occurred in 41 percent of successful plots.

Percent C: Percent of area; e.g. 210 covered 21 percent of the surface area of successful plots.

Table 20. 1996 Spring Capture Trapsite Habitat Characterization Data

sampsite	trapsite	hab1	cov1	hab2	cov2	hab3	cov3	hab4	cov4	trapsuc	can_spec	treecan
9605A	1	220	70	210	20	010	10		0	TRUE	SYOC1	0
9605A	22	220	50	322	30	210	20		0	TRUE	SYOC1	0
9609A	1	210	50	322	40	220	10		0	TRUE	SAEX1	.1
9643A	5	220	50	322	45	324	5		0	TRUE	SYOC1	0
9643A	5	220	50	322	45	324	5		0	TRUE	SYOC1	0
9643A	7	230	50	322	35	220	15		0	TRUE	PRVI1	0
9643A	8	322	60	230	40		0		0	TRUE	RHAR1	0
LRC1	C10	210	100			0	0		0	TRUE	SAEX1	0
LRC1	C9	210	55	322	45		0		0	TRUE	SAEX1	0
LRC1	E8	210	65	322	15	040	20		0	TRUE	SAEX1	0
LRC1	G5	220	45	322	40	230	13	324	2	TRUE	SYOC1	0
LRC1	G9	322	60	220	30	230	10		0	TRUE	PRVI1	0
LRC1	H3	210	90	322	10		0		0	TRUE	SAEX1	0
LRC1	I2	322	60	210	40		0		0	TRUE	SAEX1	0
LRC1	I3	210	40	220	30	322	30		0	TRUE	AMFR1	2
LRC1	J3	322	65	220	30	324	5		0	TRUE	SAEX1	0
WBP2 (B-4)	B4	324	80	220	20		0		0	TRUE	PRVI1	0
WBP2 (B-4)	B4	324	80	220	20		0		0	TRUE	PRVI1	0
WBP2 (B-4)	C3	324	50	220	25	210	25		0	TRUE	SYOC1	0
WBP2 (B-4)	C4	230	60	110	20	324	15	220	5	TRUE	PRVI1	40
WBP2 (B-4)	D3	210	50	110	30	324	18	220	2	TRUE	SAEX1	10
WBP2 (B-4)	D3	210	50	110	30	324	18	220	2	TRUE	SAEX1	10
WBP2 (B-4)	D5	220	75	322	20	324	5		0	TRUE	PRVI1	0
WBP2 (B-4)	E5	220	50	322	50		0		0	TRUE	PRVI1	0
WBP2 (B-4)	E5	220	50	322	50		0		0	TRUE	PRVI1	0
WBP2 (B-4)	F4	220	40	324	30	322	30		0	TRUE	PODE1	0
WBP2 (B-4)	H5	322	55	230	45		0		0	TRUE	RHAR1	0
WBP2 (B-4)	J3	324	90	220	10		0		0	TRUE	SYOC1	0
WBP2 (B-4)	J4	322	60	324	30	220	10		0	TRUE	SYOC1	0

Sampsite: Sampling location

Trapsite: Trapping station number

Hab1: Habitat type providing greatest cover in plot. See Appendix B for habitat code types.

Cov1: Percent cover provided by hab1.

Hab2: Habitat type providing second greatest cover in plot.

Cov2: Percent cover provided by hab2.

Hab3: Habitat type providing the third greatest cover in plot.

Cov3: Percent cover provided by hab1.

Hab4: Habitat type providing the fourth greatest cover in plot.

Cov4: Percent cover provided by hab1.

Trapsuc: Whether capture occurred at trapsite or not.

Can_spec: Woody plant species of nearest contiguous canopy.

Treecan: Percent cover of tree layer above plot.

MEAN	2.172414
S.D.	7.718572

Table 20. 1996 Spring Capture Trapsite Habitat Characterization Data (cont.)

