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THE ECOLOGY OF POCKET GOPHERS
IN A
WILDERNESS ENVIRONMENT

A Completed Report Presented to the
Wilderness Research Center

by

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ABSTRACT

A project was conducted during the summer of 1975 to study the ecology of the northern pocket gopher (Thomomys talpoides fuscus) in a wilderness environment.

The study area was divided into 2 sections (1) high ridge--steep valley and (2) mountain meadows.

Information was collected (1) quantatively from 7 macroplots and (2) by direct observation of 139 sites of new pocket gopher sign.

Gopher activity (fresh soil movement) was highly variable ranging from 0.66 activity per gopher per day to 9.25. Activity was even more variable for the periodic (2-week) activity counts. This variation may result from differences in the population density, vegetation composition or soil characteristics among the plots.

Observations showed pocket gophers were present throughout both study sections. Activity was highest where vegetation was primarily forbs and grasses. In the high ridge--steep valley section, ridges that lack a dense conifer cover and have a cover mostly of forbs and grasses, will support a large gopher population. Mountain meadows that have a large portion of dry cover type will also support a large population.

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INTRODUCTION

The control of pocket gophers (Thomomys spp.) requires an understanding of their behavior in undisturbed as well as disturbed habitats. For this reason, a study on gophers in a wilderness area is appropriate. Evaluation of the life processes of the flora and fauna in an area that is generally unaffected by man is important. This allows for a comparison showing the affects of man's activities on the floral and faunal communities between wild, unaltered areas and areas that have been altered by man (Onthank, 1960).

The literature concerning gophers has dealt with areas disturbed by logging and grazing practices (Julander et al. 1959, Richens 1965, Reid et al. 1966, and Hooven 1971). Thus, much of the data gathered has been from gopher populations affected by the use and manipulation of the vegetation.

Investigation concerning habitat requirement for gophers, is listed among the research needs concerning pocket gophers (Hooven 1971, and Barnes1973). Habitat requirements and food habits have been studied by (Garrison and Moore 1956, Ward 1956, Richens 1965 and Hooven 1971). Barnes (1973) states that gophers occur with the highest density near river banks, springs, meadows and other breaks in the forest where large quantities of ground vegetation occur. Hungerford (1975) says a number of factors may cause an increase in gophers in forested areas; timber harvest methods, compaction

of the soil or the change in vegetation resulting from harvest. By identifying the habitat and food requirements, one type of control of gopher damage to reforestation projects in the Pacific Northwest could be accomplished by habitat manipulation to limit the production of preferred foods (Barnes 1973). Further knowledge about food habits and habitat requirements are needed and may be found in studies conducted in a wilderness environment.

My intent was to examine northern pocket gophers in an area that had not been subject to the influences of timber harvesting and gather information regarding (1) the distribution and the activity of gophers in the vegetation types encountered and (2) similarities between the vegetation types which could influence gopher occurrence. The project was conducted during the summer of 1975.

STUDY AREA

Location and Physiography

The study was conducted in the lower portion of the Big Creek drainage and the Cold Meadows area in Chamberlain Basin (Fig. 1). These are found in the Idaho Primitive Area, located in central Idaho (Fig. 2). The dominant land feature is canyons which are characterized by high ridges and steep valleys. An exception to this is Chamberlain Basin, consisting of gentle topography and mountain meadows. (U.S. Forest Service 1972).

General reconnaissance of the two study sections occurred throughout the summer. The first two weeks of the study were spent exclusively searching for gopher sign. The areas surveyed were Rush, Pioneer, Cliff and Goat Creeks around the Taylor Ranch and Big Creek, from Taylor Ranch to Monumental Bridge. At the same time, the lower portion of Garden Creek, Mile Hi to Crescent Meadow via Blackburn Saddle and from Crescent Meadow to the mouth of Crooked Creek were also surveyed (Fig. 1). General reconnaissance of Cold Meadows was conducted in late June; Middle and Lower Cottonwood Meadows and Phantom Meadow in mid-July and Cold Meadows to Goat Creek via Coyote Springs in mid-August (Fig. 3). Other areas surveyed during the summer are seen in Figure 4.

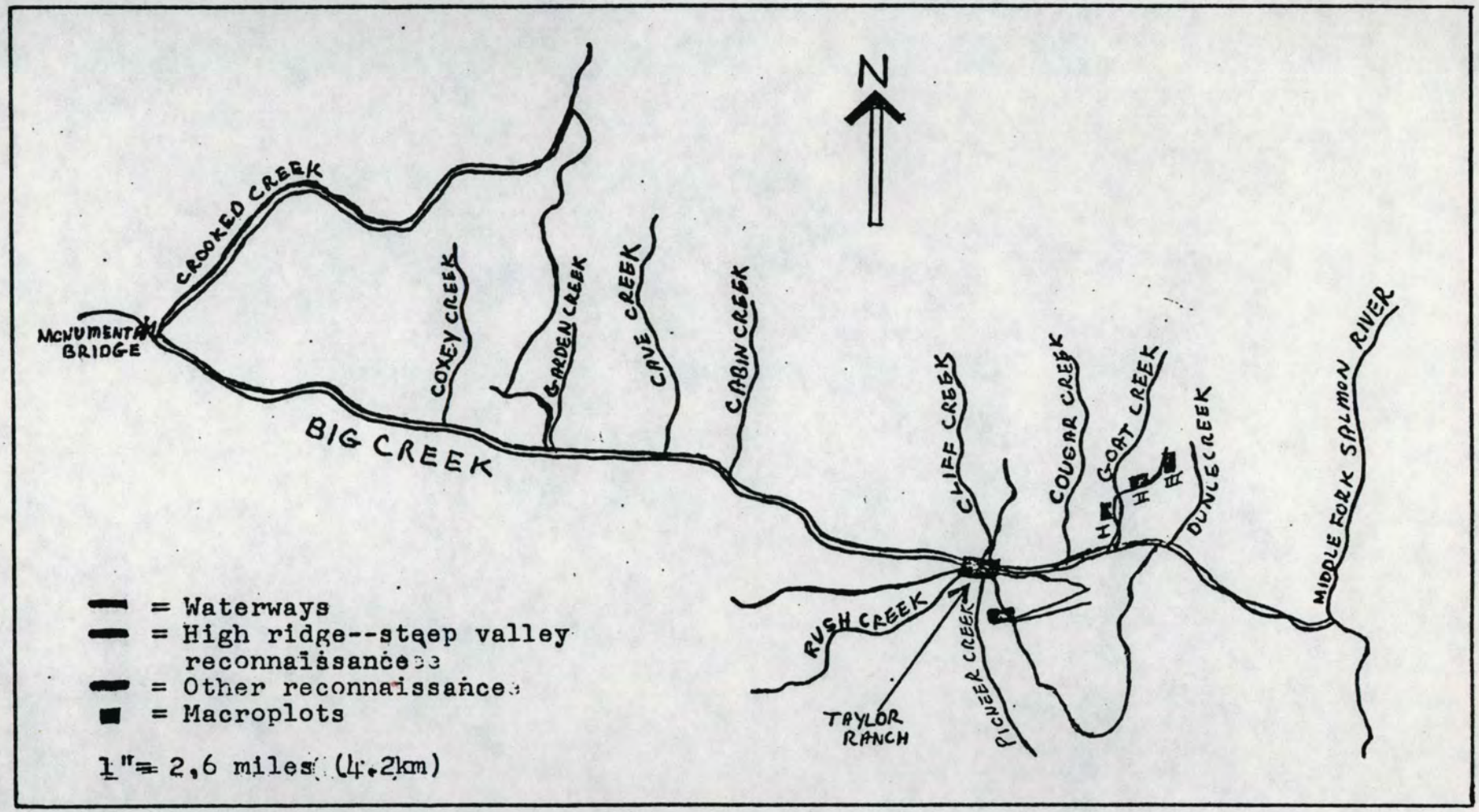

Fig. 1. High ridge--steep valley study section, macroplot location and reconnaissance.

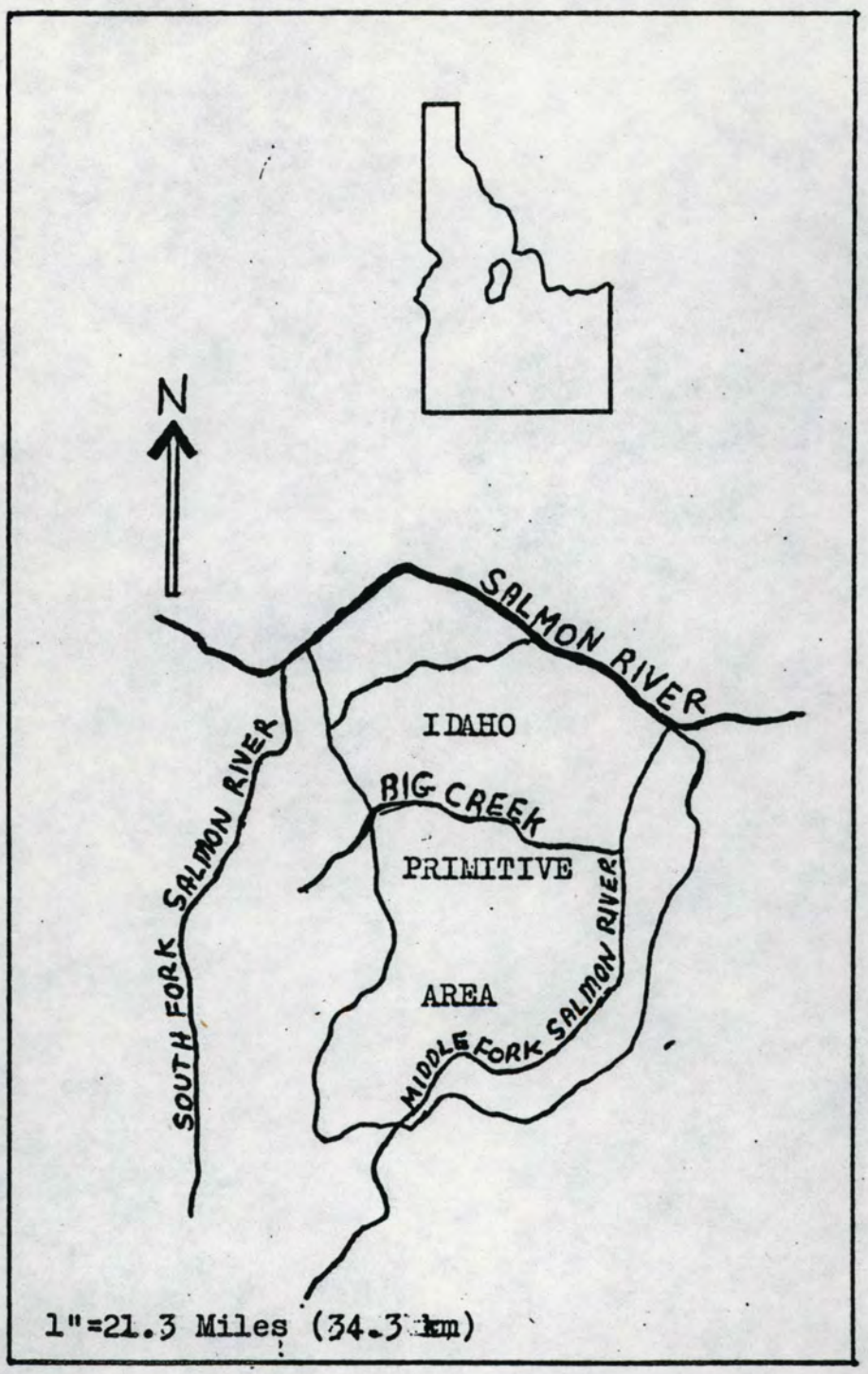

Fig. 2. Location of the 2 study sections. Inset shows location of the Idaho Primitive Area in Idaho.

