

Vegetation Changes between 1943 and 1965 on the Shortgrass Plains of Wyoming

ROBERT LANG

Highlight: *Ground cover estimates on permanently marked plots in East Central Wyoming were compared between 1943 and 1965. On grazed native range plots, shortgrasses increased and midgrasses decreased when comparing 1965 to 1943. Plots in exclosures showed a decrease in shortgrass cover and an increase in cover of midgrasses. Generally, big sagebrush (*Artemisia tridentata*) and plains pricklypear (*Opuntia polyacantha*) increased markedly on both open and exclosure plots. Due to excessive grazing pressure, the total perennial grass cover on a section of abandoned farmland was nearly 35% less in 1965 than in 1943.*

During the mid 1930's, large amounts of land in Converse, Campbell, and Weston Counties in northeastern Wyoming were purchased and administered by the Resettlement Administration of the federal government. The administration of these lands was later transferred to the Soil Conservation Service and finally to the United States Forest Service, where they are currently administered as the Thunder Basin National Grasslands. The repurchased lands were mostly small holdings (usually 320 to 1280 acres) of which part was dryland farmed in compliance with provisions of the homestead acts and part was maintained in native range to allow for livestock grazing.

In 1936, a range survey was initiated and jointly financed by the Resettlement Administration and the Bureau of Agricultural Economics of the federal government and the Department of Agronomy and Agricultural Economics of the University of Wyoming.

The objective of this range survey was to determine the ground cover of vegetation present on the range and to translate these ground cover data into grazing capacity.

Methods

1936-1943 Research

The 1936 survey, using the "square foot density" method

The author is professor of range management, Plant Science Division, University of Wyoming, Laramie.

The study is published with the approval of the Director, Wyoming Agricultural Experiment Station, as Journal Article No. 530.

Manuscript received April 19, 1972.

(Stewart and Hutchings, 1936), was conducted on all of the land purchased by the Resettlement Administration. In this general range survey only five sample plots were studied on each square mile.

In addition to the general survey, intensive study areas were selected (one on each of five major vegetational types) and 99 plots arranged in 9 rows of 11 plots with rows oriented north and south were permanently marked on each 640-acre intensive study site. These plots were used to determine grazing effects on ground cover and vegetational composition. From 5 to 10 additional plots on each study section were marked to be fenced as an exclosure so that vegetational changes under protection could be documented. The exclosures, approximately an acre in size, were fenced in 1941 and were maintained through 1965 on only two sections—those designated *A* & *D* below. The exclosures on the other three study sections were refenced in 1965.

The sections marked for intensive study were legally described as Sec. 20, T38N, R70W and Sec. 17, T38N, R70W in Converse County, Sec. 1, T41N, R71W and the E ½ of Sec. 25, T43N, R69W in Campbell County and Sec. 32, T41N, R68W and the W ½ of Sec. 30, T43N, R68W in Weston County, Wyoming. The vegetative types on these study sections have been designated as (*A*) shortgrass-sagebrush, (*B*) abandoned farmland, (*C*) mixed grass, (*D*) sagebrush, and (*E*) cactus section, respectively, and are located approximately in Figure 1. All intensive study areas were visited each year from 1936 through 1943, and the ground cover data from all permanently marked plots were summarized and published as a Wyoming Agricultural Experiment Station Bulletin (Lang, 1945).

1965 Research

In June of 1965, the author in cooperation with personnel from the U. S. Forest Service collected ground cover data again using the square foot density method from some plots on each of the study sections. Many plots (whose center had been marked by an iron pipe driven into the ground) had lost their marker. In some instances the marker was in place but the vegetation completely obliterated by a prairie dog (*Cynomys ludovicianus*) colony, livestock holding pen, or some other disturbing factor. Some plot markers were covered by sagebrush growth, and, consequently, many plots could not