sampsite	trapsite	shrbcan	folcov	grndcov	litcov	stdist	emdist	dce	ang	asp	slopo	moist	burro
9605A	1	90	50	0	M	4	4	0	4	146	R	M	M
9605A	22	60	70	15	M	5	1	0	5	133	R	M	M
9609A	1	60	85	5	H	1	0	0	5	54	R	M	H
9643A	5	50	80	20	L	19	19	0	22	320	M	M	M
9643A	5	50	80	20	L	19	19	0	22	320	M	M	M
9643A	7	65	50	20	L	17	14	0	22	338	M	M	M
9643A	8	40	60	25	L	17	15	0	22	320	M	M	M
LRC1	C10	100	40	40	L	1	8	0	3	42	R	U	H
LRC1	C9	50	80	10	M	2	1	0	12	307	R	M	M
LRC1	E8	65	60	10	L	1	2	1	2	68	R	U	M
LRC1	G5	60	80	5	M	15	2	0	5	307	R	M	M
LRC1	G9	40	60	10	H	9	7	4	8	222	B	M	M
LRC1	H3	90	50	20	M	5	8	0	1	342	R	M	L
LRC1	I2	40	50	30	L	5	2	1	1	22	R	M	M
LRC1	I3	70	85	5	L	3	7	1	8	68	R	M	M
LRC1	J3	30	80	5	M	4	2	4	2	58	R	M	M
WBP2 (B-4)	B4	20	80	68	H	11	2	4	3	40	B	M	M
WBP2 (B-4)	B4	20	80	68	H	11	2	4	3	40	B	M	M
WBP2 (B-4)	C3	30	50	44	M	1	1	2	10	160	R	M	H
WBP2 (B-4)	C4	70	30	84	H	8	5	0	2	50	R	M	H
WBP2 (B-4)	D3	50	70	69	H	3	1	1	1	40	R	M	H
WBP2 (B-4)	D3	50	70	69	H	3	1	1	1	40	R	M	H
WBP2 (B-4)	D5	75	90	50	M	20	20	4	40	300	M	M	H
WBP2 (B-4)	E5	50	50	70	H	25	25	5	30	330	M	M	H
WBP2 (B-4)	E5	50	50	70	H	25	25	5	30	330	M	M	H
WBP2 (B-4)	F4	40	70	15	M	13	12	6	11	326	B	M	M
WBP2 (B-4)	H5	45	65	10	L	17	15	0	16	332	M	M	M
WBP2 (B-4)	J3	10	70	20	M	3	3	14	8	282	R	M	M
WBP2 (B-4)	J4	10	60	30	M	9	9	11	19	316	M	M	M
	MEAN	51.03448	65.34483	31.27586		9.517241	8	2.344828	10.96552				
	S.D.	22.41569	15.40704	25.82205		7.618683	7.773582	3.44628	10.61832				

Sampsite: Sampling location

Trapsite: Trapping station number

Shrbcan: Percent cover of shrub layer above plot.

Folcov: Percent cover of foliar herbaceous layer above plot.

Litcov: Amount of litter in plot.

Stdist: Distance (m) from trapsite to stream.

Emdist: Distance (m) from trapsite to nearest embankment.

Dce: Distance to nearest continuous canopy edge.

Ang: Slope angle (degrees).

Asp: Slope aspect (degrees).

Slopo: Slope position.

Moist: Soil moisture category.

Burro: Burrowing opportunities.

Appendix A

**Data Management and
Quality Assurance**

DATA MANAGEMENT AND QUALITY ASSURANCE

TRAPPING

Capture data were recorded only on approved field data sheets entitled "Small Mammal Trapping Form." Once completed, the forms were signed and dated by the data recorder. This signature and date serves as a QA check and signifies that the field data sheets have been filled out completely and correctly.

All capture data were entered into an electronic database the week they were collected. A file was developed specifically for these data and was incorporated into the Ecology Database. Verification must ensure that there is 100 percent agreement for "essential" fields. Validation must ensure that there is a 90 percent agreement of 20 percent of the records for all fields. Each step of the data entry process, including verification and validation, was documented by a signature or initials and a date.

Examples of photographs, as required by the U.S. Fish and Wildlife Service guidelines for Preble's mouse surveys (USFWS 1995), are provided in Attachment B. Photographs of each individual captured at the Site in Spring 1996 are on file with the Site Ecology Group and are available on request.

HABITAT CHARACTERIZATION

Habitat characterization data were recorded only on approved field data sheets. The approved field data sheets for microsite habitat characterization are "Small Mammal Vegetation Species Richness Forms" and "Preble's Meadow Jumping Mouse Supplemental Habitat Characterization Forms." Macrosite habitat characterization data were sketched on grid forms and signed or initialed and dated by the data recorder. This signature, or the initials and date, serves as a QA check and signifies that the field data sheets have been filled out completely and correctly. Once completed, the grid sketches were digitized into the site GIS system, with each vegetation stratum being an overlay.