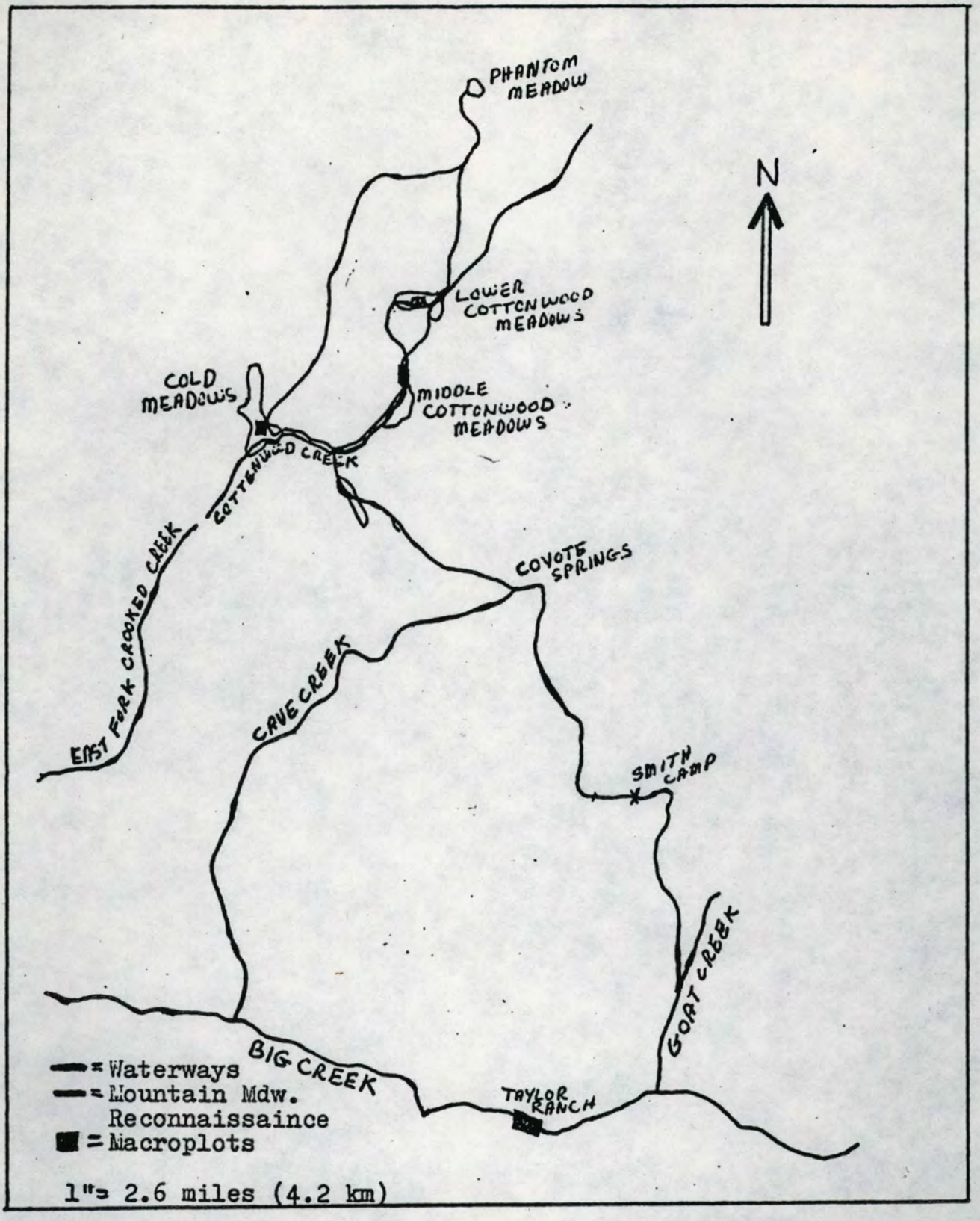

Fig. 3. Mountain Meadow study section, macroplot location and reconnaissance.

Soils

Two main types of soils occur in the Idaho Primitive Area; soils derived from granitic rocks which have coarse textures and soils derived from volcanic and sedimentary rocks which have medium to moderately fine textures. Soils of low elevation--steep slopes and south and west aspects generally are shallower than the soils of the upper steep slopes and of the gentle slopes and north and east aspects. No extensive areas of highly productive soils occur in the Idaho Primitive Area (U.S. Forest Service 1972).

Vegetation

Generally, the Idaho Primitive Area is covered with conifers, except on some south and west aspects, basins and ridgetops, meadows and above timberline (Douglas 1972).

The steep slopes and high ridges which are predominate over much of the Primitive Area allows for a diversified vegetation. Claar (1973) mentioned that 4 of Daubenmire's 10 vegetation zones of Northern Idaho and Eastern Washington occur in the Primitive Area. These are the ponderosa pine (Pinus ponderosa) zone, Douglas fir (Pseudotsuga menziesii) zone, spruce-fir (Picea-Abies) zone and the alpine zone. Claar notes these are major zones, and include many vegetation types, which may or may not fit into these zones.

I will limit discussion in this paper to the vegetation types (defined as dominance by optical observation) identified in the 2 main study sections in which pocket gopher

activity was found. High ridge--steep valley vegetation types included Blue wildrye (Elymus glaucus)--forbs, Douglas fir--pinegrass (Calamagrostis rubescens), Douglas fir--big sagebrush (Artemisia tridentata), bunchgrasses-forbs amd bunchgrasses-forbs-shrub. Mountain meadows study section was divided into 2 broad vegetation types, meadows and coniferous forests.

METHODS AND PROCEDURES

Kinds of Data

Data accumulated during this study was of 2 types, quantitative plot measurements and direct observation.

Establishment, Location and Time Use of Study Plots

The location of the 7 macroplots established were determined from the general reconnaissance. Macroplots were established according to the amount of gopher sign visible in a particular area. An attempt to insure having more than one gopher per plot was made to enclose as many mounding areas as possible. Plot size was 87ft X 100ft (27m X 30m), approximately 1/5 of an acre and delineated with the aid of string wrapped around corner stakes.

Four macroplots were established in the high ridge--steep valley study region (Fig. 2). Three plots occurred in open patches of grassland surrounded by a predominately Douglas fir forest and one plot was located in a grassland [illegible]. Three were located in Goat Creek drainage and one in the Pioneer Creek drainage. The time of observation for each follows: Goat Basin I (GBI), 16 June-9 August; GBII, 17 June-[illegible] July; GBIII, 17 June-10 August; Pioneer Creek I (PCI), 18 July-18 August. Three plots were established in the mountain meadow region (Fig. 2): Cold Meadows (CoMI), 29 June-3 July; Middle Meadows (MMI), 26 July-28 July; Lower Meadow (LMI),

26 July-29 July. A description of each macroplot occurs in Table 1.

Gopher Population Studies

The methods used in the gopher population study were patterned after Richens (1965) and Reid, et al. (1966). The number of gophers were counted and the activity (fresh sign) was counted in all 7 macroplots. Three types of activity counts were used: 48-hour count; 72-hour count; and periodic count at 2-week intervals. The 48-hour count was used on study plots Co.MI, MMI and LMI. A 72-hour count was conducted on GBII. GBI, GBII, and PCI were checked with the periodic count.

The sign used in the activity counts were mounds (piles of soil) and earth plugs (circular holes of fresh soil at ground level) (Reid, et al. 1966). These are shown in Figs. 4 and 5.

At the beginning of each activity count, all sign in the plot was leveled. A daily count was kept on the total amount of sign made if the plot was a 48- or 72-hour count. During the check, daily in every plot but GBII, the sign was leveled. GBII was checked just once, at the end of 72 hours. A 2-week (periodic count) plot was given the above treatment only at 2 week intervals.

At the end of the specific activity count, trapping of the gophers started. Two or three days of trapping were used for a trapout. Two types of traps were used, the macabee

Table 1. Descriptive characteristics of the seven macroplots.

[illegible]	Drainage	Aspect	Slope	Elevation	Vegetation type
GBI	Goat	S.E.	Zero-Gentle	4320'	Bunchgrass-Shrub-Forb
GBII	Goat	N.W.	Steep	6000'	Bunchgrass-Shrub-Forb
GBIII	Dunce	S.W.	Gentle-Mid. steep	6300'	Forb-Bunchgrass Bunchgrass-Forb
PCI	Pioneer	N.W.	Steep	5200'	Bunchgrass-Forb
COMI	Cottonwood	ZE.	Gentle	6700'	Meadow
MMI	Cottonwood	Zero	Zero	6285'	Meadow
LMI	Cottonwood	Zero	Zero	6075'	Meadow.