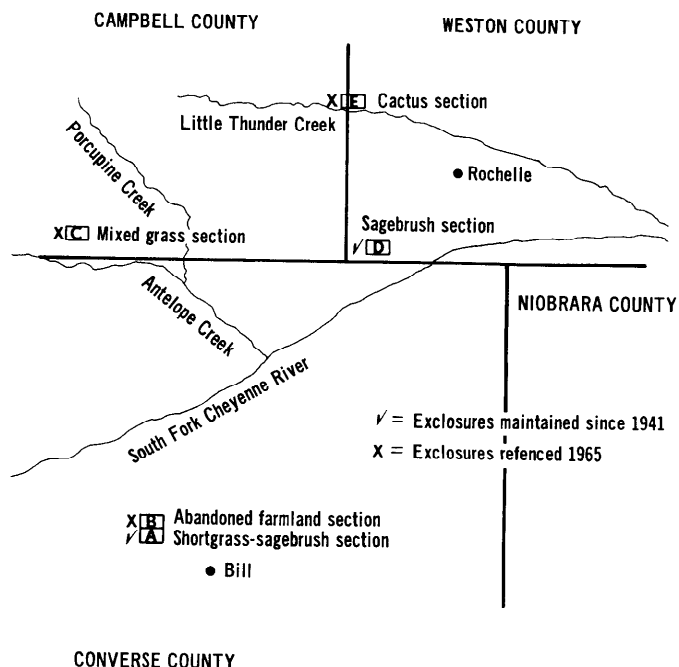


Fig. 1. Approximate locations of five study areas in Converse, Campbell, and Weston Counties, Wyoming.

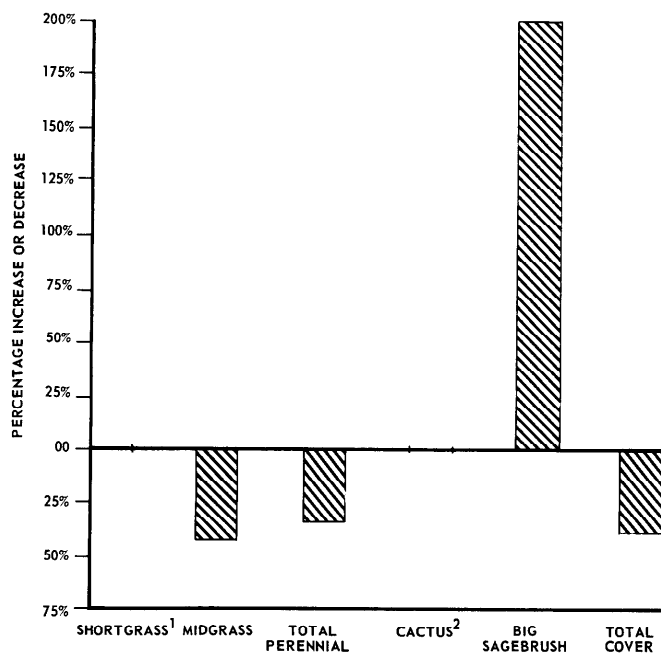
be located. Ground cover data from each permanently marked plot studied in 1965 were compared with that from the same plot studied in 1943. Thus any differences noted were differences which occurred on the same 100-ft² area.

Results

The results from this study are presented as a comparison of major species and/or categories of perennial vegetative cover for plots open to grazing and for protected plots on the two sections where the exclosures had been maintained since their erection. Although the discussion is generalized and covers all of the study sections, the comparisons for each species or category of perennial vegetation may be made on any study section. These comparisons may be noted by referring to Figures 2 through 6.

The amount of ground cover attributable to blue grama (*Bouteloua gracilis*) on plots open to grazing was greater in 1965 than in 1943. The ground cover of midgrasses and grasslike plants on these plots was less in 1965 than in 1943. This reaction was in line with general concepts of range condition class for the area. Blue grama was determined to be an increaser under grazing pressure; western wheatgrass (*Agropyron smithii*), needleandthread grass (*Stipa comata*), and Junegrass (*Koeleria cristata*), the major midgrass species, were determined to be decreasers (Beetle, 1950). Where the increase in shortgrass and decrease in midgrasses was not great, the area was probably being subjected to approximately the proper grazing pressure. (See Figures 3, 4, 5, and 6 for comparisons on individual native vegetation sections).

On the abandoned farmland section, the open plots showed a severe decrease in midgrasses and in total ground cover. Ground cover data shows there was approximately 40% less in 1965 than in 1943 in both categories (Fig. 2). Unfortunately, the exclosure on the abandoned farmland was not maintained. In view of the vegetational reaction in an exclosure on an adjoining section, it would appear that the abandoned farmland vegetation was deteriorating rather than progressing toward a climax type of vegetation.



¹None present in 1943; a small amount present in 1965.

²None present in 1943 nor 1965.

