# Relation of the Dalles Pocket Gopher to Establishment and Maintenance of Range Grass Plantings

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Several species and varieties of pocket gophers (*Thomomys* spp.) are common on meadow and grassland openings in the mountains of eastern Oregon and eastern Washington. Since pocket gophers are active yearlong and often infest large tracts, the ill effects of their burrowing and feeding habits can reach serious proportions. Pocket gophers greatly retard natural improvement of mountain meadows previously overgrazed by livestock (Moore and Reid, 1951), but the relation of gopher activities to development of new grass stands has had little study. Since range reseeding investments are increasing, range administrators and stockmen need more information on the influence of pocket gophers on grass plantings.

To meet this need for some mountain valleys of eastern Oregon, a cooperative study was begun in the fall of 1947 by the Pacific Northwest Forest and Range Experiment Station and the U. S. Fish and Wildlife Service. Logan Valley, elevation 5,000 feet, in the Malheur National Forest was chosen for the study. This site, reseeded in 1938 to crested wheatgrass, supported a mediocre drill-row stand but only a scanty amount of grass reproduction, even though the stand had produced several seed crops and cattle use had been restricted to the month of September. Gopher workings were abundant, thus it appeared gophers were responsible for the rather poor condition of the planting.

The objectives of the study were to determine the effects of Dalles pocket gopher (*Thomomys talpoides quadratus*) on (1) the old drill-row plants and their seedlings; and (2) on some new drill plantings.

## Study of Established Plantings

To investigate current effects of gophers on the 1938 grass planting, two pairs of 200x250-ft. plots were laid out in 1947 about one mile apart. The two areas will later be referred to as blocks 1 and 2 (Fig. 1). From the fall of 1947 through 1950 one plot of each pair, with a surrounding buffer strip 200 to 600 feet wide, was maintained in a near gopher-free condition by trapping. Twenty circular samples, each 100 square feet in area, were established grid fashion in all four plots, and all crested wheatgrass plants on each sample were inventoried annually by basal diameter measurements. Diameters of drill-row plants and grass reproduction between rows were tallied separately. Work was done in the fall each year, starting in October 1947. Readings on the drill-row plants were terminated after the 1949 observation; measurements of between-row plants were carried through 1952 except for an omission in 1950.

## Results

### Gopher Activity

Gopher population at the beginning of the study was found to be 16.1 animals per acre. The ratio of adult males to females was 1:1.4. By the last trapping period in 1950, the population of the "gopher-free" areas had been so reduced that gophers were removed at the rate of only 0.85 per acre in the trapped portion of Block 1, and 2.4 per acre in Block 2. Eighty-one percent of these were young or immature animals.

Gophers apparently prefer to feed upon plant bulbs and fleshy roots but they were found to also feed upon other plant parts. In the untrapped plots, gophers ate the root crown of an occasional old clump or bunch of crested wheatgrass. Partially eaten stems of crested wheatgrass were found

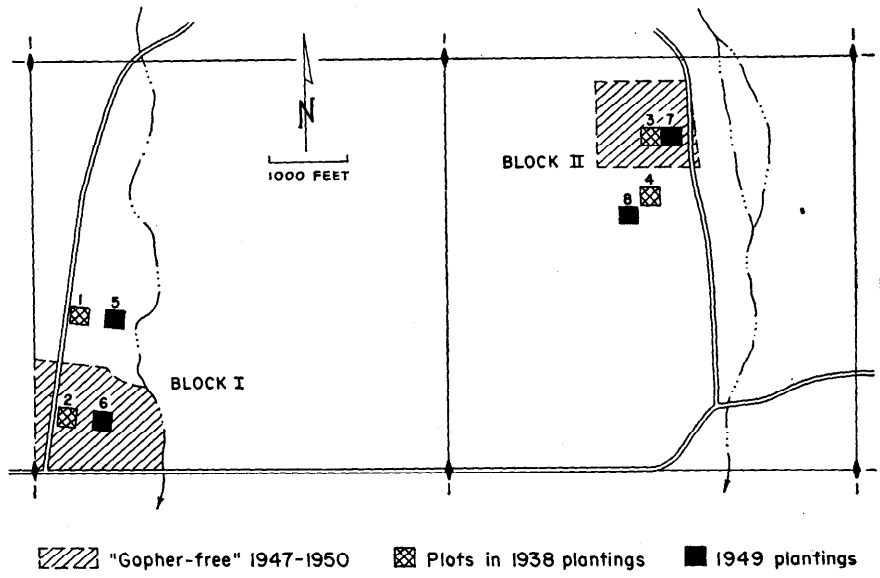


FIGURE 1. Field layout showing location of plots and "gopher-free" or trapped areas.