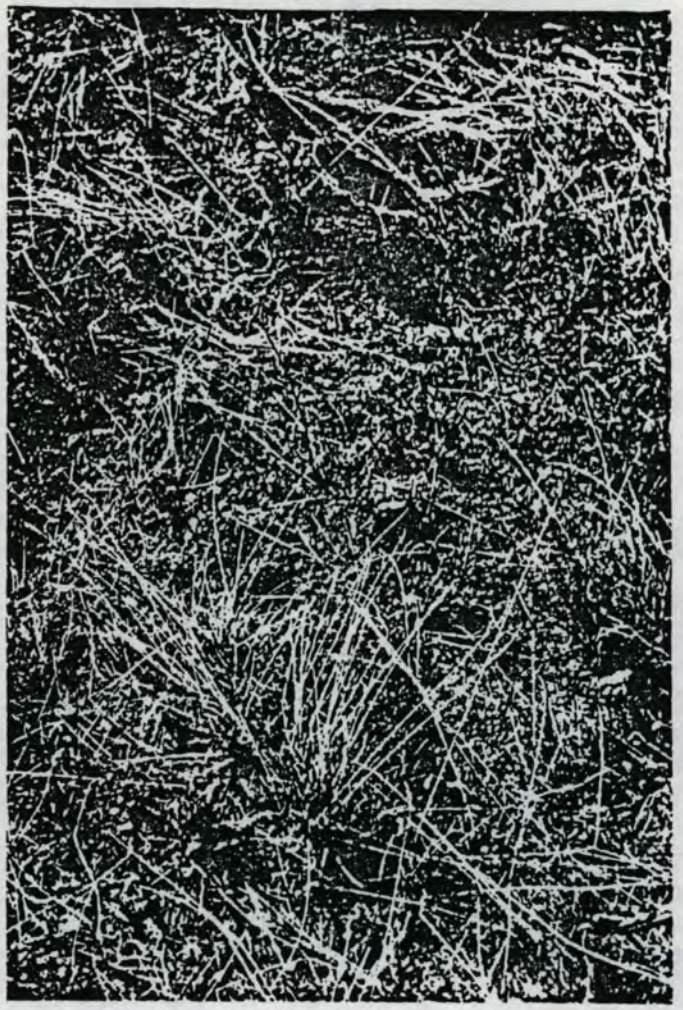

Fig. 4. Pocket gopher mounds.

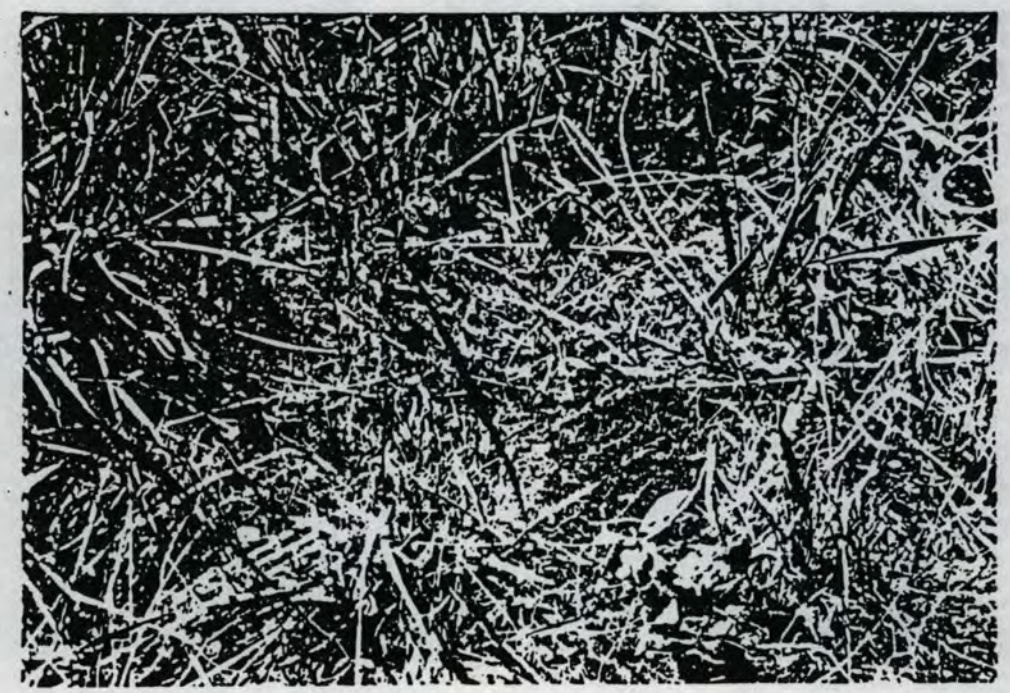

Fig. 5. Pocket gopher plug.

pocket gopher kill trap and box traps (live traps). The majority of traps were placed in the areas of fresh sign. Only 1 or 2 traps were placed in the burrow system showing old sign.

Vegetation Studies

Sampling of vegetation was patterned after Foulton and Tisdale (1961). Four 50 ft (15m) transects were located within the 87 ft X 100 ft (27m X 30m) macroplot. These were located at specific points as shown in Fig. 6. Four 8 in X 20 in (20cm X 50cm) microplot frames were located on each transect at the 5 (1.5m), 20 (6m), 35 (11m) and 50 foot (15m) marks. A total of 16 microplots were taken from each macroplot. Each time the microplot was placed down, plot leg hits were used to record percent bare ground, rock, live vegetation and litter (Daubenmire 1959). A total of 64 plot leg hits were taken at each macroplot.

Species composition was recorded within and outside of the microplot. Percent frequency and percent canopy coverage were also recorded using the microplot. Transects were used to measure the shrub foliage. Each transect was divided into 12 1/2 ft (3.8m) sections to measure a frequency of contact (Canfield 1941). Scientific names follow Hitchcock and Cronquist (1973).

The above information was gathered on all high ridge--steep valley plots. Mountain meadows plots received no detailed vegetation study in this project due to Wing's (1969) intensive study of the mountain meadows. Only the relative

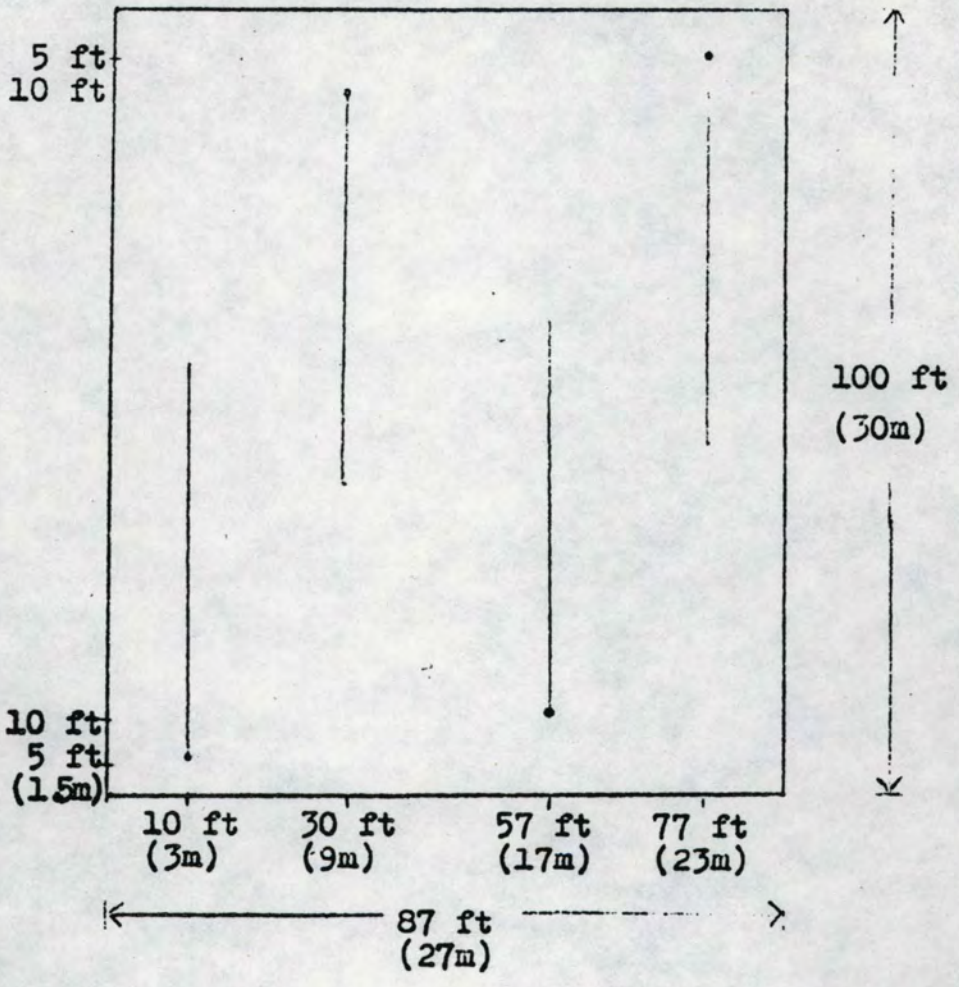

Fig. 6. Location of transects in macroplot for vegetation sampling.

abundance of recognizable plants were recorded. Ideas for field form layouts were acquired from Lauer (1973). The forms can be found in Appendix I.

Observational Information

The majority of observational information deals with the vegetation in which pocket gopher sign occurred. Most of this information came from reconnaissance of areas that I wanted to observe. Whenever I found a fresh gopher sign (usually mounds), a species list was constructed on the recognizable vegetation around the mounds. Complete vegetation present was often times not noted, especially in the mountain meadows, consequently, detailed vegetation information about the site is incomplete. Cover types, based from Wing (1969), were recorded in the mountain meadows where macroplots were located.

A transect of 0.25 mile (0.4km) at 260° was studied 4 times between GBII and GBIII. The transect was observed every 2 weeks between 22 June and 8 August. The activity was recorded in mounding clusters, which I defined as an area of gopher mounding, separated from other mounding clusters by an absence of sign. The distance varied but was at least between 5 (1.5m) to 10 ft (3m). Figure 7 shows the nature of the transect.

Two methods were used to note pocket gopher food preferences (1) direct observation of stems, leaves and roots clipped by gophers and (2) excavation of burrow systems and finding caches.

