

## Small Mammal Trapping in Successional Habitats: 2002 Progress Report Kanuti NWR Progress Report FY03-02

**Project:** Small mammal trapping in successional habitats  
**Location:** "Mouse" Lake (66E 18.8' N x 151E 45.02' W)  
**Dates:** Aug.19-23, 2002  
**Participants:** Lisa Saperstein, Harvey Williams, Curtis Knight, Ben Soiseth  
**Transportation:** Commercial flight Fairbanks-Bettles, 2 chartered Beaver aircraft (Brooks Range Aviation) Bettles-Mouse Lake  
**Author:** Lisa Saperstein

### *Abstract*

Small mammals were trapped between August 19-23, 2002 on four trapping grids established in 1991 and 1993 following a 1990 fire on Kanuti National Wildlife Refuge (NWR). Grids 1 and 2 (G1 and G2) are in burned mixed white spruce/paper birch (*Picea glauca/Betula papyrifera*) forest and G3 and G4 are in burned black spruce (*Picea mariana*). Grids have been trapped annually, with a few exceptions, since they were established. Each grid consists of 100 trapping stations separated by 10 m intervals, and each station is set with two snap traps and one cone pitfall trap. Each grid is trapped for three trap nights (TN).

A total of 494 animals were captured on all four grids. Grid 4 was the most productive, with 166 captures, followed by G3 (124 captures), G2 (105 captures), and G1 (99 captures). Preliminary species composition, pending verification from the University of Alaska Fairbanks (UAF) Museum, was 385 yellow-cheeked voles (*Microtus xanthognathus*, 78%), 21 shrews (*Sorex* spp., 4%), 71 red-backed voles (*Clethrionomys rutilus*, 14%), 16 brown lemmings (*Lemmus trimucronatus*, 3%), and 1 unidentified vole (*Microtus* spp., <1%).

### *Introduction*

A trapping project was initiated on the Kanuti NWR in 1991 to monitor changes in small mammal communities in two habitats following a 1990 wildland fire. Small mammals are important prey for a variety of carnivores ranging from furbearers to raptors. Fire plays a major role in the ecology of Kanuti NWR by creating mosaics of different aged habitats and influencing the wildlife species that use them. Since 1950, 3,157 km<sup>2</sup> ( 48%) of the 6,625 km<sup>2</sup> refuge has burned, and 2,602 km<sup>2</sup> of this burned in 1990 and 1991 (Saperstein 2002). This project is unique to interior Alaska (Interior) in that trapping began one year following fire and has continued for the past 11 years. Most small mammal trapping projects in the Interior have focused on a gradient of different aged forest stands ranging from about three years post-fire to mature forest, and trapping only occurred for a few years (West 1979, Johnson et al. 1995, Lehmkuhl 2000). Trapping was initiated one year post-fire in burned lichen woodland habitat in Gates of the Arctic National Park, but the grid was only trapped for three years (Swanson 1996). Small mammals have been trapped as part of the Frostfire prescribed burn research project outside of Fairbanks, but this is a relatively new effort with only preliminary results (Rexstad 1998 website: [http://mercury.bio.uaf.edu/~eric\\_rexstad/frostfire.htm](http://mercury.bio.uaf.edu/~eric_rexstad/frostfire.htm)).

The original objectives of the Kanuti NWR small mammal study were (Martin 1992):

- 1) Determine if small mammal populations vary over time in different vegetation types after wildland fire;
- 2) Relate changes in small mammal populations to changes in vegetation determined from intensive vegetation plots;
- 3) Predict effects of wildland fire in different vegetation types on small mammal populations, and extrapolate those results to estimate effects of wildfire on marten (*Martes americana*) populations;
- 4) Collect small mammal study skins and frozen tissue samples for the museum at the University of Alaska-Fairbanks. The frozen tissues will be used for genetic and environmental pollution studies.

To date, this study primarily addresses Objectives 1 and 4. A post-fire vegetation monitoring project was also initiated in 1991, and two of the study sites are located within trapping grids. Data from the vegetation study are currently being analyzed and will later be used to address Objective 2. Objective 3 is beyond the scope of the current study for a number of reasons, including the fact that only two broad vegetation types were included, no data are available about the habitat prior to the fire, no data are available about the marten population on the refuge, and nothing is known about small mammals outside of the current study site. Specimens trapped during the course of this study have been provided to the UAF Museum as prescribed in Objective 4. Specimens have not been used in other studies, but they are available for research in the future.