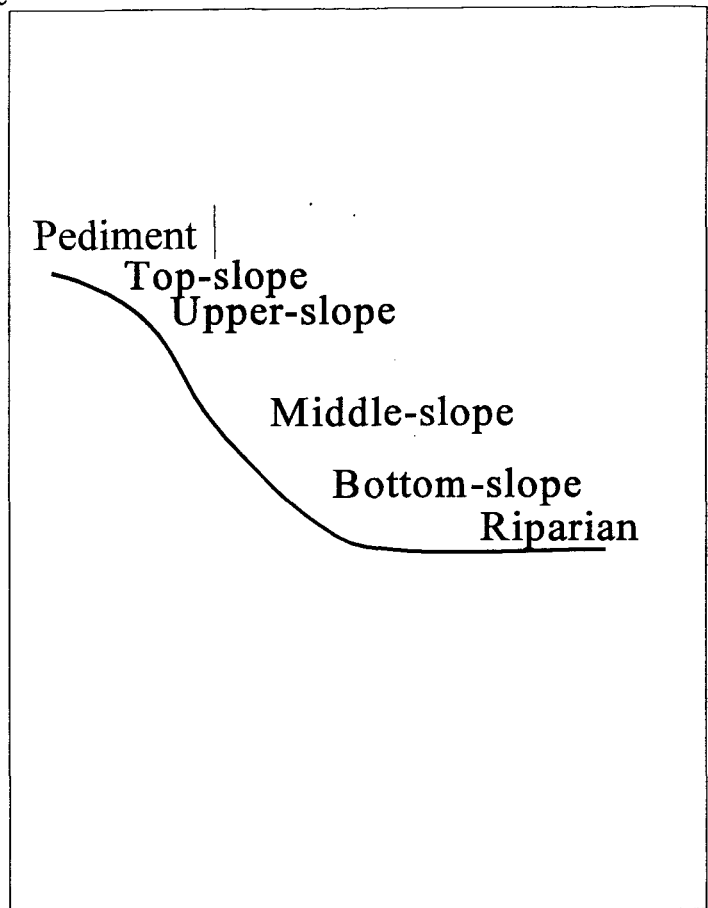
All habitat characterization data were entered into the database within a few weeks of collection. Two files, one for microsite information and one for macrosite information, were developed specifically for this purpose and became part of the Ecology Database. Verification ensured that there is 100 percent agreement for "essential" fields. Validation ensured that there is a 90 percent agreement of 20 percent of the records for all fields. Each step of the data entry process, including verification and validation, has been documented by a signature or initials and a date.

Appendix B

Habitat Code Explanations

Appendix B - Habitat Code Explanations

<u>Habcode</u>	<u>Habitat Type</u>
10	Wet Meadow/Marsh Ecotone
20	Short Marsh
30	Tall Marsh
40	Streams and Rivers
110	Riparian Woodland
210	Riparian Shrubland
220	Short Upland Shrubland
230	Tall Upland Shrubland
322	Mesic Mixed Grassland
323	Xeric Mixed Grassland
324	Reclaimed Grassland
400	Disturbance Area



Slope Positions

Attachment A

**Photographs of Preble's
Meadow Jumping Mice
Captured at the Rocky
Flats Environmental
Technology Site Buffer
Zone, Spring 1996**

**PHOTOGRAPHS OF PREBLE'S MEADOW JUMPING
MICE CAPTURED AT THE ROCKY FLATS
ENVIRONMENTAL TECHNOLOGY SITE BUFFER
ZONE, SPRING 1996**

Figure A-1: Adult male from the Walnut Creek B-series transect Z96-43A, marked #37

Figure A-2: Adult male from the Walnut Creek B-series transect Z96-43A, marked #71

Figure A-3: Juvenile male from the Walnut Creek A-series transect Z96-05A, marked #54