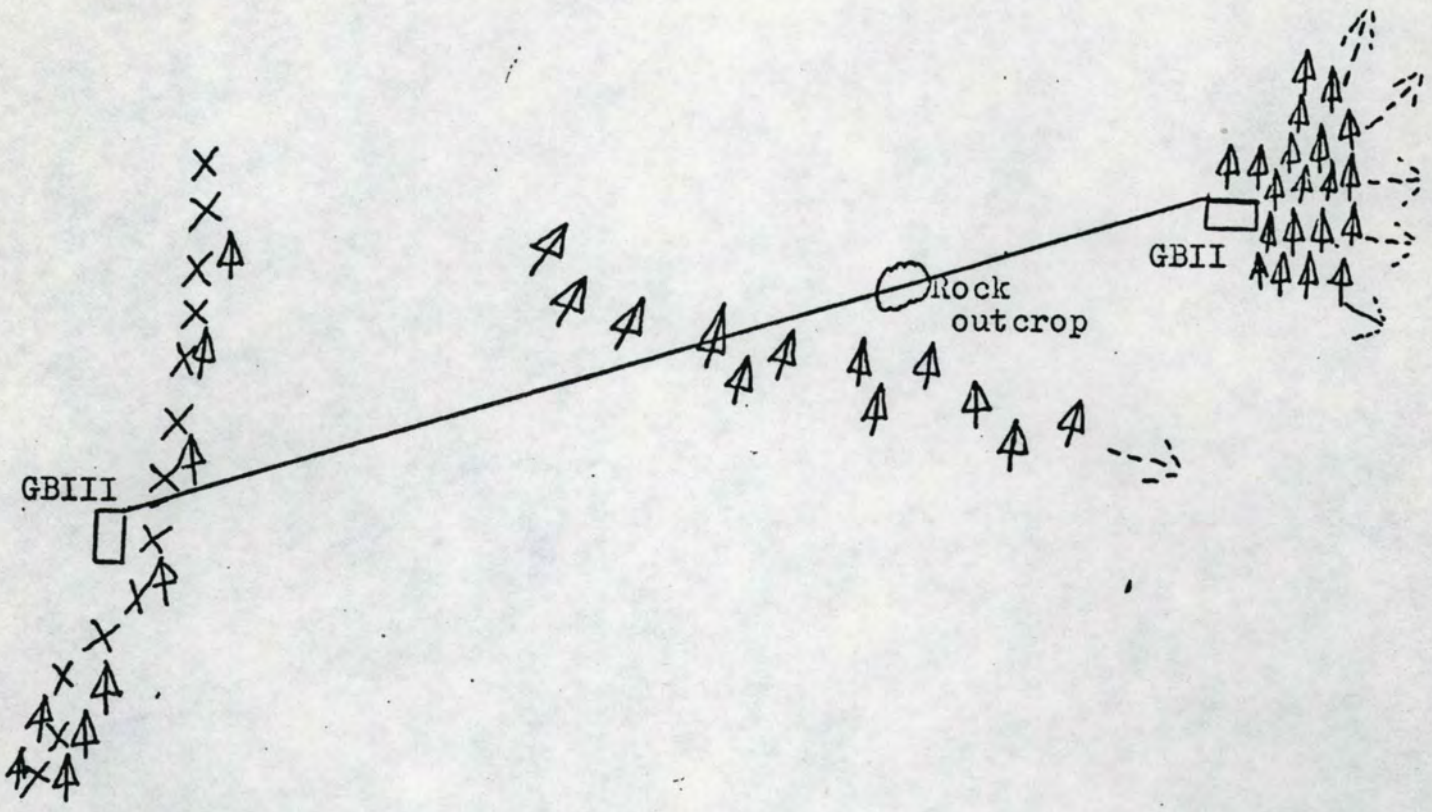

Fig. 7. Transect between GBII and GBIII. Rectangles are the macroplots, X's represent a ridge and the closed arrows represent coniferous trees. Tree symbols closer together represent greater density.

RESULTS AND DISCUSSION

Gopher Population Study

Twenty-six gophers were collected from the study plots of which 5 were juveniles and were not included in the population study. The number of animals trapped for each plot, and the mean number of animals for each main study section are listed in Table 2.

On plots GBIII and LMI, trap-outs were not complete. From the amount of sign present, one gopher on each plot was estimated to still occur on each plot shortly after trapping. Time did not permit continued trapping and one gopher was added to the total number of gophers trapped from each plot.

The amount of activity for each plot varied greatly (Table 2). For the plots that received daily checks, the activity ranged from 0.66 activity per gopher per day for GBII to 9.25 for Co.MI. Activity for the periodic counts in GBI, GBIII and PCI yielded 7.66, 11.48 and 29.60 respectively for activity per gopher per 2 week check.

Originally GBI, GBII and GBIII were planned to be 48-hour counts, but gopher sign did not occur very readily upon daily plot chects. It was decided to increase the counts to 72 hours for GBII and to 2 weeks for GBI and GBIII in hopes of receiving a more adequate activity count.

Although 48-hour counts yielded poor correlation for Richens(1965), Reid et al. (1966) achieved good correlation

Table 2. Total number of gophers and activity for each macroplot. GBI, GBIII and PCI plots were checked every 2 weeks, GBII was checked only once, at 72 hours and Co.MI, MMI, and LMI were checked daily.

Plots	Total number of gophers	Activity per gopher per daily check	Activity per gopher per 2 week check
High-Ridge Steep Valley			
GBI	1	-	7.66
GBII	2	0.66	-
GBIII	7	-	11.48
PCI	5	-	29.60
Mean	3.75	0.66	16.75
Mountain Meadow			
Co.MI	2	9.25	-
MMI	2	6.25	-
LMI	4	5.00	-
Mean	2.66	6.83	-

with gopher populations. Richens noted the difference possible occurred as a result of different seasons. My idea was not to get an estimation of the total gophers present within an area (a large number of plots would be needed), but an estimation of the activity of gophers. This varies accordingly with the population density. Reid it al. (1956) points out that the average number of signs per animal increases as the density per acre increases. Based on the mountain meadows plots, my data did not show this. LMI with the most gophers in a plot had the lowest average activity per gopher per day. More gopher sites were observed in Lower Cottonwood Meadow than Middle Cottonwood Meadows and Cold Meadows which could be an indication the density is higher. One explanation for my results may be that the habitat that the gophers can occupy is more prevalent in Lower Meadow. As Wing (1969) pointed out the moist habitat of Middle Meadows appears to be drier than the moist habitat of the other meadows. This, from my observations, increased the habitat available to the gophers. Table 3, a combination of 2 tables from Wing (1969: 17 and 69), displays the acreage of each meadow unit and the percent of area occupied by Wing's cover types. 14.8% of Lower Meadow is classified as dry and 47.9% is classified as moist. Table 4 shows that out of 24 observed gopher mounding sites in Lower Meadow, 21 were in the moist cover type and only 3 were found in the dry cover type. Only 7.4% of Middle meadows is dry cover type and 12.35% of Cold Meadows is dry cover type. The other 2 meadows had 25 gopher mounding sites observed in the dry cover type and 5 sites in the moist cover type.

Table 3. Acreage of Wing's (1969) meadow units and percent of area occupied by the cover types of each unit.

Meadow unit	Acres	Cover			
		Wet	Moist	Dry	Very Dry
Cold	144.85	52.6	38.3	9.1	0.0
Horse*	62.21	29.4	37.5	16.6	16.5
Phantom	8.30	76.9	23.1	0.0	0.0
Ginger	17.74	60.9	39.1	0.0	0.0
Middle Meadows	122.26	59.5	33.1	7.4	0.0
Lower Meadow	74.44	37.3	47.9	14.8	T <1.0

*A portion of Cold Meadows that is fenced for stock animal use during the summer and fall.

Table 4. Cover type of observed mounding sites and number of sites in Cold, Middle and Lower Meadows.

Meadow Unit	Number of Sites	Dry Cover Type	Moist Cover Type
Cold	18	15	3
Middle Meadows	12	10	2
Lower Meadow	24	3	21

Vegetation Studies

High Ridge--Steep Valley. Results from the 4 macroplots show bluebunch wheatgrass (Agropyron spicatum), Idaho fescue (Festuca idahoensis) and bluegrass (Poa spp.) to be the dominant grasses. Common forbs in all 4 macroplots were yarrow (Achillea millefolium), arnica (Arnica cordifolia), arrowleaf balsomroot (Balsamorhiza sagittata), western hawkweed (Hieracium albertinum), western gromwell (Lithospermum ruderale), stonecrop (Sedum spp.) and goatsbeard (Tragopogon dubius). Common schrubs include rubber rabbitbrush (Chrysothamnus nauseosus) and Oregon grape (Berberis repens).

Table 5 shows data collected from 4 high ridge--steep valley macroplots and line transects. Listed are plants found in the microplots and also plants not occuring in the microplots but within the 100 ft X 87 ft (27m X 30m) macroplot.

Total canopy coverage was 57.4%, 56.6%, 49.3% and 25.4% for GBII, PCI, GBI and GBIII respectively. GBII had 17.81% cover of forbs and 27.66% cover of grasses. In PCI forbs comprised 20% cover and grasses comprised 36.56% cover. GBI's total coverage was 17.81% and 20.15% forbs and grasses respectively. GBIII had 21.22% forb coverage and 2.52% grass coverage.

Tietjen et al. (1967) mentions that forbs are the preferred foods of gophers and that grasses offer only a marginal diet except when they are succulent and have corms or rhizomes, in which case they are a subsistence diet. Barnes (1973) summarized the food habits of gophers as having a preference

Table 5. Percent canopy coverage and percent frequency of the species from the high ridge--steep valley macroplots. The number preceeding the slash is percent canopy coverage, proceeding the slash is percent frequency. Trace (T) represents amounts less than 1 percent. A (#) denotes it is found on the macroplot but not in any microplot.

Species	Pioneer Creek	Goat Creek		
	I	I	II	III
Grasses and Grasslikes				
Agropyron spicatum	3/50	T/12	#	2/38
Bromus tectorum	#	5/31	-	#
Festuca idahoensis	34/100	-	20/94	-
Phleum alpinum	-	#	-	-
Poa spp.	-	10/56	7/75	-
Stipa spp.	-	6/37	-	-
Carex spp.	-	-	T/12	-
Woody Plants				
Berberis repens	-	11/88	T/12	-
Chrysothamnus nauseosus	T/6	#	#	T/19
Phlox longifolia	-	-	T/6	#
Physocarpus malvaceus	-	-	T/12	-
Prunus virginiana	-	T/6	-	-
Pseudotsuga menziesii	#	-	-	-
Ribes cereum	-	-	#	6
Rosa woodsii ultramontana	-	T/12	-	-
Sambucus cerulea	-	-	#	-
Spiraea betulifolia	-	T/75	T/75	-
Forbs				
Achillea millefolium	4/50	7/75	T/12	T/12
Allium spp.	-	-	-	#
Antennaria microphylla	2/37	-	5/56	#
Arabis holboellii	#	-	-	-
Arnica cordifolia	T/12	2/31	T/6	T/6
Astragalus spp.	T/6	-	-	-
Balsamorhiza sagittata	T/6	#	2/19	9/44
Brodiaea douglasii	T/19	T/6	-	-
Castilleja cusickii	-	#	-	-
Claytonia lanceolata	-	-	T/12	2/31
Collinsia parviflora	-	T/25	-	T/38
Delphinium burkei	-	-	-	1/44
Dodecatheon spp.	-	T/6	-	-
Erigeron speciosus	T/25	#	-	-
Eriogonum spp. *	5/62	3/19	#	5/50

Table 5. continued.