### *Methods*

A four person crew was transported to Mouse Lake in two Beaver floatplanes on August 19. After establishing camp, the crew split into two teams and set up two of the four trapping grids according to instructions in the draft Kanuti NWR Wildlife Inventory Plan (Saperstein 2001a). The remaining grids were set up the following afternoon. Each grid consists of 100 trapping stations at 10 m intervals, and each station is equipped with two Museum Special snap traps and one conical pitfall trap. Traps were set within 1.5 m of the metal poles marking the trapping station and were strategically placed along small mammal runs and other areas deemed likely to have high trapping success. Grids were checked for three consecutive trap nights. Trapped animals were stored in plastic bags, one bag per station, for transport back to camp. Each bag was marked with the date, grid, station, species, and trap type. This information was also recorded in waterproof notebooks along with information about whether a trap was sprung but empty, missing traps, and miscellaneous observations. Animals found alive in traps were released if they had not suffered life threatening injuries, but information about the capture was recorded in the notebooks.

Most specimens were preserved in ethanol, but some caught during the last two days were frozen upon return to the refuge field station in Bettles. A uniquely numbered "AF" sheet from the UAF Museum was filled out for each specimen listing date, grid, station, species, trap type, and preservation method. The AF number was recorded on a tag in alcohol-proof ink and tied to the right foot of each specimen. Alcohol preservation required additional processing. Specimens were weighed (weight recorded on AF sheet) and cut open ventrally from anus to sternum prior to immersion in the alcohol. All specimens were provided to the UAF Museum for verification of species identification, recording of additional morphological and sex information when possible, and entry of data into the Museum database.

A 55 gallon drum with a bear-proof locking top was transported to each grid using a portable stretcher for storage of cone traps on site. Previously, cone traps had been transported back and forth to Bettles or, for the last two years, left at camp in duffel bags due to their excess weight in the plane (Saperstein 2001b). The barrels will provide more protection than the duffel bags and could also be used to store flagging and other material. Wooden snap traps were transported back to Bettles to avoid the potential of mold growth if left in the barrels.

### Results

Weather during the trapping session was mostly clear but cool, with temperatures occasionally dropping below freezing in the evenings. Crews woke to find that water had frozen in their water bottles, but the days were pleasantly warm once the sun came out. There were periods of high winds, particularly in the afternoon, that created whitecaps in the lake and made it difficult to paddle the inflatable kayaks.

A total of 494 animals were captured on all four grids (Table 1), the second largest number of animals caught since the project started and an increase of 153 captures compared to 2001 (Fig. 2). Preliminary species composition, pending verification from the UAF Museum, was 385 yellow-cheeked voles (*Microtus xanthognathus*, 78%), 21 shrews (*Sorex* spp., 4%), 71 red-backed voles (*Clethrionomys rutilus*, 14%), 16 brown lemmings (*Lemmus trimucronatus*, 3%), and 1 unidentified vole (*Microtus* spp., <1%). Five yellow-cheeked voles and two red-backed voles were found alive in traps and were released. Thirteen birds were killed in snap traps: four white-crowned sparrows (*Zonotrichia leucophrys*), five gray jays (*Perisoreus canadensis*), and four unidentified sparrows. One gray jay was released unhurt.

The total number of small mammals trapped has been similar since all four grids were established in 1993, with peaks in 1997 and 2002 and a low in 1994 (Fig. 2). Few animals were trapped in 1991 and 1992, which was soon after the fire when only two grids (1 and 3) were operational. Species composition has changed over time, however. Yellow-cheeked voles have comprised a major proportion of captures since 1997 but were rarely caught prior to that. The 2002 trapping effort resulted in the most yellow-cheeks caught to date. Conversely, other species of *Microtus* (primarily meadow vole [*M. pennsylvanicus*] with some tundra vole [*M. oeconomus*]) have declined dramatically since 1999, and only one *Microtus* spp. was caught this year. Shrews also declined notably in 2002 compared to previous years. The highest number of red-backed voles were caught this year since 1993.