Fig. 2. Percentage increase or decrease of ground cover in 1965 as compared to 1943 on a section of abandoned farmland in Converse County, Wyo. Data presented were from permanently marked plots open to grazing.

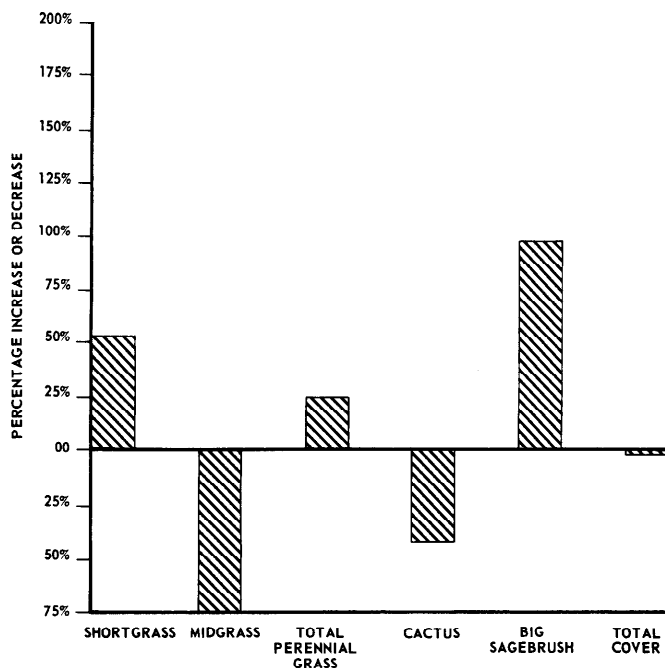


Fig. 3. Percentage increase or decrease of ground cover in 1965 as compared to 1943 on a section of cactus-infested rangeland located half in Campbell County and half in Weston County, Wyo. Data presented are from permanently located plots open to grazing.

Plots open to grazing on the four native vegetation sections showed an increase in plains pricklypear (*Opuntia polyacantha*) excepting the cactus section, which showed a decrease in this species in 1965 when compared with 1943. This decrease was probably due to a prairie dog colony and an infestation of cactus moth (*Cactoblastus cactorum*).

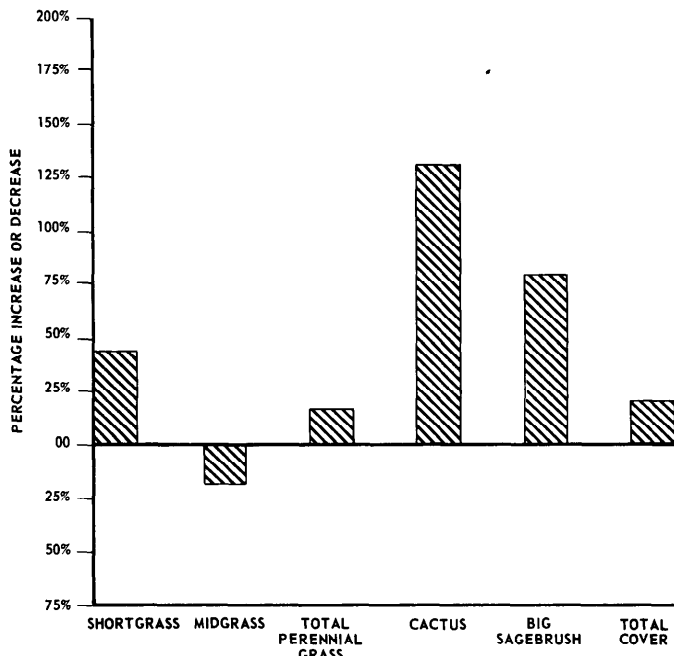


Fig. 4. Percentage increase or decrease of ground cover in 1965 as compared to 1943 on a section of mixed grass rangeland in Campbell County, Wyo. Data presented are from permanently located plots open to grazing.