Species	Pioneer Creek I	Goat Creek I	Goat Creek II	Goat Creek III
Erythronium grandiflorum	-	-	#	-
Fragaria vesca	-	T/6	T/6	-
Frasera albicaulis	2/32	-	--	-
Fritillaria atropurpurea	-	-	T/6	-
Geum triflorum	#	-	#	-
Hackelia cinerea	-	T/35	-	-
Hieracium albertinum	1/25	#	1/12	T/31
Lithophragma spp.	-	T/12	#	-
Lithospermum ruderale	4/12	T/6	#	#
Lupinus sericeus	-	T/9	-	T/31
Mertensia longiflora	-	-	3/38	-
Microsteris gracilis	-	T/12	T/25	T/12
Phacelia spp.	-	#	-	-
Phacelia linearis	-	T/31	-	#
Potentilla diversifolia	-	-	T/6	-
Sedum spp.	T/6	#	T/12	#
Senecio spp.	-	-	-	T/12
Smilacina stellata	-	-	T/6	-
Taraxacum officinale	T/6	T/19	#	-
Tragopogon dubius	#	T/12	#	#
Trifolium spp.	-	T/38	3/44	-
Unknown Vegetation				
Grass	-	-	T/12	#
Grass	-	-	-	#
Grasslike	-	-	-	T/50
Mustard	#	T/31	-	-
Mustard	#	#	-	#
Annual Forb	#	#	#	-
Perennial	T/6	-	T/12	-
Perennial	-	-	-	#

* Eriogonum heracleoides and E. ovalifolium expressed together.

for forbs over grasses and consume woody plants when the preferred species are not available. This might explain the larger number of gophers in PCI and GBIII where coverage with forbs was higher than in GBI and GBII. Composition of the vegetation varies greatly between GBII and GBIII. In this case vegetation may be the limiting factor, but other factors such as soil depth, temperature, moisture and texture could be limiting (Richens 1965, Hooven 1971) but were not studied. GBI is about 2000 ft (609.6m) lower than GBIII and much warmer. As mentioned previously, soils of lower elevation are generally shallower than those of upper slopes. If the soil of GBI is shallower than GBIII, soil temperature or soil depth may influence the population density. Claar (1973) found gopher disturbance generally occurring on ridgetops and higher elevation benches.

The condition of the ground surface was estimated using the legs of the microplot frame (Table 6). Leg hits were

Table 6. Condition of the ground surface using microplot leg hits expressed as percentages.

Ground surface leg hits	Microplots GBI	GBII	GBIII	PCI
Soil	40.6	40.6	73.4	37.5
Rock	0.0	0.0	3.1	4.7
Live vegetation	6.2	20.3	6.2	14.1
Litter	53.1	39.1	17.2	43.8

used to record the percentage of soil, rock, live vegetation and litter. Each macroplot contained 64 hits. Soil ranged

from 37.5% to 73.4%, rock from 0.0% to 4.7%, live vegetation from 6.25% to 20.3% and litter ranged from 17.2% to 53.1%.

Mountain Meadows. Common species of the 3 macroplots in the mountain meadow study region are wheatgrass, (Agropyron spp.), Idaho fescue, yarrow, strawberry (Fragaria virginiana, cinquefoil (Potentilla diversifolia), groundsel (Senecio spp.), and clover (Trifolium spp.). A list of plants and the relative abundance of each species are found in Table 7. I define relative abundance as an ocular estimate of dominance based on individual species cover. A detailed description of these mountain meadows and others of the northern 2/3 of the Big Creek Ranger District can be found in Wing (1969).

Using data calculated by Wing (1969) a partial table of total ground coverage for Horse Pasture, Middle Meadows and Lower Meadow is shown in Table 8. Table 9 shows total ground coverage of forbs, grasses, sedges and rushes, and shrubs of the dry cover type of Horse Pasture and Middle Meadows and the moist cover type of Lower Meadow.

Macroplots Co.MI, actually located in the Horse Pasture, and MMI occurred in the dry cover type. Macroplot LMI was located in a moist cover type. The coverage totals in the table are listed as a reference. The number of gophers caught in each meadow Table 2) may be explained as a result of similarities in vegetation and cover types (Lower Meadow is drier). Forbs have already been mentioned as the preferred foods of gophers. Table 9 shows that total ground coverage of forbs does not vary greatly in the 3 meadows.

Table 7. Common species of the Mountain Meadows macroplots and relative abundance of each. A represents abundant, C, common and R, rare.

Species	Macroplots Co.MI	MLI	LMI
Grasses and Grasslikes			
Agropyron spp.	C	C	A
Festuca idahoensis	C	C	R
Phleum alpinum	-	A	R
Poa spp.	-	A	-
Carex spp.	-	C	C
Woody Plants			
Potentilla fruticosa	-	C	C
Forbs			
Achillea millefolium	C	C	C
Aconitum columbianum	-	-	R
Antennaria spp	A	*	-
Castilleja spp.	A	-	-
Claytonia lanceolata	*	-	-
Cirsium scariosum	-	A	-
Fragaria virginiana	C	A	R
Penstemon spp.**	C	C	-
Polygonum bistortoides	R	-	-
Potentilla diversifolia	A	C	C
Ranunculus alismaefolius	*	-	-
Senecio spp.	A	R	A
Taraxacum officinale	-	-	C
Trifolium spp.	C	C	C
Viola spp.	*	-	-
Unknown Vegetation			
Grass	C	-	-
Mustard	*	-	-
Annual forb	-	-	C
Perennial forb	-	C	R

* Early phenology and did not show up in Middle Meadows or Lower Meadow.

** Both P. procerus and rydbergii included.

Table 8. Total ground coverage of meadow vegetation for each cover type in Horse Pasture, Middle Meadows and Lower Meadow.

Cover Type	Horse Pasture	Middle Cottonwood Meadows	Lower Cottonwood Meadow
Very Dry	36.9	0.0	0.0
Dry	46.8	51.2	56.8
Moist	54.2	48.2	74.7
Wet	68.5	67.1	83.9

Table 9. Total ground coverage of forbs, grasses, sedges and rushes and shrubs of the dry cover type of Horse Pasture and Middle Meadows and the moist cover type of Lower Meadow.

Species Category	Horse Pasture	Middle Cottonwood Meadows	Lower Cottonwood Meadow
Forbs	28.2	21.9	25.9
Grasses	14.7	19.0	25.8
Sedges, Rushes, Horsetails	3.6	4.1	8.1
Shrubs	0.3	6.2	14.9

Observational Information

High Ridge--Steep Valley Vegetation and Gopher Occurrence.

The observational data for the high ridge--steep valley section was gathered from 4 drainages, Rush Creek, Cliff Creek, Pioneer Creek and Goat Creek. The results of the vegetation found near gopher sign is shown in Table 10. The vegetation was divided into 4 vegetation types, blue wildrye--forbs, Douglas fir--pinegrass, Douglas fir--sagebrush and grass--forb--shrub.

Sixty observations were recorded: 2 for blue wildrye--forbs; 28 for Douglas fir--pinegrass; 4 for Douglas fir--sagebrush and 26 for grass--forb--shrub.

The only sites in which pocket gopher sign was recorded along Big Creek occurred in the basins next to the creek about 3 miles (5km) downstream from the Taylor Ranch. Species common to both sites were Oregon grape, snowberry (Symphoricarpus albus), blue wildrye, yarrow and fleabane (Erigeron spp.).

The Douglas fir--pinegrass vegetation type was found in all 4 drainages. The majority of these sites were in small distinct openings or clearings in the forest. Usually only one mounding area was seen. This leads me to believe that only one gopher inhabited these small openings. The vegetation in this community is more diverse than the blue wildrye--forb vegetation type. Ten species were common in all 4 drainages. The dominant species were Douglas Fir, pinegrass, Idaho fescue, yarrow and arnica. Sites that were not as open as others, had fewer species and grass species were more common.

Table 10. Species composition and percent frequency of occurrence in Rush, Goat, Cliff and Pioneer Creek drainages.

	Vegetation Type: Blue Wildrye--Forb		Douglas fir--Pinegrass				Douglas Fir Sagebrush	Grass--Forb--Shrub			
	Drainages										
	GC	PC	GC	PC	CC	RC	RC	GC	PC	CC	RC
Number of Sites	1	1	14	8	2	4	4	9	7	3	7
Grasses and Grasslikes											
Agropyron spicatum	-	100	36	38	50	75	75	89	100	100	86
Bromus tectorum	-	100	-	12	-	-	-	-	43	67	71
Calamagrostis rubescens	-	-	64	75	50	75	25	-	14	-	-
Elymus glaucus	100	100	-	-	-	50	-	-	-	-	-
Festuca idahoensis	-	100	64	50	-	50	100	89	100	67	71
Poa spp.	100	-	-	12	-	-	25	-	29	-	-
Stipa spp.	-	-	14	-	-	75	-	11	29	-	14
Carex spp.	-	-	36	12	-	-	-	33	-	33	-
Woody Plants											
Artemesia tridentata	-	-	-	-	-	-	100	-	29	-	86
Berberis repens	100	100	21	-	-	-	-	-	29	-	-
Chrysothamnus nauseosus	-	-	-	-	-	-	-	44	29	33	43
Phlox longifolia	-	-	[illegible]					[illegible]	[illegible]	-	[illegible]
Physocarpus malvaceus	-	-	43	50	50	25	75	33	43	-	14
Pinus ponderosa	-	-	[illegible]		150	-	-	-	-	-	-
Pseudotsuga menziesii	-	-	79	100	100	100	100	-	-	-	-
Purshia tridentata	-	-	-	-	-	-	50	-	-	-	37
Ribes cereum	-	-	7	-	-	-	-	11	14	-	-

Table 10. continued.

	YYY										
	GC	PC	GC	PC	CC	RC	RC	GC	PC	CC	RC
Number of sites	1	1	14	8	2	4	4	9	7	3	7
Rosa woodsii	-	-	-	-	-	-	-	-	29	-	-
Spiraea betulifolia	-	-	7	-	-	-	-	-	11	14	-
Symphoricarpus albus	100	100	36	25	-	50	25	11	29	33	-
Forbs											
Achillea millefolium	100	100	64	38	100	100	100	89	86	100	100
Antennaria microphylla	-	-	14	-	-	-	25	78	14	-	-
Arabis holboellii	-	-	7	-	-	-	-	-	-	-	-
Arnica cordifolia	-	-	36	62	50	50	-	11	14	-	-
Astragalus spp.	-	-	-	-	-	-	-	-	-	33	14
Balsamorhiza sagittata	-	-	29	38	100	75	100	78	71	100	57
Brodiaea douglasii	-	-	-	-	-	-	-	33	29	33	14
Castilleja spp.	-	-	-	-	50	-	-	-	-	67	-
Claytonia lanceolata	-	-	-	-	-	-	-	11	-	-	-
Collinsia parviflora	-	-	-	12	-	-	25	-	-	-	-
Delphinium burkei	*	-	--	-	-	-	-	11	-	-	-
Epilobium angustifolia	-	-	-	-	-	-	-	11	-	-	-
Erigeron speciosus	-	-	-	-	-	100	75	11	43	33	57
Erigeron spp.	100	100	-	-	-	-	-	-	-	-	-
Eriogonum spp.	-	100	-	12	-	-	50	67	57	67	86
Erythronium grandiflorum	-	-	-	-	-	25	25	-	14	33	-
Fragaria vesca	-	-	64	25	-	25	-	22	-	-	-
Frasera albicaulis	-	100	-	-	50	-	-	22	57	67	29
Geum triflorum	-	-	7	12	-	25	25	-	14	33	-
Gilia aggregata	-	-	-	-	50	-	-	-	-	33	-
Hackelia cinerea	-	-	-	-	-	-	-	-	-	33	-
Hieracium albertinum	-	100	36	12	-	100	75	67	100	67	58
Lithophragma spp.	-	100	14	12	-	-	25	11	29	33	-

Table 10. continued.