In 2002, the two black spruce grids were the most productive with 166 captures on G4 and 124 captures on G3. There were 105 captures on G2 and 99 on G1. In addition to having the most captures, G4 and G3 also produced the most yellow-cheeked voles at 148 and 102 captures, respectively, followed by 69 captures on G2 and 66 on G1 (Table 2). In 2001, G1 and G4 produced the highest number of yellow-cheeked voles at 60 individuals each. Over half of the 71 red-backed voles were caught on G1 (20 voles) and G2 (24 voles)(Table 2). Shrew numbers were considerably lower than in previous years with a total of 21 caught on all grids (Table 2, Figure 2). In 2001, each grid produced at least 20 shrews, while in 2002 captures ranged between two to eight per grid. The 16 brown lemmings were distributed in low numbers among Grids 1, 2, and 4; none were trapped on G3 (Table 2).

Total captures declined each night on Grids 2, 3, and 4 (Fig. 3), as expected for removal experiments (White et al. 1982). This decline reflects the pattern observed for yellow-cheeked voles, which comprised 78% of the total animals caught. Grid 1 had a slight increase between TN2 and TN3 due to increases in the number of red-backed voles and shrews that exceeded the drop in yellow-cheeks. Trapping success by different trap types depended on species (Fig. 6). All but two of the yellow-cheeked voles were trapped in snap traps. Few yellow-cheeks have been caught in cone traps during the study; from 1997-2001, between 89%-98% were caught in snap traps. The pattern is similar for red-backed voles, where 86-97% were caught in snaps from 1991-2002. Brown lemmings were more equitably divided between trap types in 2002, with slightly more found in cones. This trend was also seen in the past, although sometimes more were caught in snap traps than cones in a given year. Most of the shrews were caught in cones, as they were in the past. The one *Microtus* spp. caught in 2002 was in a cone.

### *Discussion*

This study has documented a shift in species dominance from meadow voles to yellow-cheeked voles between eight to nine years post-fire. Yellow-cheeks and other *Microtus* occurred in similar numbers in 1997, but since 1999 the other *Microtus* have been rare or absent. Findings reported in other studies have also been observed here, increasing our understanding of how small mammal populations function on a regional basis. Rexstad and Debevec (2001) reported an unexplained sharp decline in shrew captures in Denali National Park in 2000, similar to what was observed on Kanuti NWR this year. Trapping success for this project and for efforts in Denali National Park, Fairbanks (USFWS 1995), and Gates of the Arctic National Park (Swanson 1996) were low in 1994, suggesting a regional mechanism rather than a localized effect.

During a review of the Kanuti NWR biological program in July 2002, a panel comprised of university researchers and biologists from Federal and State agencies recognized the value of this study but questioned the need to trap on an annual basis since species diversity and proportions appeared to have stabilized. They also noted that nothing is known about small mammal populations elsewhere on the refuge. Refuge staff have therefore made a preliminary decision to switch to biannual sampling of the post-fire grids and focus efforts on catching small mammals in other refuge habitats on alternate years.

### *Cost*

Total cost of the project, excluding overtime, was \$9,634.50 out of a \$10,000 budget (Appendix 1). Museum charges increased this year because UAF charged 36.3% overhead on the Museum contract, a cost we had been able to avoid in previous years.

### *Logistical Comments*

- Crews were unable to open the top of the bear barrel at G1 because of a stuck bolt, and the traps were left in a duffel bag next to the barrel. The traps should be transferred to the barrel in summer 2003.
- Ethanol is a hazardous material and the quantities used for the project cannot be transported on a commercial passenger flight. Bottles of ethanol should be shipped to Bettles in a Fish and Wildlife Service plane and stored in a flammable materials locker until fieldwork begins. Transporting the alcohol to Mouse Lake in a chartered plane is not a problem.

- The aluminum canoe and Kevlar Old Towne one-person canoe left at the site were once again used to access Grids 2, 3, and 4 despite some leaking due to earlier bear damage. Two inflatable kayaks were also used, but occasional strong winds made them difficult to handle and caused people to switch to the hard bodied canoes. Refuge staff may want to consider storing the boats at the Kanuti Lake cabin if sampling is to be conducted every other year and shuttle them to Mouse Lake as needed.
- Due to unavailability of seasonal technicians, a four-person crew was used rather than the recommended five-person minimum if the specimens are to be preserved in alcohol (Saperstein 2001*b*). Ideally, one person would stay in camp and work on the specimens while two crews check the grids. The smaller crew worked well this year, despite the large number of captures, because cool temperatures kept the specimens from rotting and all crew members put in extra hours processing. Despite the extra work, decay would have been a problem had the temperatures been warmer.

