

**SMALL MAMMAL COMMUNITIES IN GLACIER NATIONAL PARK'S
FESCUE GRASSLANDS: IMPLICATIONS OF EXOTIC PLANT INVASIONS
2001 REPORT**

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Submitted
28 January 2002



Northern bog lemming – Photo by Dean E. Pearson

Introduction

This document provides an update on the second year of an ongoing study of small mammal communities in Glacier National Park's (GNP) east-side bunchgrass communities. The primary objectives of this study are to 1) establish baseline information on small mammal community composition and relative abundance and 2) determine the impacts of exotic plant invasions on small mammals in bunchgrass habitats on the east side of GNP. Background information on the problem of exotic plant invasions in intermountain bunchgrass communities and detailed information on the study methods and objectives are outline in the first annual report (Pearson and Ruggiero 2000). We present here additional results obtained from the 2001 field season.

Methods

Small mammals were live trapped along 25-trap transects of Sherman live traps for four days in Belly River (2 sites – 8 transects), Many Glacier (1 site - 4 transects), Saint Mary's (2 sites – 8 transects), and Two Medicine (1 site – 6 transects) drainages (after methods in Pearson and Ruggiero 2000). The only difference in protocol from the previous year was that 1 live-captured "vole" from each transect where voles were captured was collected by cervical dislocation (ASM 1998). This was done to establish positive identifications of voles for the four species, of vole look-a-likes that could occur in GNP bunchgrass habitats. Standard body measurements were taken for trap mortalities and collected specimens. Skulls were cleaned, and species were identified from skull and dental characteristics based on Foresman (2001a) and Hoffmann and Pattee (1968). All identifications were made by D. E. Pearson and confirmed by K. R. Foresman, mammalogist, University of Montana. Specimens are repositied at the USDA Forest Service, Rocky Mountain Research Station, Mammal Collection, Missoula, Montana. Vegetation cover percentages were determined from ocular estimates as in Pearson and Ruggiero (2000).

Results

Our sampling effort of 2900 trap nights produced 49 captures of 32 individuals representing 5 species of small mammals (Table 1). This compares with 68 captures of 48 individuals from 3 species in 2000. These sample returns were insufficient for conducting analyses of community composition or habitat selection because small mammal populations were simply too low during

the 2001 season. However, trapping did result in identifying 2 new species of small mammals for this habitat and confirmed the presence of the meadow vole (*Microtus pennsylvanicus*) (Table 2). One species, the yellow pine chipmunk (*Tamias amoenus*) was captured at the Two Medicine and Windy Flats sites. The other species, a northern bog lemming (*Synaptomys borealis*), was captured in the Two Medicine drainage.

Vegetation data has been entered and summarized, but is not presented here since it does not differ greatly from 2000 and habitat analyses could not be conducted for this year alone.

Table 1. Trapping results from 2000 and 2001 field seasons indicating the number of unique individual animals captured by species and by location.

Species	Year	Location						Total
		Belly West	Belly East	Windy Flats	Two Dog Flats	Saint Mary	Two Medicine	
PEMA	00	0	0	15	17	4	3	39
	01	0	0	16	2	6	1	25
ZAPR	00	0	0	5	0	0	0	5
	01	0	0	1	0	0	0	1
MIPE	00	0	0	0	0	0	0	0
	01	0	1	0	0	0	1	2
PHIN	00	0	0	0	0	0	1	1
	01	0	0	0	0	0	0	0
SYBO	00	0	0	0	0	0	0	0
	01	0	0	0	0	0	1	1
TAAM	00	0	0	0	0	0	0	0
	01	0	0	1	0	0	1	2
VOLE	00	2	0	0	0	0	1	3
	01	0	0	0	0	0	1	1
Total		2	1	38	19	10	10	80

PEMA = *Peromyscus maniculatus*, ZAPR = *Zapus princeps*, MIPE = *Microtus pennsylvanicus*, PHIN = *Phenacomys intermedius*, SYBO = *Synaptomys borealis*, TAAM = *Tamias amoenus*, VOLE = unidentified voles.

Table 2. Species list for small mammals in fescue grasslands on the east side of Glacier National Park based on sign surveys or trapping.

Species	Location					
	BW	BE	WF	TD	SM	TM
PEMA			X	X	X	X
ZAPR			X	X ^a		
VOLE	X			X ^a		X
MIPE		X				X
MILO			X ^b			
PHIN						X
SYBO				X		
SOCI				X ^a	X ^a	
TAAM			X			X
SPCO ^c		X	X	X	X	X
THTA ^c						X

a - Indicates species detected by Tyser (1991) that were not detected in this study.

b - This individual was collected from a glass bottle (see results).

c - Indicates species sampled using sign surveys rather than trapping data.

PEMA = *Peromyscus maniculatus*, ZAPR = *Zapus princeps*, VOLE = unidentified voles, MIPE = *Microtus pennsylvanicus*, MILO = *Microtus longicaudus*, PHIN = *Phenacomys intermedius*, SYBO = *Synaptomys borealis*, SOCI = *Sorex cinereus*, TAAM = *Tamias amoenus*, SPCO = *Spermophilus columbianus*, THTA = *Thomomys talpoides*.

