

# An Efficient and Economical Pocket Gopher Exclosure

**JAMES O. KEITH**

*Range Conservationist, Rocky Mountain Forest and Range Experiment Station,<sup>1</sup> Forest Service, U. S. Department of Agriculture*

One approach to determining the effect of pocket gophers (Family Geomyidae) on rangelands is to prevent the animals from occupying certain areas over a period of time and to compare conditions on these sites with conditions where gophers are present. Fenced exclosures have been used to deter gophers from entering study plots (Branson and Payne, 1958; Moore and Reid, 1951). Poisoning and trapping have also been used to reduce gopher numbers on study areas (Kalmbach, 1948; Julander et al., 1959; Garrison and Moore, 1956). Ellison and Aldous (1952) used a buried fence to exclude gophers on one side of their gopher-free plot and poisoned the animals on the other three sides. A rodent enclosure used by Horn and Fitch (1942), and Fitch and Bentley (1949), was apparently successful in prohibiting the movement of gophers into or out of study plots.

Costs of construction have usually limited the size and replication of elaborate fenced plots, while cheaper fences, poisoning, and trapping have usually been relatively unsuccessful in keeping plots gopher-free. A combination of fencing and poisoning described here has proved both successful and efficient in keeping study plots relatively free of gophers at a reasonable cost.

The plot design was the result of a joint study by the Rocky Mountain Forest and Range Experiment Station, U. S. Forest Service, the Denver Wildlife Re-

search Center, U. S. Fish and Wildlife Service, and the Colorado Agricultural Experiment Station.

Study objectives required that the exclosures be about one acre in size, be of reasonable cost, permit normal use by cattle, and effectively prevent gopher invasion.

In 1956 and 1957, eight gopher exclosures were established on Black Mesa in west-central Colorado (Figure 1). Exclosures were 190 feet square, enclosed by a three-foot, wooden and hardware-cloth fence buried two feet and extending one foot above the ground surface (Figure 2). The hardware-cloth was stapled to a 2x4-inch horizontal railing attached to the top of the 3½-foot fence posts. Pieces of the railing were connected every 20 feet by a shiplap joint and were bolted to fence posts and hardware-cloth every 10 feet.

Costs of materials and labor to construct the exclosures are shown in Table 1. The average total cost of an exclosure was

about \$627.00. Variations in the cost of labor and machinery rental as well as in ease of digging the trenches could raise or lower this cost substantially. The trench around one exclosure was dug with a backhoe at a cost of 17 cents a lineal foot including backfill. Trenches for the other seven exclosures were scraped out and backfilled with a road maintainer at a cost of 9 cents a lineal foot. However, the cost of extra hand labor required in setting the fence when the road maintainer was used offset its cost advantage.

Resident pocket gophers were first trapped from exclosures in September 1957. Densities varied from 16 to 31 and averaged 21.4 per 190-foot-square exclosure or 25.8 per acre. Immediately after trapping was completed, gophers were carefully poisoned in a border strip 200 feet wide around seven of the exclosures. Previous studies have indicated that pocket gophers may move a maximum distance of 200 feet during the winter snow period. Gophers were not poisoned around one exclosure that was to serve as a check on the necessity for poisoning to maintain the areas free of gophers.

Table 2 shows the number of animals removed from the exclosures during 1957-60. Fifteen



FIGURE 1. Pocket gopher exclosure in one of the experimental pastures on Black Mesa.

<sup>1</sup>Central headquarters maintained in cooperation with Colorado State University, Fort Collins, Colorado.

**Table 1. Average cost of material and labor to fence a pocket gopher enclosure, 190 feet square**

Item	Cost
Excavation and backfill of trench	\$ 68
Lumber, 2x4 inch, No. 1, good, Douglas-fir	68
Mill work (shiplap ends of lumber and drill holes)	18
Fence posts, 3½', treated lodgepole, 3½" dia.	38
Hardware cloth, 36", ⅝" mesh, 17 gauge	280
Miscellaneous materials (bolts, staples, etc.)	11
Motor vehicle operation (transporting workers & supplies)	14
Salaries: Supervisor, ¾ man-day	12
Construction crew, 9 man-days	118
<b>Total</b>	<b>\$627</b>

animals were trapped from the check enclosure in 1958. This was considerably more animals than were caught from any other enclosure and shows that poisoning in the border strip is needed to keep gophers from invading enclosures. Snow covers the enclosures from November to May, which is the period of greatest invasion. An occasional gopher invaded enclosures during summer, probably by burrowing beneath enclosure fences.

**Table 2. Number of resident pocket gophers trapped from enclosures in 1957 and number of invading animals removed 1958-60**

Enclosure No.	Year			
	1957	1958	1959	1960
1	16	1	0	0
2	31	5	2	0
3	21	1	4	0
4	18	0	0	1
5	20	0	0	0
6	27	6	2	0
7	18	1	2	3
8	20	115	1	0
<b>Total</b>	<b>171</b>	<b>29</b>	<b>11</b>	<b>4</b>

<sup>1</sup>Plot periphery not poisoned in 1957.