#### *Acknowledgments*

Thanks to the trapping crew (Harvey Williams, Curtis Knight, and Ben Soiseth) who made this effort a success despite the reduced crew size. Brooks Range Aviation transported the crew safely and was impeccably prompt with pickups, as usual.

#### *Literature Cited*

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Table 1. Summary of trapping results by grid, species, and trap night, Kanuti NWR, August 2002. Abbreviations are as follows: MIXA= yellow-cheeked vole, CLRU=red-backed vole, Sorex= shrew, LETR= brown lemming, UK= unidentified vole, Tot=Total, and GT=grand total.

Grid	Trap Night 1						Trap Night 2						Trap Night 3						GT
	MIXA	CLRU	Sorex	LETR	UK	Tot	MIXA	CLRU	Sorex	LETR	UK	Tot	MIXA	CLRU	Sorex	LETR	UK	Tot	
1	38	13	2	3	0	56	16	2	1	2	0	21	12	5	3	2	0	22	99
2	35	11	6	1	0	53	23	10	2	2	0	37	11	3	0	1	0	15	105
3	46	7	1	0	0	54	37	4	1	0	0	42	19	6	3	0	0	28	124
4	73	2	1	1	1	78	54	4	0	3	0	61	21	4	1	1	0	27	166
Tot	192	33	10	5	1	241	130	20	4	7	0	161	63	18	7	4	0	92	494

Table 2. Summary of trapping results by grid and species, Kanuti NWR, August 2002. Abbreviations are as follows: MIXA= yellow-cheeked vole, CLRU=red-backed vole, Sorex= shrew, LETR= brown lemming, UK= unidentified vole

Grid	Species					Total
	MIXA	CLRU	Sorex	LETR	UK	
1	66	20	6	7	0	99
2	69	24	8	4	0	105
3	102	17	5	0	0	124
4	148	10	2	5	1	166
Total	385	71	21	16	1	494