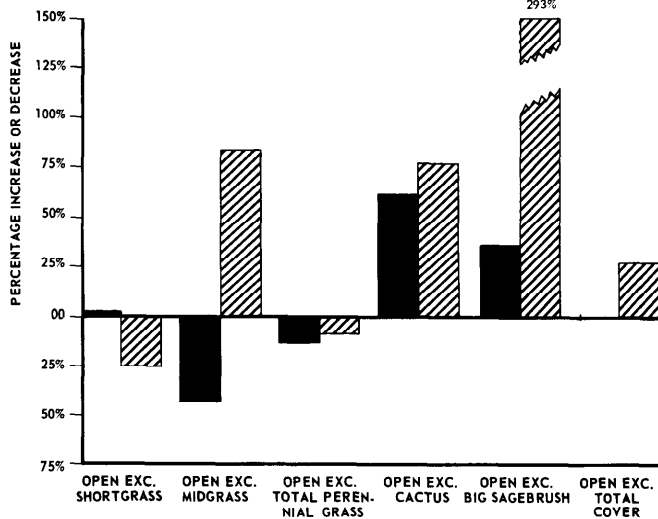


Fig. 5. Percentage increase or decrease of ground cover in 1965 as compared to 1943 on a section of shortgrass-sagebrush rangeland in Converse County, Wyo. Data presented are from permanently marked plots both open (solid) to grazing and within an exclosure (cross hatched).

Prairie dogs were particularly abundant in the western part of the cactus section, and there was evidence of cactus moth activity at all locations on this intensive study area. These two factors were not noted on any other study sections. Plains pricklypear not only increased on the grazed plots but showed a marked increase in the exclosures on the sagebrush and shortgrass-sagebrush sections (A and D).

Big sagebrush (*Artemisia tridentata*) cover increased on all

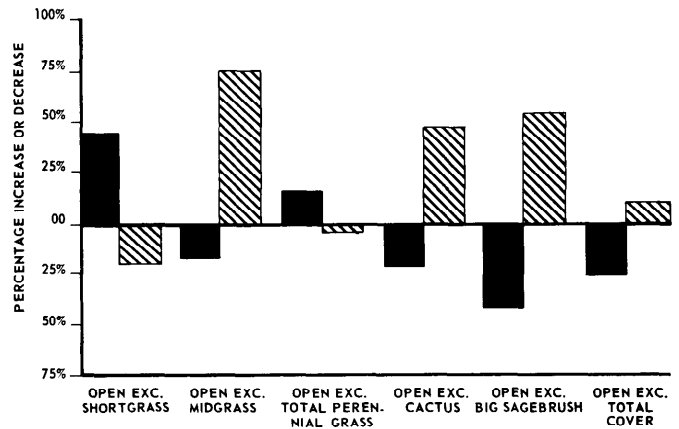


Fig. 6. Percentage increase or decrease of ground cover in 1965 compared to 1943 on a section of sagebrush rangeland in Weston County. Data presented are from permanently marked plots both open to grazing (solid) and within an exclosure (cross hatched).

grazed plots on native vegetation sections excepting the sagebrush section, where there was nearly 40% less big sagebrush ground cover in 1965 than in 1943. However, sagebrush within the exclosure on this section as well as that of the shortgrass-sagebrush section showed a substantial increase over the 23-year period (57% and 293%, respectively). The decrease on open plots may possibly be attributed to a high concentration of antelope on and near the sagebrush intensive study area.

The comparisons between plots open to grazing for the years 1943 and 1965 and for three study sections (B, C, and E) are presented graphically in Figures 2, 3, and 4. Comparisons between plots open to grazing and exclosure plots on the two sections where exclosures were maintained are presented in Figures 5 and 6.

Summary and Conclusions

Comparisons of ground cover between 1943 and 1965 on permanently marked plots showed the following:

- 1) Shortgrass cover increased and midgrass cover decreased on plots open to grazing and the opposite on plots protected in an exclosure. On the four native range sections, the change was not of sufficient magnitude to indicate a change in condition class.

- 2) The cover of perennial grass as well as total ground cover was drastically reduced on the abandoned farm section from 1943 to 1965. The change was so great that this section would have to be considered in very poor condition from severe overgrazing.

- 3) Plains pricklypear and big sagebrush generally increased both on grazed plots and in protected areas. In some instances this increase did not occur, but this could usually be accounted for by some disturbing factor such as prairie dogs, insects, or game concentration.

Literature Cited

- Beetle, A. A. 1950. Range condition classes on the Laramie Plains, Wyoming. Wyo. Agr. Exp. Sta. Circ. No. 37. 7p.
- Lang, Robert L. 1945. Density changes of native vegetation in relation to precipitation. Wyo. Agr. Exp. Sta. Bull. No. 272. 31 p.
- Stewart, George, and S. S. Hutchings. 1936. The point-observation-plot (square-foot density) method of vegetation survey. J. Amer. Soc. Agron. 28:714-722.