# Value of Broom Snakeweed as a Range Condition Indicator[1]

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## Highlight

**Following an initial 13 year stabilization period, changes in broom snakeweed populations on southwestern pinyon-juniper ranges were investigated over a subsequent 13-year period. The changes which occurred appeared to be the result of oscillating populations rather than of range condition.**

Broom snakeweed (*Gutierrezia sarothrae* (Pursh) Britt & Rusby) is a common range weed in the West. In the Arizona pinyon-juniper type, for example, its cover is exceeded only by the cover of junipers (*Juniperus* spp.) and grama grasses (*Bouteloua* spp.) (Arnold et al., 1961). Broom snakeweed is important in range management because it is abundant, relatively unpalatable, and competitive with associated desirable grasses (Jameson, 1966). Snakeweed can be controlled by chemicals (Johnsen, 1966) and appears to be reduced by protection from grazing (Arnold et al., 1961). Observations also indicate that the species responds to changes in climate. This report describes some changes in snakeweed populations on protected study plots in northern Arizona from 1953 to 1966. These results should be useful in assessing the place of snakeweed in range ecology and range condition evaluation.

## Methods

In 1939, 11 exclosures (about 1 acre in size) which contained snakeweed were established in the northern Arizona pinyon-juniper type. Vegetation on these plots was measured with the line intercept method (Canfield, 1941) in 1940 and again in 1953. Each plot was sampled with 20 randomly located 50-foot transects except at one location where only 10 transects were used. These results were reported earlier (Arnold et al., 1961). During this first period, snakeweed declined from an average of 4.77 percent cover in 1940 to 1.51 percent cover in 1953. On adjacent grazed plots the cover at the same dates was 5.14 and 1.72, respectively, or a decrease of 68 percent of the original ungrazed stand and 66 percent of the grazed stand. These similar reductions on both protected and grazed plots may have been caused by introduction of improved grazing management at about the same time that the plots were fenced or they may have resulted from drier conditions in northern Arizona in 1953 than in 1940 (Green, 1959).

In 1966 the transects on the protected plots were remeasured in the same way. The period from 1940 to 1953 was considered to have allowed recovery from past grazing treatment and changes during the period 1953 to 1966 were considered to represent

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FIG. 1. Study plot (No. 11) near Show Low, Arizona. Snakeweed decreased from 3.16 percent cover in 1953 (left) to 1.26 percent cover in 1966 (right). U. S. Forest Service Photos.

changes which occurred without grazing effects.

## Results

Snakeweed increased (Fig. 1) from 1953 to 1966 on 7 of the 11 plots and decreased (Fig. 2) on the other 4 (Table 1). Maximum increase was 2.6% cover and maximum decrease was 2.9% cover. Three of the 11 plots had snakeweed cover of over 1% in 1953; all of these showed decreases in snakeweed cover from 1953 to 1966. The other 8 plots had snakeweed cover of 1% or less in 1953; 7 of the 8 showed increases in snakeweed cover by 1966. These changes resulted in an inverse relationship between the amount of snakeweed present in 1953 and the change of snakeweed cover between 1953 and 1966.

**Table 1. Cover (%) and changes in cover of broom snakeweed on 11 plots in the northern Arizona pinyon-juniper type over a 13 year period.**

| Plot No. | 1953 | 1966 | Difference |
|---|---|---|---|
| 1 | 0.38 | 1.95 | 1.57 |
| 2 | .59 | 3.17 | 2.58 |
| 3 | 1.00 | 2.65 | 1.66 |
| 4 | .18 | .23 | .05 |
| 5 | 1.31 | 1.02 | – .30 |
| 6 | .48 | 3.02 | 2.54 |
| 7 | 8.88 | 5.99 | –2.89 |
| 8 | .00 | .14 | .14 |
| 9 | .36 | .00 | – .36 |
| 10 | .30 | .52 | .22 |
| 11 | 3.16 | 1.26 | –1.90 |
| Mean | 1.51 | 1.81 | .30 |

## Discussion and Conclusions

The results indicate that a major factor in changes of snakeweed is the decline of older communities and a buildup of younger communities. The changes did not appear to be due to climate; two plots within ½ mile of each other showed changes in percent cover of +0.06 and –0.30, two other plots about 5 miles apart had changes of +2.54 and –2.89.

On the average, continued protection from grazing did not result in changes in snakeweed cover. The average cover change for all 11 plots for the 13 year period was a 0.30% increase and this change was not statistically significant ($t = 0.41$ for paired plot comparison). The average snakeweed cover on these plots appears to

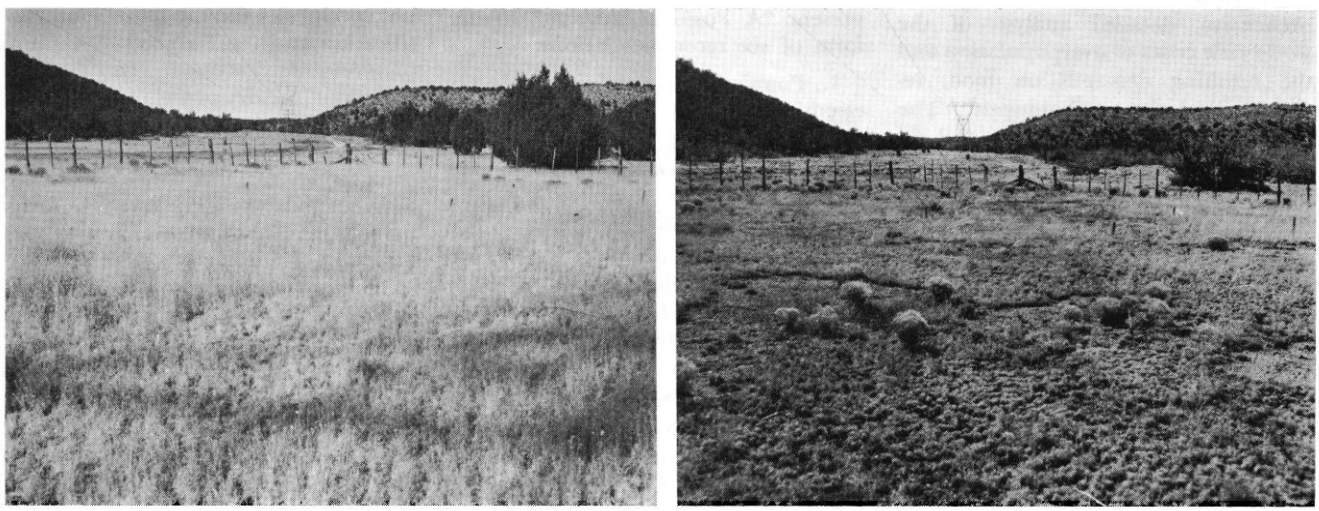

FIG. 2. Study plot (No. 1) near Seligman, Arizona. Snakeweed increased from 0.38 in 1953 (left) to 1.95 in 1966 (right). U. S. Forest Service Photos.

be in the range of 1 to 2%; fluctuations from these values seem to indicate population oscillations rather than range condition. Snakeweed, therefore, appears to be unreliable as a range condition indicator.

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