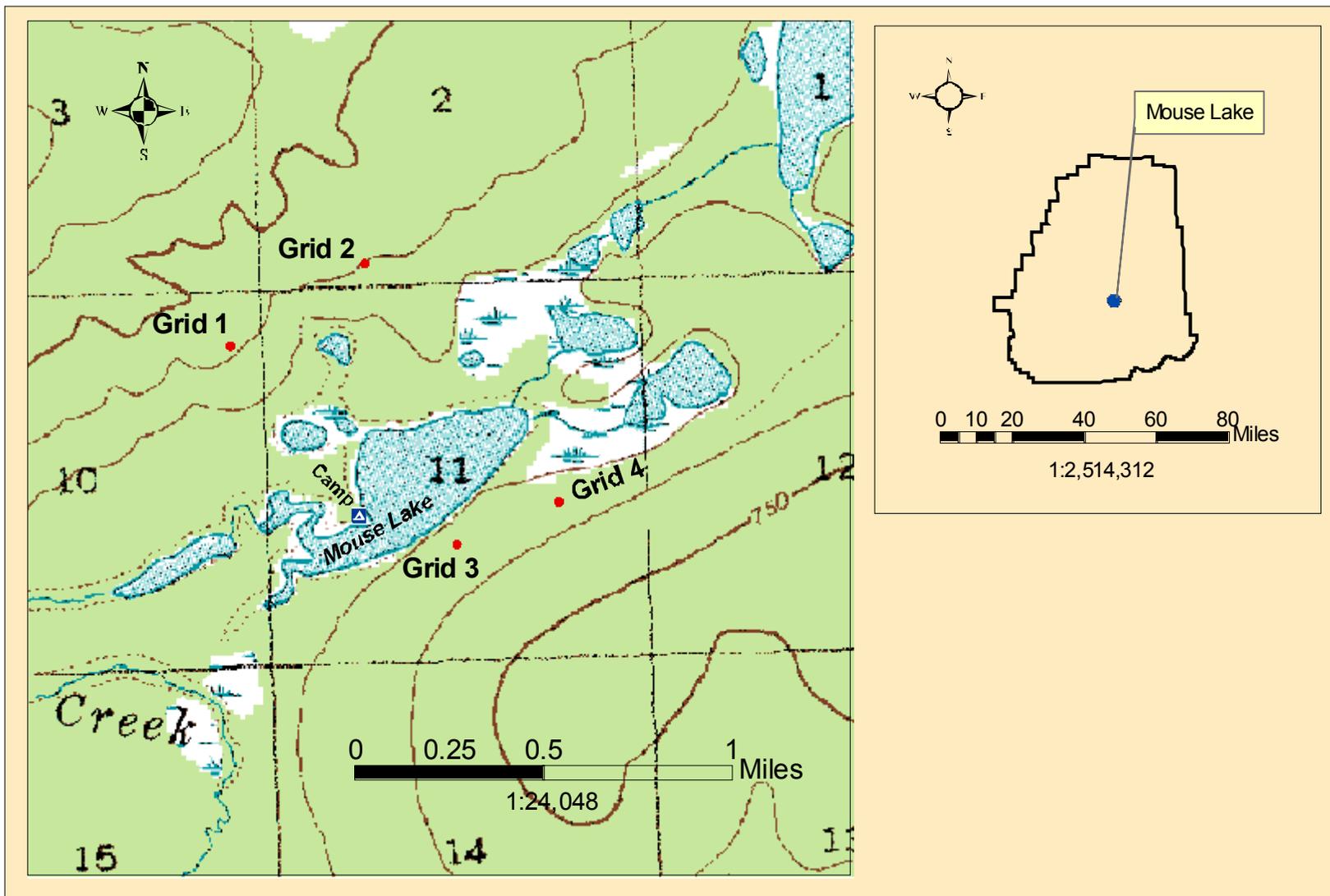


Figure 1. Location of small mammal trapping grids on Kanuti NWR, 1991-2002.