	GC	PC	GC	PC	CC	RC	RC	GC	PC	CC	RC
Number of sites	1	1	14	8	2	4	4	9	7	3	7
Lithospermum ruderale	-	100	7	12	50	75	-	55	43	100	58
Lomatium spp.	-	-	-	-	-	-	25	11	-	-	-
Lupinus sericeus	-	-	-	-	50	-	75	22	29	67	71
Mertensia longiflora	-	-	14	12	-	25	25	33	14	-	-
Penstemon spp.	-	-	-	-	50	-	-	-	-	33	-
Phacelia linearis	-	-	7	-	-	-	-	11	-	-	29
Potentilla diversifolia	-	100	43	-	-	-	25	33	14	-	-
Ranunculus spp.	-	-	-	-	-	-	25	-	-	-	14
Sedum spp.	-	-	-	12	-	25	-	44	14	67	14
Taraxacum officinale	100	-	-	-	-	-	-	-	14	-	-
Tragopogon dubius	-	100	14	-	-	-	25	44	29	33	57
Trifolium spp.	100	-	86	62	-	75	25	78	29	-	29
Viola purpurea	-	-	-	-	50	-	-	-	-	33	-
Unknown Vegetation											
Grasses	-	100	14	-	50	-	-	55	29	67	-
Composite	-	-	-	-	-	-	-	-	-	-	14
Mustards	-	-	-	-	-	-	-	22	-	-	-
Annuals	-	-	-	-	-	-	-	22	-	-	-
Ferns	-	-	77	12	-	-	-	-	-	-	-

* Erigonum heracleoides and E. ovalifolium included.

The Douglas fir--sagebrush vegetation type was only found on the east and southeast aspects of Rush Creek. Four sites were observed for this vegetation type and were located in slight draws (drainages) or near the tops of side ridges. These sites were moisture reservoirs. The draws of course had a concentration of water flowing towards the depression and the ridges were sites of snow deposition as was evident during early summer when snow was still present on the lee ward slopes. The dominant species were big sagebrush, Douglas fir, Idaho fescue, yarrow and balsamboot.

The last vegetation type is the grass--forb--shrub. This community occurs in all 4 drainages and is the most diverse (diversity being measured by the number of species). A total of 14 species were common in all drainages. The dominant species were bluebunch wheatgrass, Idaho fescue, yarrow, balsamroot, buckwheat (Eriogonum spp.) and western hawkweed. The sites that comprise this vegetation type are usually the drier, steeper slopes, south and west facing or the basins and mesas that have a gentle slope and are south facing.

Mountain Meadows Vegetation and Gopher Occurrence.

The mountain meadows observation section is divided into 2 broad communities, meadows and coniferous forest. The meadows included Cold, Middle Cottonwood, Lower Cottonwood, Ginger and Coyote Springs (Table 11). The coniferous forest was observed during trips from Middle Meadows to Lower Meadow, Lower to Phantom Meadow to Cold Meadows and from Coyote Springs to Smith Camp (Table 12). Seventy-nine observations were recorded, 57 from the meadows and 22 from the forest.

Table 11. Species composition of plants from observations in Cold Meadows, Middle Cottonwood Meadows, Lower Cottonwood Meadow, Ginger Meadow and Coyote Springs, and frequency of occurrence of each species.

	Meadows				
	Cold	Middle	Lower	Ginger	Coyote
Number of sites	18	12	24	2	1
Species					
Grasses and Grasslikes					
Agropyron spp.	89	17	50	100	-
Carex spp.	33	8	46	-	100
Festuca idahoensis	39	25	38	-	-
Phleum alpinum	67	75	38	100	-
Poa spp.	-	8	4	-	-
Stipa spp.	17	-	20	-	-
Woody Plants					
Alnus spp.	-	-	82	-	-
Pinus contorta	-	17	-	-	-
Potentilla fruticosa	-	42	100	-	-
Vaccinium scoparium	-	-	12	50	-
Forbs					
Achillea millefolium	78	83	100	100	-
Aconitum columbianum	11	-	42	-	-
Antennaria spp.	39	43	92	-	-
Castilleja spp	11	-	-	-	-
Cirsium scariosum	6	67	38	50	-
Erigeron spp.	-	-	-	50	-
Eriogonum spp.	17	-	-	-	100
Fragaria virginiana	33	42	92	100	-
Geum triflorum	5	-	12	-	-
Penstemon procerus	78	-	12	-	100
Penstemon rydbergii	5	-	-	-	-
Polygonum bistortoides	44	-	-	-	100
Potentilla diversifolia	50	8	12	-	-
Ranunculus spp.*	-	-	-	-	100
Sedum spp.	-	25	38	-	-
Senecio spp.	61	8	54	100	-
Taraxacum officinale	44	42	80	50	-
Trifolium spp.	66	92	75	50	-
Trollius laxus	-	-	-	-	100
Valeriana spp.	11	-	-	-	-
Unknown Vegetation					
Grass	50	75	54	100	100
Shrub	-	8	-	-	-
Composite	17	33	83	-	-

* High elevation phenology.

Table 12. Species composition of plants from observations of mountain meadows coniferous areas and frequency of occurrence of each species.

	Middle to Lower Meadow	Lower to Phantom to Cold Meadow	Coyote Springs to Smith's Camp
Number of Sites	4	11	7
Species			
Grasses and Grasslikes			
Agropyron spp.	75	-	-
Calamagrostis rubescens	25	-	-
Carex spp.	25	45	43
Woody Plants			
Abies lasiocarpa	-	27	71
Berberis repens	-	9	-
Picea engelmannii	25	18	-
Pinus albicaulis	-	-	43
Pinus contorta	100	82	29
Pseudotsuga menziesii	25	18	-
Spiraea betulifolia	-	9	-
Symphoricarpus albus	-	9	-
Vaccinium spp.	-	9	-
Vaccinium scoparium	50	64	43
Forbs			
Achillea millefolium	50	36	29
Antennaria spp.	-	27	-
Aquilegia flavescens	-	-	43
Arnica spp.	-	-	57
Castilleja spp.	50	9	57
Cirsium scariosum	-	-	-
Erigeron spp.	-	-	29
Eriogonum umbellatum	-	-	14
Fragaria virginiana	-	27	-
Lupinus spp.	50	45	86
Pedicularis contorta	-	-	14
Penstemon procerus	-	-	29
Senecio spp.	25	64	-
Trifolium spp.	100	64	-
Valeriana spp.	-	9	57
Xerophyllum tenax	-	64	-
Unknown vegetation			
Grasses	100	18	14
Shrub	-	9	-
Composite	-	-	43

Ginger meadows and Coyote Springs were observed during mid-August. Together, only 3 observations were made and fewer plants were recorded than for the other 3 meadows. The observations for Ginger Meadows were recorded along the edge of the meadow. The common species were wheatgrass, mountain timothy (Phleum alpinum), yarrow, strawberry and groundsel. The vegetation of Coyote Springs was far behind the other meadows in phenology. Only 7 plants were recognized and at least 6 species were not recognized. All 5 meadows had unknown grasses.

Transects were run to observe the vegetation and gopher occurrence in Cold, Middle and Lower Meadows. Thirteen species were common to all 3 meadows. Of these, the most common were mountain timothy, yarrow, pussytoes (Antennaria microphylla), strawberry, dandelion (Taraxacum officinale) and clover. These meadow sites were divided into the cover types used by Wing (1969) based on similarities in vegetation between the sites and Wing's cover types. (pages 28, 29 and 30). For Cold and Middle Meadows, 30 mounding sites were observed and 25 were on the dry cover type (Table 4). Twenty-four mounding sites were observed on Lower Meadow, 21 sites were in the moist cover type. Wing (1969) points out that the moist habitat on Lower Meadow appears to be drier than the moist habitat of the other meadows he studied.

Generally the dry cover type was found on the outer edge of the meadow next to the forest and the moist was between the dry cover type and the wet cover type (Wing 1969).

This was not always the case as often the dry cover type extended into the meadow further than can be considered the edge and the moist cover type was often seen to extend up next to the edge. Particular attention was payed to the location of the gopher mounding site in relation to the edge as Hungerford (1975) indicated that the site of an initial gopher population expansion may be located near the edge of the meadow.

From the observations I made of the mounding sites and from Wing's observation about Lower Meadow, I would have to conclude that gophers are concentrated in the dry cover types and the drier moist cover types. The location of these sites do not always correspond to the meadow-forest ecotone as sometimes the dry cover type extends in towards the middle of the meadow and the moist cover types may extend to the edge.

The forest around Cold Meadows was predominately dense lodgepole pine (Pinus contorta), with scattered Engelmann spruce (Picea engelmannii) and subalpine fir (Abies lasiocarpa). A fire at one time in the near past created this situation. The understory consisted of whortleberry (Vaccinium scoparium), beargrass (Xerophyllum tenax), snowberry, Oregon grape and violet (Viola spp.). In the moister habitats sedge (Carex spp.), dogtooth-violet (Erythronium grandiflorum), trillium (Trillium ovatum), strawberry and huckleberry (Vaccinium spp.) were also found. Gophers were not found in this dense coniferous forest with a large cover of whortleberry and a small cover of forbs and grasses.

The species common in the other 3 areas (Table 12) are

lodgepole pine, whortleberry, sedge, yarrow, lupine (Lupinus spp.) and unidentifiable grasses. Most of the observation sites occurred in openings in the forest canopy but some occurred where the canopy was closed except for the opening the hiking trail created. The trail opening along with soil compaction may have an influence on gopher occurrence but gophers were found in the Douglas fir--pinegrass vegetation type where a closed canopy was present.

GBII to GBIII Transect for Gopher Activity.

The number of mounding clusters increased from 2 clusters on 22 June to 19 clusters on 8 August (Figs. 8-11). No trapping was conducted and I do not know if the increase in clusters is due to increased adult gopher activity or juvenile dispersal.

The majority of mounding clusters occurs in the upper portion of the transect(GBIII). The vegetation is similar to GBIII, but by ocular estimates, rubber rabbitbrush and Idaho fescue are more abundant on this west facing slope. Forbs comprise 90% of the vegetative cover in GBIII and grasses 9.8%. The percentage of forbs and grasses in GBII is 32% and 48% respectively. A gradual change from a high percentage of forbs to a lower percentage of forbs occurs with a decrease in elevation. Quantatative data is lacking to prove this, as only ocular measurements of vegetation were taken. Barnes (1973) states forbs are more preferred than grasses as a food source and this fact could explain the presence of more gophers nearer to GBIII. Also various soil factors could influence the gopher population.

