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A Comparison of Small Mammal Populations Occupying Three Distinct Shrub-Steppe Communities in Eastern Oregon¹

Abstract

This study compares population parameters of small mammals occupying three distinct shrub-steppe communities in eastern Oregon. Pocket mice (*Perognathus parvus*) were found to be the dominant animals in terms of both biomass and density in cheatgrass (*Bromus tectorum*) and needle-and-thread grass (*Stipa comata*) communities. Kangaroo rats (*Dipodomys ordii*) dominated a sagebrush-juniper (*Artemisia tridentata-Juniperus occidentalis*) community. Deer mice occurred in all study areas but were only abundant in the sagebrush-juniper community.

Introduction

This study compares population parameters of small mammals inhabiting three distinct plant communities within the shrub-steppe region of eastern Oregon. These data were gathered as part of an ecological assessment of a proposed electrical power generation complex (Rogers *et al.*, 1975). Current plans call for construction of a 550,000 megawatt coal fired generator. Nuclear generators may be added to the complex at a later time. Field data gathering sessions were conducted during 1973 and 1974.

Study Area

The study area is located about 19 km (12 mi) southwest of Boardman, in Morrow County, Oregon. Plant communities are typical of steppe communities in the semi-arid regions east of the Cascades. In the absence of recent fire, the plant communities are dominated by a shrub overstory. An understory comprised of herbaceous plants extends beneath and among the shrubs, with grasses being the important biomass contributors. The abundant shrubs are big sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus nauseosus* and *C. viscidiflorus*). The important understory grasses are needle-and-thread (*Stipa comata*), Sandberg's bluegrass (*Poa sandbergii*), and cheatgrass (*Bromus tectorum*). Indian ricegrass (*Oryzopsis hymenoides*) and thick-spiked wheatgrass (*Agropyron dasystachyum*) are locally abundant on sandy soils. Three distinct plant communities were selected for study: one supports clumps of needle-and-thread grass, another swards of cheatgrass, and a third supports woody vegetation, especially big sagebrush and western juniper.

The climate of the area is characterized by hot dry summers and cold winters, with most of the precipitation occurring during fall and winter months. Precipitation

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averages less than 25 cm (10 in) per year. The prevailing winds are westerly and may be occasionally strong.

The relative abundance of small mammals was studied by trapping, using a live-trap, mark, and recapture technique. Three grids of 144 traps each were established within cheatgrass, needle-and-thread grass, and sagebrush-juniper communities. The traps were arranged in a 12 x 12 grid pattern with 15 m intervals between traps. Each trap was placed inside a slightly larger metal box so that only the trap opening was exposed. The extra shielding helped to protect captured animals from extreme temperatures; in addition, a sheet metal tent was placed over the metal box and trap, preventing the sun's direct rays from overheating confined animals. Care was taken to visit the traps as early in the morning as possible during periods of hot weather.

Beginning in April 1973, all traps were opened for a total of 10 trapping sessions, ending in September 1974. The first seven sessions occurred at approximately monthly intervals. Additional sessions were conducted during February, June, and September of 1974. Only the cheatgrass community was trapped during June and September of 1974. Traps were provided with a sufficient quantity of seeds to prevent torpor in trapped animals. Traps were opened in late afternoon of the first trapping day and remained open for three successive days of trapping. A small quantity of mixed oatmeal and peanut butter was placed in the trap entrance as bait.

All captured animals were marked for individual identification by a series of toe amputations, weighed, determined as to sex, examined for reproductive condition, and released near the point of capture. Field data were recorded in notebooks and later transcribed to keypunch forms for computer processing.

Results and Discussion

Four species of small mammals were trapped on the three intensive study plots: Great Basin Pocket Mouse (*Perognathus parvus*), Deer Mouse (*Peromyscus maniculatus*), Ord kangaroo rat (*Dipodomys ordii*), and the Northern Grasshopper Mouse (*Onychomys leucogaster*).

The trap catches for the three study areas are shown in Tables 1 and 2. The numbers represent the total number of individuals captured during each trap session, thereby providing an indication of the abundance of animals of each species living

TABLE 1. Number of small mammals captured.