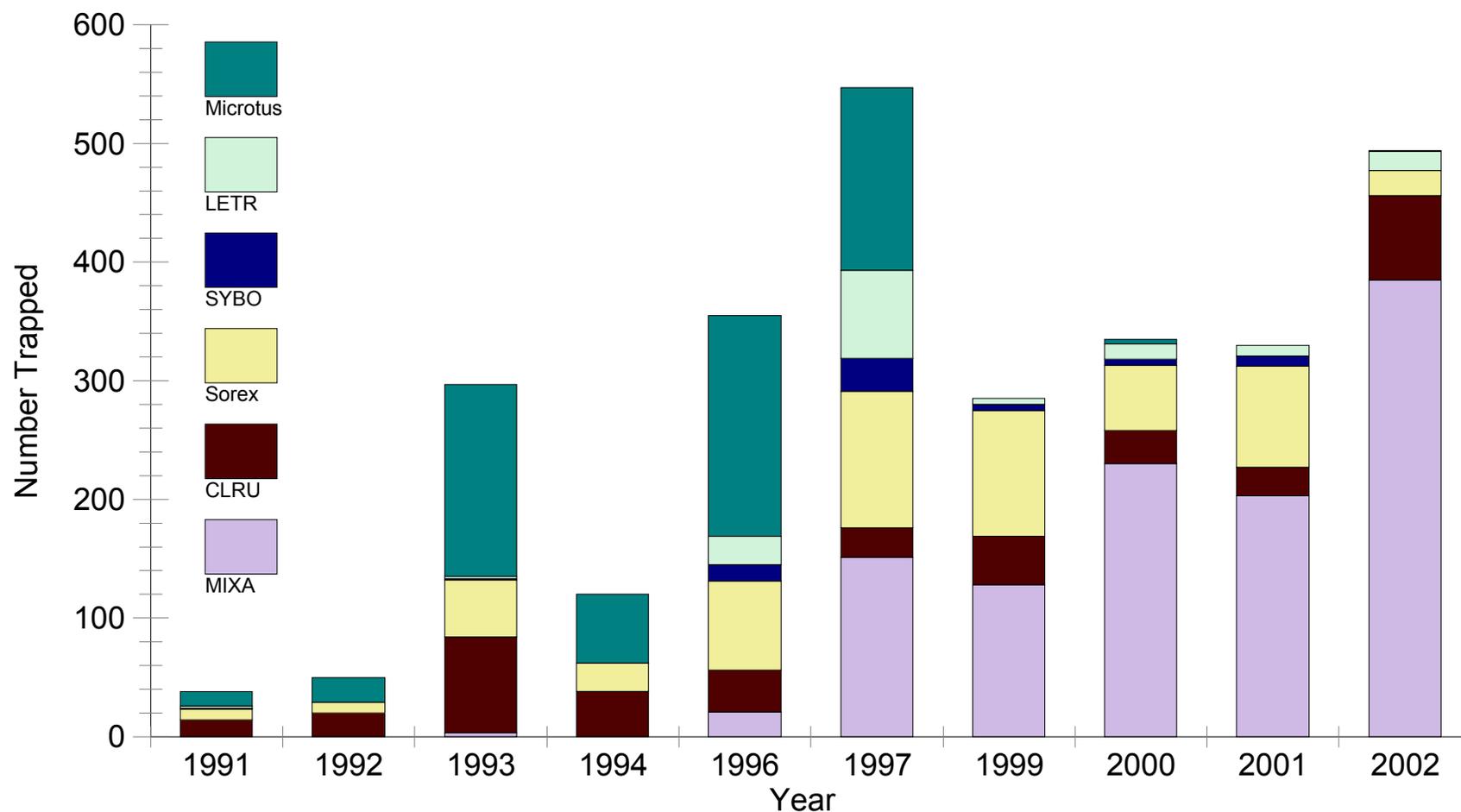


Figure 2. Small mammals trapped on Kanuti NWR, 1991-2002. Only two grids (G1 and G3) were trapped 1991-1992; four grids were trapped the remaining years. Species identification in 2002 is preliminary pending verification by the University of Alaska Fairbanks Museum. Species codes are as follows: MIXA=yellow-cheeked vole; CLRU=red-backed vole; Sorex=shrew species; SYBO=northern bog lemming; LETR=brown lemming; and Mircotus= "other vole."



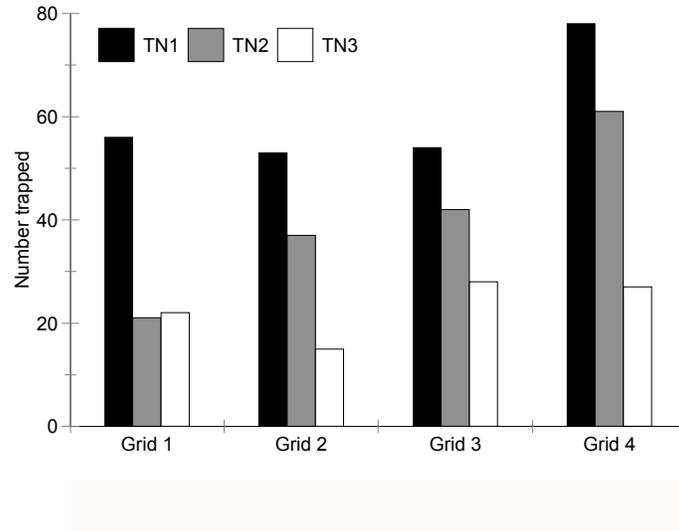


Figure 3. Total small mammals trapped by grid and trap night, Kanuti NWR, August 2002.

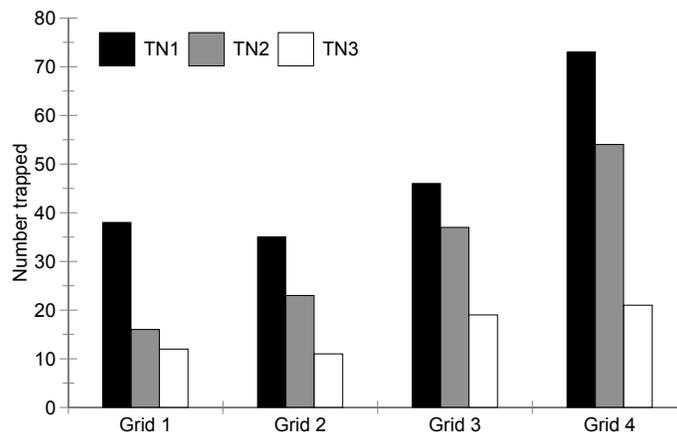


Figure 4. Yellow-cheeked voles trapped by grid and trap night, Kanuti NWR, August 2002.