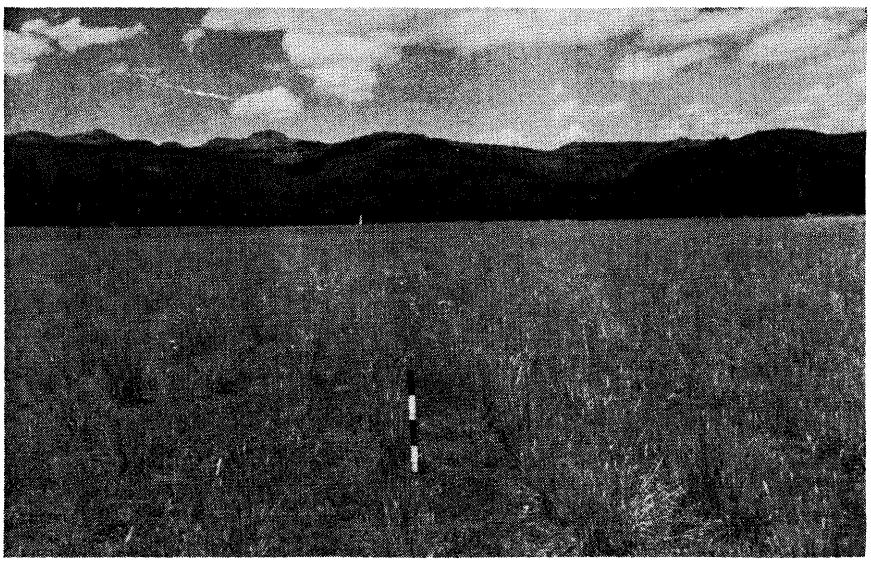

FIGURE 2. The old drill-row planting of crested wheatgrass was 9 years old and about a two-thirds stand when the study was undertaken.

in gopher runways. Consumption of green food in early summer was confirmed by examination of stomach contents. Young plants were frequently killed by gophers tunneling through the small root systems or by burial of the tops under the abundant soil "casts" and mounds. Old spots of intensive disturbance 15 to 30 feet in diameter were kept completely free of crested wheatgrass by continued gopher activity.

#### Influence in Old-Grass Planting

When the study was undertaken, the planting was 9 years old and consisted of about a two-thirds stand (Fig. 2). Total basal diameter of old drill-row bunches averaged only 115 inches per 100-square-foot circular sample. After two years (fall 1947 to fall 1949) of gopher-control work, the basal diameter of grasses in drill rows of trapped plots was not significantly different from that of untrapped plots.

On the other hand, new wheatgrass plants between the drill rows benefited from gopher-control work. Basal diameters of new plants on gopher-free areas increased greatly each year and these seedling stands became superior to those where gophers were present (Table 1). A little slump in diameter gains occurred in 1952; however, statistical tests showed the greatest significance for comparisons made with 1952 data.

### Study of New Seedings

To determine the effects of gophers on new grass plantings, clean-tilled seedbeds were prepared in May 1949 near each of the four original plots (Fig. 1). Thus, one plot of each new pair was maintained nearly gopher-free for 2 years within the original gopher-free areas. Randomly located, 50 x 250-foot strips were planted in each new plot, four species being used: Crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Agropyron intermedium*), pubescent wheatgrass (*Agropyron trichophorum*), and tall oatgrass (*Arrhenatherum elatius*). Drill-row spacing was 12 inches. These new plots were of the same dimensions as the older plots, and the same number and size of circular samples were established within them. The length of drill-row planting destroyed by gophers was measured in June and October during the first growing season and the late summer or fall for the second through the fifth years.

FIGURE 3. By the end of the first growing season, gophers started to reinhabit untrapped plantings of tall oatgrass. Surveyor's chaining pins mark "craters" in drill rows where gopher pulled young grass plants down into runways.

The new stands were fenced to exclude cattle use until September 1950. In September 1949, however, cattle destroyed young stands in the untrapped plot (No. 8) of Block 2 after an electric fence controller failed. Consequently, Plot 8 was ignored for the remainder of the study.

#### Influence in New Grass Plantings

Pocket gophers caused no damage during germination and emergence of the spring-planted grasses. In fact all seedling stands

**Table 1. Total basal diameter of crested wheatgrass between drill rows and percentage increase since 1947, with and without gopher control.**

| *Treatment* | Total basal diameter | Increase in basal diameter | | | |
|---|---|---|---|---|---|
| | 1947 | 1948 | 1949 | 1951 | 1952 |
| Block 1 | *inches* | % | % | % | % |
| Plot 1—gophers present | 77.5 | 234 | 223 | 364 | 261 |
| Plot 2—gophers controlled 1947-1950, inclusive | 36.5 | 311 | 429 | 1,463 | 1,018 |
| Block 2 | | | | | |
| Plot 4—gophers present | 94.0 | 32 | 121 | 166 | 31 |
| Plot 3—gophers controlled 1947-1950, inclusive | 59.5 | 93 | 150 | 526 | 316 |

obtained by the May 1949 plantings were undisturbed by either mice or gophers when inspected in June of the same year. Thorough seedbed preparation had eliminated former vegetation that has been attractive gopher food. Young stands were rated good or excellent as to number of plants per foot, distribution, and vigor.