Species	Apr	May	Jun	Jul	Aug	Oct	Nov	Feb	Jun	Sep
Cheatgrass Plot										
Pocket Mouse	80	67	86	87	102	18	1	8	28	8
Deer Mouse	7	0	0	0	0	0	0	0	0	0
Grasshopper Mouse	0	0	0	0	0	0	0	0	0	0
Kangaroo Rat	0	0	0	0	0	0	0	0	0	0
Needle-and-Thread Grass Plot										
Pocket Mouse	43	70	92	93	81	8	3	8		not trapped
Deer Mouse	6	3	3	0	0	4	6	11		
Grasshopper Mouse	0	0	0	1	0	0	0	0		
Kangaroo Rat	0	0	0	0	0	0	0	0		
Sagebrush-Juniper Plot										
Pocket Mouse	21	29	25	20	18	5	0	2		not trapped
Deer Mouse	27	26	18	11	11	9	7	5		
Grasshopper Mouse	0	0	0	0	0	0	0	0		
Kangaroo Rat	25	34	25	31	29	36	37	30		

TABLE 2. Small mammal biomass.¹

Species	Apr	May	Jun	Jul	Aug	Oct	Nov	Feb	Jun	Sep
Cheatgrass Plot										
Pocket Mouse	1344	1079	1340	1314	1509	223	12	108	473	121
Deer Mouse	109	0	0	0	0	0	0	36	0	0
Grasshopper Mouse	0	0	0	0	0	0	0	0	0	0
Kangaroo Rat	0	0	0	0	0	0	0	0	0	0
Needle-and-Thread Grass Plot										
Pocket Mouse	701	1120	1444	1432	1206	109	39	118		not
Deer Mouse	109	43	42	0	0	66	110	210		trapped
Grasshopper Mouse	0	0	0	0	0	0	0	0		
Kangaroo Rat	0	0	0	0	0	0	0	0		
Sagebrush Juniper Plot										
Pocket Mouse	336	432	380	302	275	64	0	30		not
Deer Mouse	437	424	270	157	169	161	142	102		trapped
Grasshopper Mouse	0	0	0	0	0	0	0	0		
Kangaroo Rat	1245	1703	1200	1473	1418	1804	1790	1605		

¹Biomass expressed as grams (wet weight).

on each plot. Biomass values are expressed in terms of grams (wet weight) and represent an estimate of total biomass per species for each study plot.

The pocket mouse dominates both cheatgrass and needle-and-thread grass plots, accounting for 98 percent and 92 percent of individuals captured on the respective plots. Pocket mice accounted for only 25 percent of the individuals on the sagebrush-juniper plot. Pocket mice comprised over 90 percent of the total small mammal biomass on cheatgrass and needle-and-thread grass plots, but only 13 percent on the sagebrush-juniper plot. The decline of pocket mice in the trap catches during the early fall months is normal. They spend the summer months actively feeding and storing seeds. They remain largely below ground in burrows during the winter months and re-emerge as the weather warms in spring (O'Farrell *et al.*, 1975.).

Kangaroo rats require a sandy area in which to dig, as well as an abundant seed supply. These conditions, while satisfied in the sagebrush-juniper area, apparently preclude their inhabiting the other study sites. The kangaroo rats account for about half of the individuals captured in the sagebrush-juniper community (51 percent).

Deer mice were trapped on all study sites, but occurred in small numbers on the cheatgrass and needle-and-thread grass plots. The absence of deer mice from trap catches in mid-summer on these two plots was expected, as similar results were obtained in studies conducted on the Arid Land Ecology Reserve near Richland, Washington. There, deer mice were also often absent from mid-summer catches, although the cause for absence is not known. A single northern grasshopper mouse was captured on the needle-and-thread grass plot during July. These mice occur throughout the arid and semi-arid regions of the west, but at low densities (O'Farrell *et al.*, 1975).

Calculated sex ratios for pocket mouse populations averaged about 50 percent females in the cheatgrass and needle-and-thread grass plots, but only 36 percent in the sagebrush-juniper plot. Sex ratios of deer mice ranged from a low of 39 percent females on the needle-and-thread grass plot to 41 percent on the sagebrush-juniper plot and 44 percent on the cheatgrass plot. The kangaroo rat population averaged 38 percent females in the sagebrush-juniper study area. There were consistently more male kangaroo rats caught than females during all trapping sessions.

The small mammal abundance, biomass, and sex ratio data presented here provide

baseline information permitting a later evaluation of population changes related to the construction and operation of the power complex planned for northeastern Oregon.

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