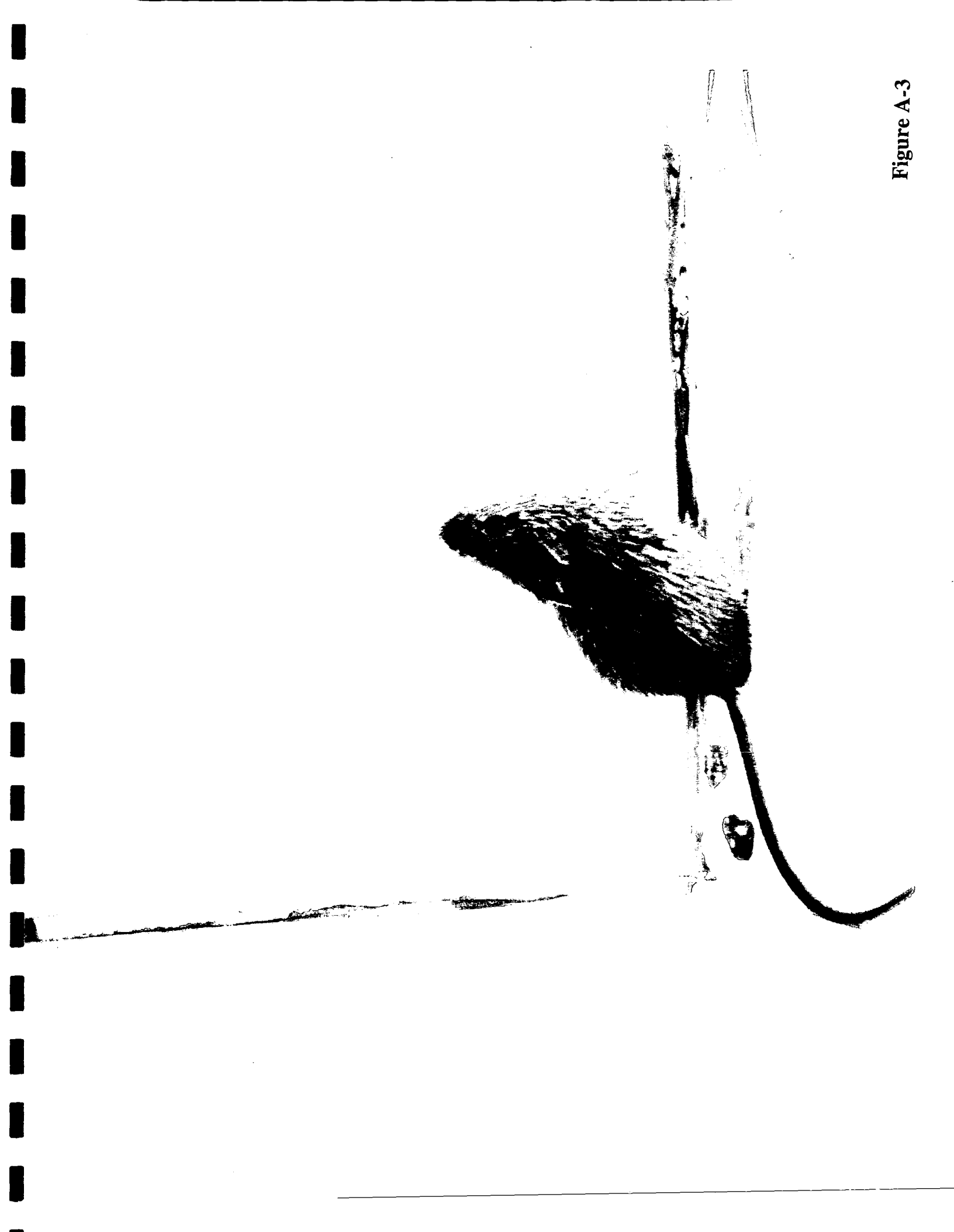
Figure A-1



Figure A-2



Figure A-3



Attachment B

**Preliminary Preble's
Meadow Jumping Mouse
Habitat Characteristics for
the Site**

PRELIMINARY PREBLE'S MEADOW JUMPING MOUSE HABITAT CHARACTERISTICS FOR THE SITE

GENERAL SPRING PREBLE'S MEADOW JUMPING MOUSE HABITAT DESCRIPTION

A general synopsis of the Preble's meadow jumping mouse habitat requirements at the Site based on the spring 1996 habitat characterization data would indicate that the mouse is most likely to be found on gentle to moderate north-facing slopes, within or in close proximity to multi-strata vegetation consisting of at least herbaceous and shrub canopy layers. This multi-strata vegetation is found along or near stream drainages. A tree layer may or may not be present. The most commonly associated shrub species would be *Salix exigua*, *Prunus virginiana*, and *Symphoricarpos occidentalis*. In addition, the Preble's meadow jumping mouse would be found within 25 m of the stream and embankments in the area, would most likely occur on the riparian slope position, and would only occur at higher slope positions where a shrub canopy is present providing at least 40 percent cover and within 5 m of a continuous shrub canopy.

GENERAL HABITAT PARAMETERS FOR SPRING AND FALL SEASONS

The following table of the general range of values for different measures is provided to serve as a first step in determining the habitat requirements for the Preble's meadow jumping mouse at the Site. NOTE: These two seasons of data are not directly comparable, because the actual trapping locations on the Site were in different areas.

	Spring 1996	Fall 1995
Slope Angle (°)	1-40	1-65
Slope Aspect	see Figure 3	see Figure 3
Slope Position	R, B, M	R, B, M
Distance to Stream (m)	0-25 (9.5)	0-35 (8.6)
Distance to Embankment (m)	0-25 (8)	0-20 (4.1)
Distance to Canopy Edge (m)	0-15 (2.3)	0-73 (7.7)
Stem Densities (stems/m ²)		
<i>Symphoricarpos occidentalis</i>	6.61	3.1
<i>Salix exigua</i>	1.61	2.89
<i>Rosa arkansana</i>	0.7	0.91
<i>Prunus virginiana</i>	0.2	0.47
<i>Amorpha fruticose</i>	0.17	0.59
<i>Rhus aromatica</i>	0.12	0.02
Tree and Shrub Canopy Cover (%)	46-68	70
Herbaceous Canopy Cover (%)	32-53	30
Tree Canopy (%)	0-40 (2.2)	0-70 (10.8)
Shrub Canopy (%)	10-100 (51)	0-80 (46.8)
Foliar Canopy (%)	30-90 (65.3)	30-80 (49.3)

R=Riparian, B=Bottom, M=Middle Slope, number in ()=Mean