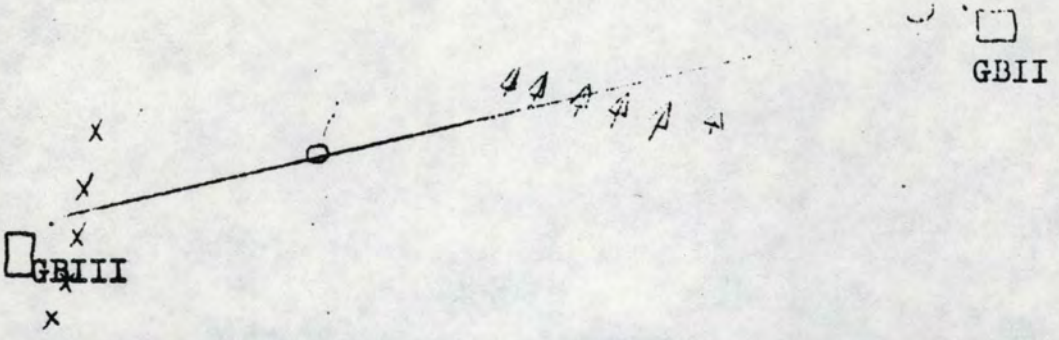

Fig. 8. Transect 22 June. (o) represent mound clusters.

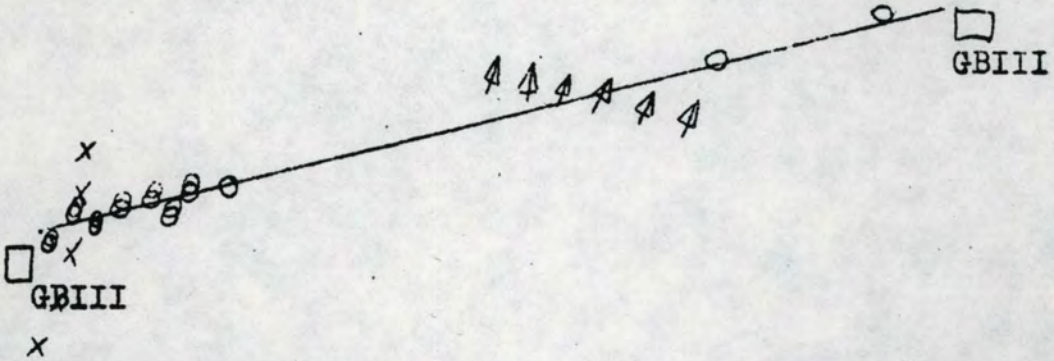

Fig. 9. Transect 10 July.

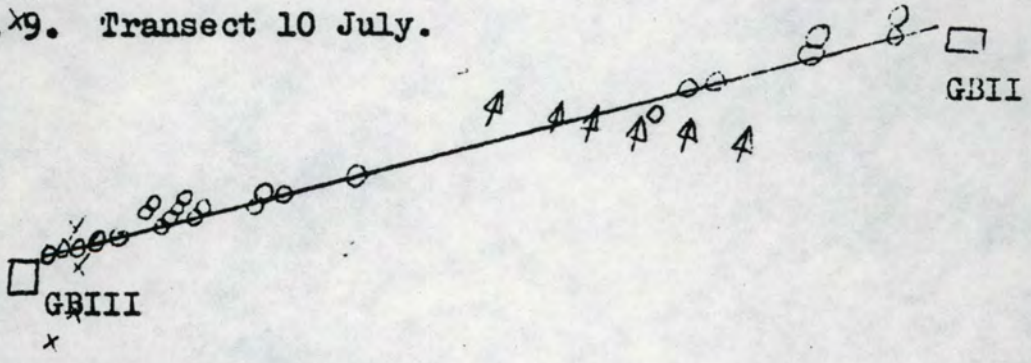

Fig. 10. Transect 24 July.

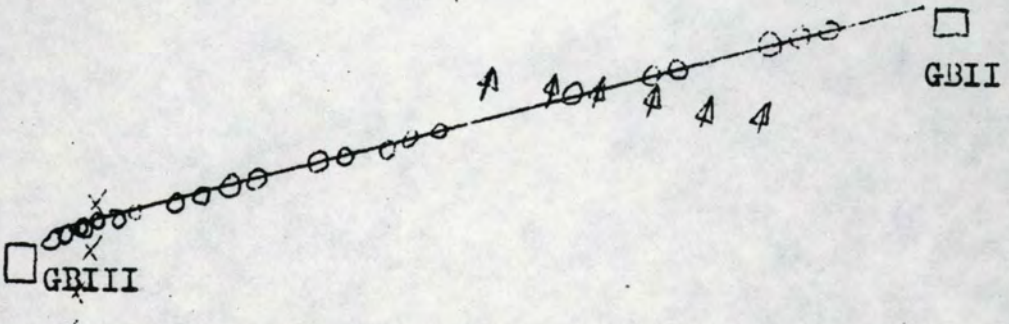

Fig. 11. Transect 8 August.

Food Preference.

Two caches were uncovered during examination of burrows. One, in Cold Meadows, revealed both dry and green material. The dry matter made up over 75% of the total material and consisted of grass and/or sedge pieces. The green matter, mostly leaves and stems, was primarily groundsel with some dandelion. The other cache, found in GBIII, had 4 large pieces of balsamroot leaves.

From the size of the teeth marks and the close proximity to gopher mounds, 12 species were found clipped by gophers (Fig. 12). Two species, a western hawkweed leaf and an unknown root were found in the cheek pouch of one gopher. Grasses clipped were bluegrass, Idaho fescue and an unknown grass. Shrubs clipped were rubber rabbitbrush, Oregon grape and buckwheat (Eriogonum spp.). Balsamroot, locoweed (Astragalus spp.), western hawkweed, goatsbeard and elk thistle (Cirsium scariosum) were the forbs clipped. Table 13 lists the species, the damage to them and the number of occurrences.

Pocket gopher measurements.

Standard scientific measurements were taken from 31 gophers. Of the 31, 15 were females, 11 were males and 5 were young of the year. The measurements can be found in Table 14. The variety of nothern pocket gopher represented in the Idaho Primitive Area is (T. T. fuscus) and corresponds to the geographic distribution of this variety in (Davis 1939). The variety was determined by total length, foot length and color comparison of specimens found in the Life Science Department

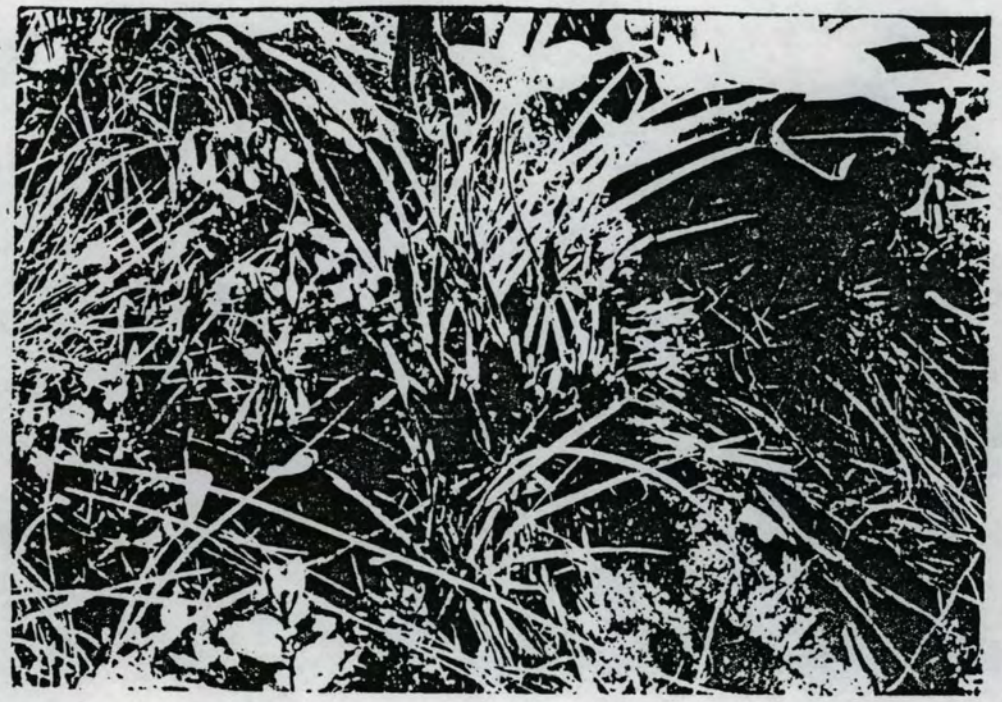

Fig. 12. Balsamroot leaves clipped. Mound in lower right corner.

Table 13. Species list of plants found disturbed by gophers, the damage to the plant and the number of times each disturbance was found.

Species	Plant Portion Damaged	
	Leaves and Stems	Roots
Grasses		
Festuca idahoensis	1	-
Poa spp.	1	-
Woody Plants		
Berberis repens	-	1
Chrysothamnus nauseosus	-	1
Forbs		
Astragalus spp.	-	1
Balsamorhiza sagittata	9	1
Cirsium scariosum	1	-
Eriogonum spp.	-	1
Hieracium albertinum	2	2
Tragopogon dubius	-	2
Unknown vegetation		
Grass	1	-
Root	-	1

Collection at the University of Idaho.

Female Activity.

Of the 31 gophers, 6 were collected from general reconnaissance trips and they were females. From GBI only 1 gopher was trapped, this was also a female. When trapping during reconnaissance, I placed the traps where fresh sign was abundant. The locations of the macroplots were also based on intensive fresh sign. On plot GBII gopher #3 was trapped first. Time did not allow for a complete trapout. I knew one gopher still inhabited the plot. Upon returning 2 weeks later to finish trapping, little sign was present and only in the immediate location of where I had unsuccess-

Table 14. Measurements of gophers trapped in both study sections.