In July, August, and late September of 1959 and 1960 gophers were poisoned outside the enclosures. This was done to reduce invasion during summer and to minimize invasion during winter. Border strips were poisoned with a bait dispenser developed and described by Hansen (1956). The poison bait used was oat groats treated with 1080 (sodium fluoroacetate). Workers walked systematically across the

area about 20 feet apart. At each group of fresh mounds, bait was placed in several burrows. Mounds in the area were flattened to indicate that systems had been treated.

Poisoning in 1957 and 1958 required about 1½ man-days per enclosure. With more frequent control and with fewer animals to poison in 1959 and 1960, poisoning required less than one-half man-day per enclosure.

Vegetation is being sampled in

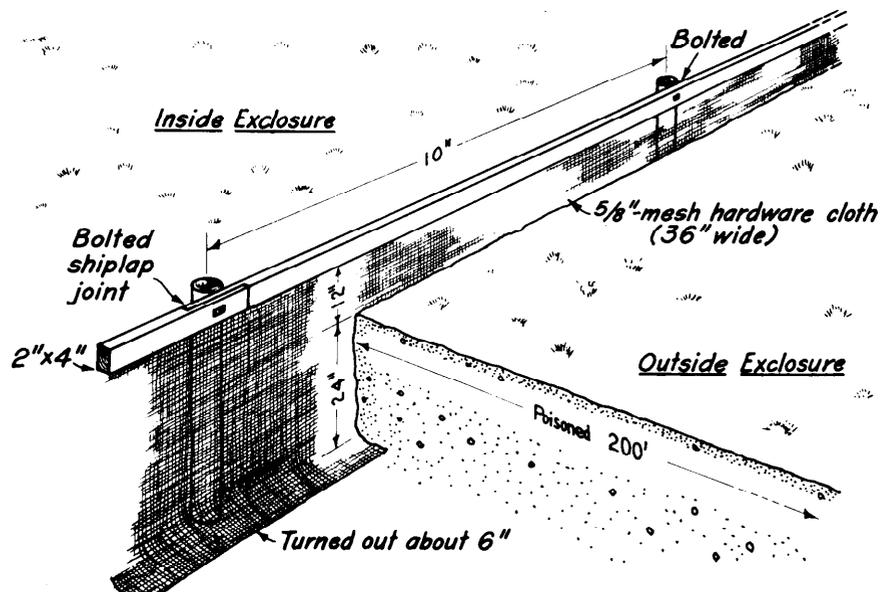


FIGURE 2. Construction detail of enclosure fence.

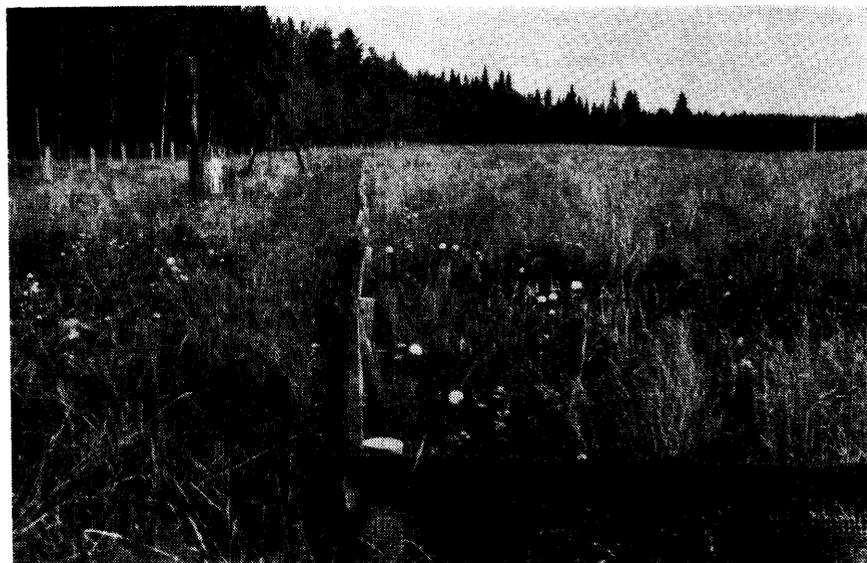


FIGURE 3. Enclosure fence two years after construction.

a central 100x135-foot area within each enclosure. Most invading gophers were trapped before they reached that area. These enclosures are large enough that, even if a few gophers invade them, the study is not necessarily disrupted.

Snow accumulates to depths of four to six feet on Black Mesa during winter. The weight of this snow has caused some warping and breakage of 2x4-inch railings (Figure 3). Though warping is unsightly, it has not affected the efficiency of the enclosures. Only ten 2x4 rails have had to be replaced since 1957.

Experience indicates that the enclosures described here are efficient and, together with border poisoning, will practically prevent invasion of relatively small areas. The enclosures have also

met the objective of permitting normal use by cattle. The one foot high fence does not appear to either attract or deter cattle, for enclosures have generally received about the same grazing use as pastures in which they are located.

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