In October of this first growing season, gophers started to reinhabit a part of the untrapped plot; they destroyed 4 per cent of the drill rows of tall oatgrass, a species whose fleshy stem bases or corms are good gopher food. Wheatgrasses were undisturbed. By the fourth season all grass species of the unprotected plot were developed enough that gophers were starting to feed on their root crowns (Table 2). By 1953, the fifth growing-season, average stand loss by three wheatgrasses had reached 30 per cent, whereas stand loss of tall oatgrass amounted to 84 per cent.

In plots trapped for 2 years, there was no gopher damage for a year after termination of gopher control (Fig. 4). Then in 1952, the second season protection was withheld, those circular samples adjacent to narrowest portions of the buffer strip were invaded by gophers. At the next or fifth observation, gophers were present in all formerly protected plantings. Drill-row losses of tall oatgrass averaged 86 per cent and for wheatgrass 38 per cent. However, losses of wheatgrasses were much below this average in the plot (No. 6) which had the widest buffer strip and the lowest gopher population at the time of the last trapping (Table 2). Among the wheatgrasses, pubescent wheatgrass had the least apparent drill-row losses. Greater drill-row losses of this species would have been recorded if new tops from its abundant rhizomes had not partially replaced some of the destroyed portions. In addition this sod-forming species was starting to spread between the rows and this growth compensated for some drill-row loss that measurements within drill rows could not show.

FIGURE 4. Trapping and poisoning prevented gopher damage in these two-year-old stands of crested wheatgrass (left) and tall oatgrass.

## Conclusions

The damage caused by Dalles pocket gophers to range grass plantings and the differences in vulnerability of grasses by age and species were shown by a study in eastern Oregon.

Old-drill-row plants in 9- to 11-year old plantings of crested wheatgrass were not greatly affected by current gopher burrowing and feeding. Establishment of natural reproduction between drill rows of this bunchgrass, however, was definitely impaired by gopher activities.

These facts should discourage a practice sometimes used for economy reasons in seeding bunchgrasses, that of wide drill-row spacing. Under this practice less seed is purchased, and natural reseeding is depended on for filling in the stand between drill rows or for filling in areas skipped between planted strips. But dependence on natural reseeding is unwise if pocket gophers are prevalent.

Seedbed preparation, which destroyed all broad-leaved herbs preferred by gophers, rendered new planting sites unattractive to gophers until the new grass stand was developed enough to be a source of gopher food.

When unprotected from gophers, new stands of tall oatgrass were the first to be damaged and suffered most. Wheatgrass stands were much less attractive to gophers. Rhizome production of pubescent wheatgrass partially offset gopher damage.

The practice of direct gopher control cannot be eliminated for all site conditions and gopher pres-

**Table 2. Percent of drill row destroyed in young grass stands, 1949-1953, with and without gopher control for first two growing seasons.**

| *Species* | Plot 5 | | | | | Plots 6 and 7 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Gophers present | | | | | Gophers controlled two seasons | | | | |
| | 1949 | 1950 | 1951 | 1952 | 1953 | 1949 | 1950 | 1951 | 1952 | 1953 |
| | % | | | | | % | | | | |
| Tall oatgrass | 4 | 14 | 14 | 48 | 84 | 0 | 0 | 0 | 0-31 | 80-92 |
| Pubescent wheatgrass | 0 | 0 | 0 | 18 | 35 | 0 | 0 | 0 | T-29 | T-44 |
| Crested wheatgrass | 0 | 0 | 0 | 11 | 33 | 0 | 0 | 0 | 0-62 | 28-77 |
| Intermediate wheatgrass | 0 | 0 | 0 | T | 21 | 0 | 0 | 0 | 20-48 | 23-55 |

sures; however, a seedbed free of broad-leaved herbs and planted to rhizomatous wheatgrasses would probably need only moderate control for the first three growing seasons and none after the fifth growing season. Moore and Reid (1951) estimated the average cost of gopher control at 40 cents per acre. This moderate expense per year, even for 5 years, is a justifiable protection cost for investment in range reseeding usually costing from seven to ten dollars per acre.

#### Acknowledgment

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