Discussion

Low capture rates encountered the first two years of this study have prevented us from quantifying small mammal response to exotic plant invasions in GNP thus far. During the first year there were barely sufficient captures to conduct habitat selection analyses for Windy Flats and Two Dog Flats. Windy Flats again had the highest capture rates this year, but there were not sufficient data for a robust analysis. Other sites had very few captures. Low capture returns appear to be the result of small mammals generally being at a population low for the last few years rather than due to low productivity within GNP bunchgrass. We have similarly been experiencing low capture rates at 9 other study sites in western Montana bunchgrass for the last 2 years (D. E. Pearson unpublished data). We feel this is likely due to recent drought conditions. However, other study sites were beginning to show signs of population recovery by mid summer and fall, suggesting that small mammals may be starting an increase phase in populations this year. Additional trapping will allow us to examine the small mammal response to invasive species by pooling the data across years even if we do not achieve high captures in any one year. However, we feel that populations will increase over the next 2 years given that most small mammals in temperate North America fluctuate on 3-5 year cycles (Krebs 1996) and small

mammals appear to be increasing as of this field season at other study sites where we also have summer and fall trapping data.

Despite low capture rates, we have had good success with identifying the small mammal communities that occur within GNP bunchgrass. Each year this study has expanded the species list for small mammal communities in GNP east-side bunchgrass habitats. Our work establishes that GNP contains the richest small mammal communities found in bunchgrass habitats in Montana thus far. Pearson et al. (2001) identified 5 species of small mammals in pristine native bunchgrass habitats at 3 sites in westcentral Montana. Trapped species included deer mice (*Peromyscus maniculatus*), montane voles (*Microtus montanus*), and montane shrews (*Sorex montanus*). They also reported northern pocket gopher (*Thomomys talpoides*) sign at all of their study sites, and they saw yellow-pine chipmunks (*Tamias amoenus*) on their sites as well, but they did not capture this species because they avoided chipmunk habitat when setting out their trap lines. Trapping data indicated that deer mice dominated these habitats followed by montane voles and montane shrews. We have observed similar small mammal community structure elsewhere in native and knapweed-invaded grasslands at 10 other study sites in western Montana (Pearson et al. 2000, D. E. Pearson unpublished data). Consistently, deer mice dominate these systems, followed by montane voles, which are uncommon to rare, and one or other species of shrew, which is generally very rare. In GNP bunchgrass, deer mice similarly dominate, but the remainder of the small mammal community is much more diverse, including meadow voles, long-tailed voles (*M. longicaudus*), heather voles (*Phenacomys intermedius*), northern bog lemmings, western jumping mice (*Zapus princeps*), and cinereus shrews (*S. cinereus*) (Tyser 1991, Pearson and Ruggiero 2000). Montane voles may be absent from GNP grasslands as we have not captured them so far, and they are not known to occur in GNP (Shea 1971). Montane voles appear to be replaced by several other voles in this system (listed above) that we have not identified in bunchgrass habitats elsewhere in the state. However, it is possible that montane voles may eventually be detected in GNP bunchgrass since it provides optimal habitat for these voles, and they are known to occur not far to the south in Lake County (Foresman 2001b).

We suspect that future trapping will identify additional species within GNP bunchgrass communities. Possible additions include vagrant (*S. vagrans*), montane, and Preble's (*S. preblei*)

shrews. These shrews have been captured elsewhere in bunchgrass habitats of western Montana (Pearson et al. 2000, 2001; D. E. Pearson unpublished data). Vagrant and montane shrews occur elsewhere in GNP (Shea 1971) and no doubt occur in coniferous and riparian habitats adjacent to GNP bunchgrass. These species are likely present at low densities in GNP bunchgrass as has been shown for the cinereus shrew (Tyser 1991). Preble's shrews are very rare, but have recently been captured in bunchgrass habitats in the Bitterroot valley, of western Montana (D. E. Pearson unpublished data) and have historically been identified from Glacier County, east of GNP (Foresman 2001b).

The northern bog lemming is an unusual capture for this habitat. This is a rare small mammal in the state, and a species that has been captured at only 5 other locations in Glacier National Park (Table 3) (Pearson 1991, Reichel and Beckstrom 1993). This is the first capture of a northern bog lemming on the east side of the continental divide in GNP and only the third location for the species east of the divide in Montana. This is the first time a bog lemming has been reported from an arid grassland habitat. The individual captured was a 9.5 g juvenile female, suggesting that there were other individuals in the area. However, there is no bog habitat for several km in any direction and the grassland itself is an unusually dry habitat for bog lemmings. Nonetheless, Pearson and Ruggiero (2000) did suggest that this species might be captured in these habitats.

Table 3. Locations of northern bog lemming captures in Glacier National Park.

Location	Number	Habitat	Source
Camas Creek	3	Wet meadow	Wright (1949), Hoffmann et al. (1969)
McGee Meadows	3	Bog/fen	Pearson (1991)
Anaconda Creek	2	Lodgepole pine stand	Weckwerth and Hawley (1962)
Numa Ridge Bog	1	Bog/fen	Pearson (1991)
McDonald Creek	1	Cedar/hemlock forest	K. A. Keating unpublished data
Two Medicine	1	Fescue bunchgrass	Pearson and Ruggiero (this report)

This research has so far made valuable advances in establishing baseline information on small mammal community composition and relative abundance in GNP bunchgrass habitats.

Continued trapping will be necessary to further develop our understandings of community composition, and allow us to quantify habitat use and the effects of exotic plant invasions on these small mammal communities. We recommend at least 2 more years of trapping towards this

end. We also echo the recommendation from last year (Pearson and Ruggiero 2000) that specimens of voles be collected to continue identifying new species and determining their relative contribution to this unique small mammal flora. Future understandings of how exotic plants affect not only small mammals but also the critical ecological roles they play and the predators that depend on them in these threatened systems will depend on this baseline research.

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