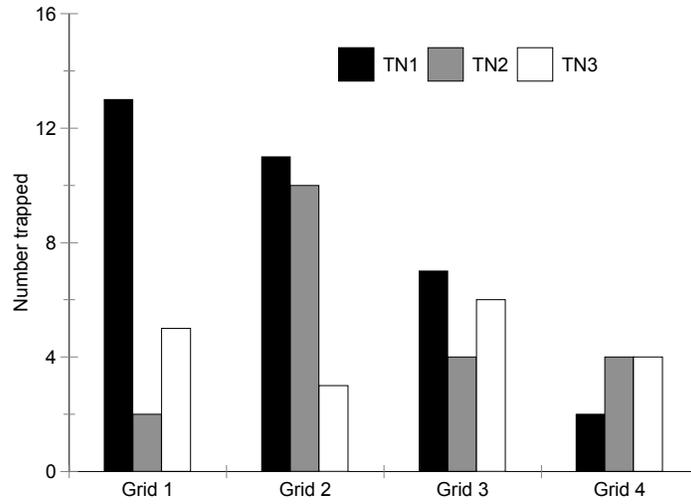


Figure 5. Red-backed voles trapped by grid and trap night, Kanuti NWR, August 2002.

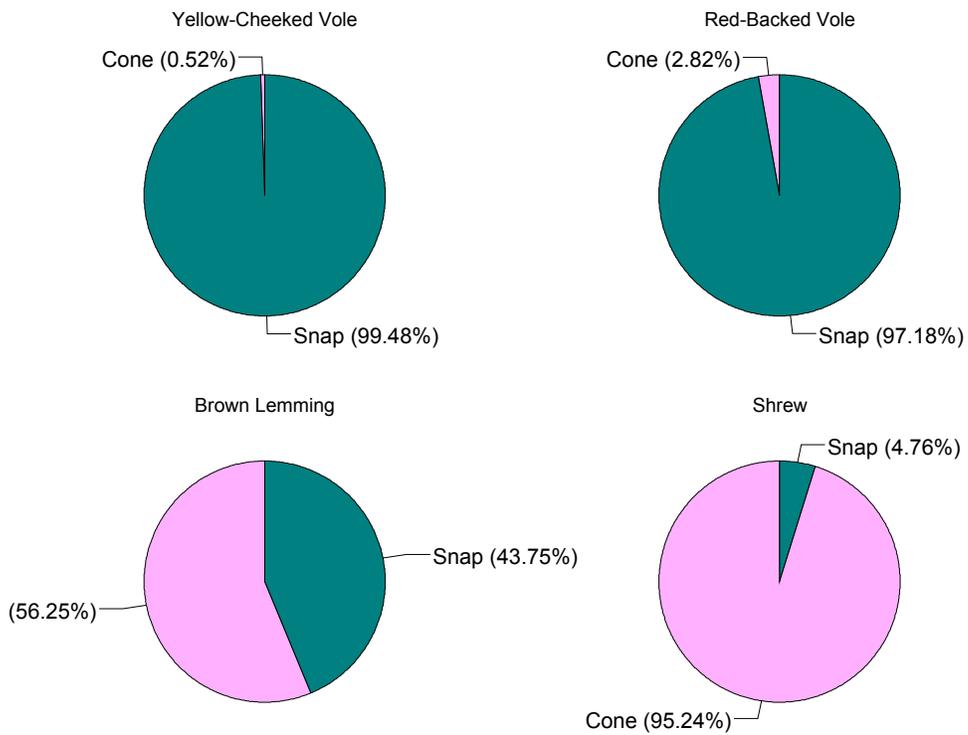


Figure 6.

Figure

Proportion of small mammals trapped in snap and cone traps, Kanuti NWR, August 2002.

Appendix 1. Small mammal project budget for 2002, Kanuti NWR.

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<b>Description</b>	<b>Cost</b>
Food <sup>1</sup>	122.65
Chartered Beaver aircraft (Brooks Range Aviation) <sup>2</sup>	1,644.50
Commercial air service tickets (Wright Air) <sup>3</sup>	1,170.00
UAF museum agreement	5,855.00
Miscellaneous supplies	842.34
Total spent	9,634.49
	Budgeted
	10,000.00

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<sup>1</sup> Only includes food purchased specifically for the project; food already in Bettles was also used.

<sup>2</sup> 2.99 hours of flight time at \$550/hr

<sup>3</sup> Includes round trip airfare for three people plus excess baggage charges