ID #	Sex	Weight	Tot. Length	Tail	Foot	Ear	Location
1	F	*	177mm.	49mm.	25mm.	7mm.	Crescent Mdw.
2	F	72gr.	181	55	25	7	Coot Basin
3	F	65	175	45	23	6	GBII
4	F	*	166	47	24	6	Co.MI
5	*	*	115	29	19	4	Co.MI
6	*	[illegible]	114	27	18	3	Co.MI
7	*	18	114	28	19	4	Co.MI
8	*	18	106	28	18	4	Co.MI
9	M	87	187	49	28	7	Co.MI
10	M	36	148	36	23	7	GBII
11	F	82	[illegible]	49	26	6	Cold Mdw.
12	M	*	176	46	25	7	[illegible]MII
13#	F	*	-	-	-	-	[illegible]MI
14	M	*	161	44	24	6	[illegible]MII
15	F	*	184	49	26	[illegible]	[illegible]MII
16	M	*	175	43	25	7	[illegible]MII
17	M	57	183	53	26	7	PCI
18	M	67	188	59	26	7	PCI
19	F	70	196	61	27	7	PCI
20	M	72	191	59	27	6	PCI
21	F	*	170	41	26	6	[illegible]GBIII
22	F	*	185	49	25	6	GBIII
23	M	*	191	48	27	7	GBIII
24	M	47	177	50	25	6	GBIII
25	M	82	193	49	25	6	GBIII
26	F	[illegible]	168	[illegible]6	26	6	GBIII
27	F	62	190	58	26	6	GBI
28	*	22	132	37	23	5	GBIII
29	F	58	182	55	25	5	Rush Cr.
30	F	54	173	55	25	6	Rush Cr.
31	F	*	185	47	27	7	Coyote Spr.
32	F	52	172	51	26	6	PCI

* = Unknown
# = Trapped and Released

fully tried to trap gopher #10 2 weeks previously.

On plot Co.MI, a female was trapped the first day. After removal of the female the activity within the plot over the next 48 hours dropped from an average sign per day of 18.5 to 4. Three signs were associated with pup activity and only 1 was found in the location of where gopher #9 was eventually trapped. A day went by before the activity of #9, an adult male, was noticed. This may be attributed to the territory of the male not occurring entirely of the plot. Kuck (1969) found that adult males were less active than the females and juveniles. He also found an increase in actibity during late June and early July and mentions that this may be attributed to an increase in the food demand of adult females and young or an increase in the availability of forbs.

CONCLUSIONS

Pocket gophers were found throughout the 2 study sections. The activity was found to be the greatest where the vegetation was primarily forbs and grasses. From the observations and from results of GBIII, ridge tops, that lack a dense conifer cover and have a cover mostly of forbs and grasses, will support a population of gophers. This is true for the mountain meadows that have a large portion of the area made up of a dry cover type. In some areas soil moisture may need to be measured as in the case of Lower Meadow, where Wing (1969) concluded its cover types were drier than the other meadows he surveyed.

Habitats in which gophers were not present were the dense lodgepole pine forest of the mountain meadows region and the shallow, rocky soils of the high ridge--steep valley section.

The activity of the gophers was quite variable in the plots established and more plots should have been established to have a more reliable estimate.

For a more detailed survey of the gopher population more than one factor (vegetation) needs to be studied since the population is a result of many factors. Factors that need to be studied along with vegetation are soil depth, temperature, moisture and texture.

This is the first time I attempted a research study and

throughout the summer I noticed various errors in my techniques. I feel that these are important to list since these were also a part of my education.

First of all, a larger macroplot should have been used. A plot size of 1/2-1 acre would have allowed more gophers to be included in the plot, and more reliable estimates of gophers and activity would be obtained. This may have accounted for the low activity on Co..I after the female was removed. But, for one person the chance of error in activity counts would increase as the plot size increased.

Two more problems occurred with the plots. One was the vegetation sampling. I should have used 40 microplots, as Daubenmire (1959) suggests, instead of 16. After the Goat Basin plots were established, I soon realized that time was spent mostly on setting up the plot and the sampling of the macroplots did not consume as much time as I had thought it would. The last problem I encountered with the plots was the 2-week activity counts on steep, loose soils. I would use a shorter time period to count the activity on steep unstable slopes. Rain was quite prevalent during the summer and fresh sign was difficult to count after a rain due to erosion of the mounds.

More adequate data could have been collected from the meadow vegetation type of the mountain meadows if I had established more plots in Cold Meadows during my first visit there and if I would have known about one particular characteristic in identifying the cover type used by Wing (1969).

Two or 3 plots should have been established in order

to yield a more reliable estimate of the activity. Also, one of these plots should have been used as a periodic count and checked throughout the summer to be compared with the periodic counts of the high ridge--steep valley section.

The characteristic used by Wing that may have been helpful in better identification of the cover types was the high occurrence of Ranunculus alismaefolius on the moist cover type. I used this for identifying the cover type in Cold Meadows my first visit there. During the second visit to the mountain meadows, this characteristic could not be used since the plant senesced. A visit to Middle Meadows and Lower Meadow should have been included in the first visit to the mountain meadows in order to have used the same cover type identification characteristic.

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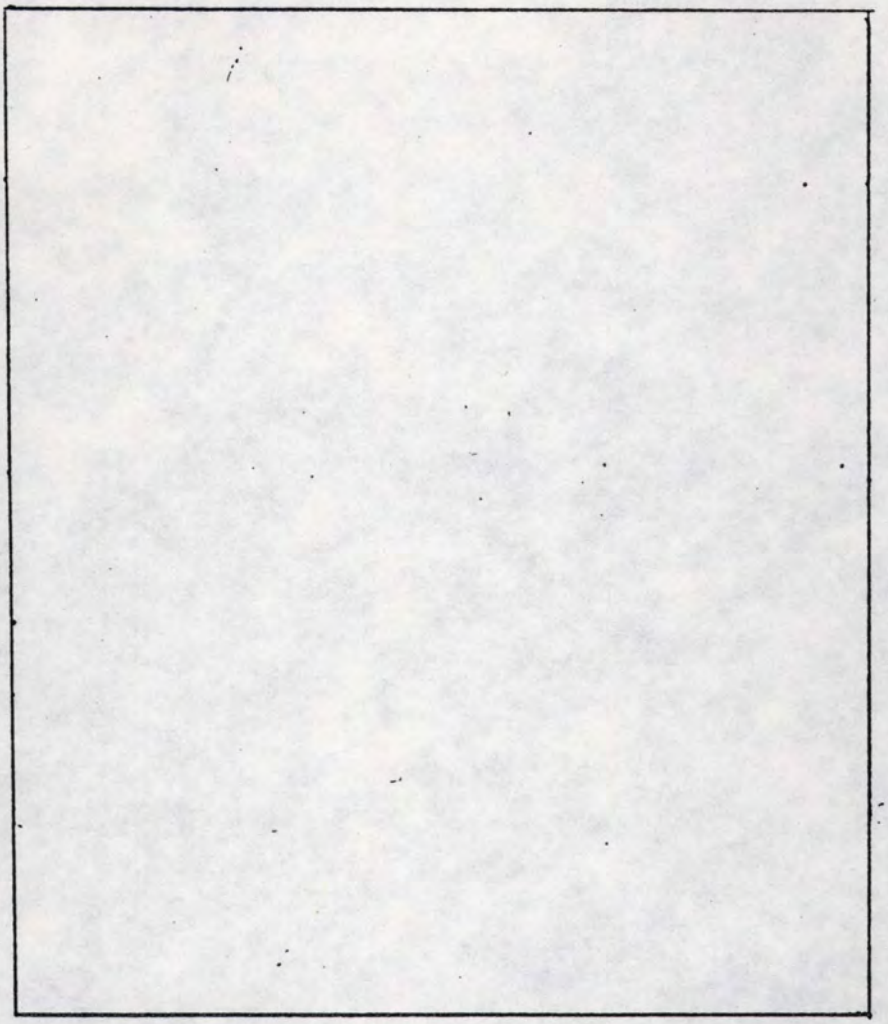
APPENDIX

• FIG. 1 3 •

I.D. NO.	DRAINAGE	EXPOSURE	SLOPE	POSITION	ELEVATION
COMMUNITY	LOCATION	DIST. FROM EDGE		DATE: / /	



ORIG. # OF MOUND CLUSTERS :	
MOUND CLUSTERS AFTER 1 DAY:	
MOUND CLUSTERS AFTER 2 DAYS:	
# OF SIGN AFTER ONE DAY :	
# OF SIGN AFTER TWO DAYS :	
AVE SIGN PER DAY:	
# OF GOPHERS TRAPPED:	
AVE # OF SIGN/GOPHER/DAY:	

FIG 14.

ID. NO.	DRAINAGE	EXPOSURE	SLOPE	POSITION	ELEVATION
COMMUNITY	LOCATION	DIST. FROM EDGE		DATE: / /	

SPECIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	RA
SOIL																										
ROCK																										
LIVE																										
LITER																										

COMMENTS

FIG 15

I.D. NO.	DRAINAGE		SHEET		DATE: / /
COMMUNITY	LOCATION				

SPECIES		SPECIES		SPECIES		SPECIES		SPECIES	
INTERCEPT NO.	FT.	INTER NO.	FT	INTER NO.	FT.	INTER. NO.	FT.	INTER NO	FT.
TOTAL		TOTAL		TOTAL		TOTAL		TOTAL	
% INTER.		% INTER		% INTER		% INTER		% INTER	

SPECIES		SPECIES		SPECIES		SPECIES		SPECIES	
INTER. NO.	FT.	INTER NO.	FT.	INTER. NO.	FT.	INTER. NO.	FT.	INTER NO.	FT.
TOTAL		TOTAL		TOTAL		TOTAL		TOTAL	
% INTER				% INTER		% INTER		% INTER	

SPECIES		SPECIES		SPECIES		SPECIES		SPECIES	
INTER. NO.	FT.	INTER NO.	FT	INTER. NO.	FT.	INTER. NO.	FT.	INTER NO	FT.
TOTAL		TOTAL		TOTAL		TOTAL		TOTAL	
% INTER.		% INTER.		% INTER.		% INTER.		% INTER	

ECOLOGY OF THE POCKET GOPHER

IN THE IDAHO PRIMITIVE AREA

1975

by

Steven J. Anderson

Summarized by K. E. Hungerford

The study area was set up to include several drainages coming into Big Creek in the vicinity of the Taylor Ranch and the meadow sites in the vicinity of Cold Meadows and the ridge area in between. Pocket gophers were found throughout the study area, but activity by gophers was found to be the greatest where vegetation was primarily forbs and grasses. These are areas generally where a dense conifer timber is lacking, or where there is no timber at all.

Habitats where gophers were not present were dense lodgepole pine forests, and the shallow rocky soils of higher mountain ridges.

Gopher activity, as expected, was quite variable, and some revision of the plot sampling system would be advantageous for another study. Also, more frequent examination of the plots should be used, because frequent rain storms often obliterated signs made by pocket gophers during the two weeks between examination. Also, it was concluded that establishing plots earlier in the season in the Cold Meadows and other meadow sites would be a definite advantage in the study of the pocket gopher population.

There is one solid conclusion that can be made, and that is that pocket gophers exist in good populations throughout this wilderness-type country.