

Sagehen Exclosure: A History of Bitterbrush Reproduction

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Built in 1939, through the joint efforts of the Grazing Service and the Civilian Conservation Corps, the 15-acre Sagehen Exclosure, 10 miles SW of Jordan Valley, Oregon, was intended to enhance habitat for sage grouse. It may have been successful in this respect for a few years, but the accumulation of vegetation plus successional advancement had made the site entirely unsuitable for these birds by 1962, when the writer first examined it. What had happened, though, was of considerable interest. Bitterbrush (*Purshia tridentata*) had become a major shrub component within the 7-strand barbed wire area while none was noted outside the fence (Fig. 1).



Fig. 1. Young bitterbrush was restricted to the interior of the Sagehen Exclosure in 1962.

Bitterbrush is one of the more valuable browse forages for both livestock and big game animals in the Great Basin area. Habitat managers have often observed and expressed concern that little reproduction occurs. Most stands tend to be of older, often even-aged, plants. The Sagehen exclosure tells a story that could shed some light on the reproductive ecology of bitterbrush in southeastern Oregon.

Aerial photographs from 1954 and 1967 were available for the area. The exclosure site was evident on both, which enabled copying with a macro-lens. The resultant prints showed the darker bitterbrush plants quite well. These prints documented that the increase in bitterbrush was restricted to the protected exclosure. Obviously the grazing system of the surrounding range at that time was not conducive to the establishment of bitterbrush.

The local management records disclosed that season-long grazing with cattle, a cow/calf operation, had been in effect until the mid 1960's. Grazing normally commenced

about the first of April and continued until late October. About 1965, a 4-year, 4-pasture rotation grazing system was established. Each pasture had a different season of use each of the four years. In the late 70's it was decided that there was insufficient perennial bunchgrass present in the pasture containing the exclosure to warrant management for an increase in bunchgrass. In 1980, spring grazing was initiated in this pasture where cheatgrass and Sandberg's bluegrass were the predominant grasses. Cattle grazed from April until the last of May and then were rotated among the three remaining pastures which contained good stands of desirable bunchgrass.

The stage was set for some remarkable changes in the vegetation outside the exclosure. The cattle foraged on the lush, green spring growth of Sandberg's bluegrass, cheatgrass, and forbs. Palatable shrubs, such as bitterbrush, were bypassed. In 1983, impressive stands of seedling bitterbrush were noted outside the exclosure with lesser amounts of seedlings inside the exclosure. Grazing system change was only partially responsible for the sudden proliferation of bitterbrush, for no cattle use had occurred within the exclosure since 1939.

Short-term changes in annual precipitation amounts were suspect. Weather records from the nearby Danner weather station showed that one of the most severe droughts in recent times had occurred in 1977. The following years, 1978 through 1984, were exceptionally moist (Fig. 2).

During 1984, belt transects 500 feet long and 3 feet wide were run both within and without the exclosure. This allowed a more detailed comparison of the bitterbrush reproduction. Within the exclosure 18 mature, 7 young, and no seedling bitterbrush were encountered. Outside the area, 6 mature, 25 young, and 3 seedlings were tallied. Thus there were 4 times the number of seedling and young bitterbrush plants outside the exclosure compared to inside. Aging through annual ring counts using a hand lens revealed that the young plants ranged from 2 to 6 years; however, the majority (40%) of the plants were 4 years of age. Young plants were similar in height and crown width between the two populations (Fig. 3).

Two factors, livestock grazing and weather, appear to have interacted to enable the expansion of bitterbrush into potentially suitable habitat. The lesser extent of reproduction within the exclosure was most likely due to the excessive competition from well-established perennial vegetation. It was, in fact, already fully stocked with climax species including bitterbrush, sagebrush, bluebunch wheatgrass, and Idaho fescue (Fig. 4).

The two observed reproductive events of bitterbrush at the Sagehen Exclosure site suggest that major reproduction of bitterbrush through seedling establishment occurs only when both weather and seedbed conditions are favorable. The initial population of bitterbrush became established

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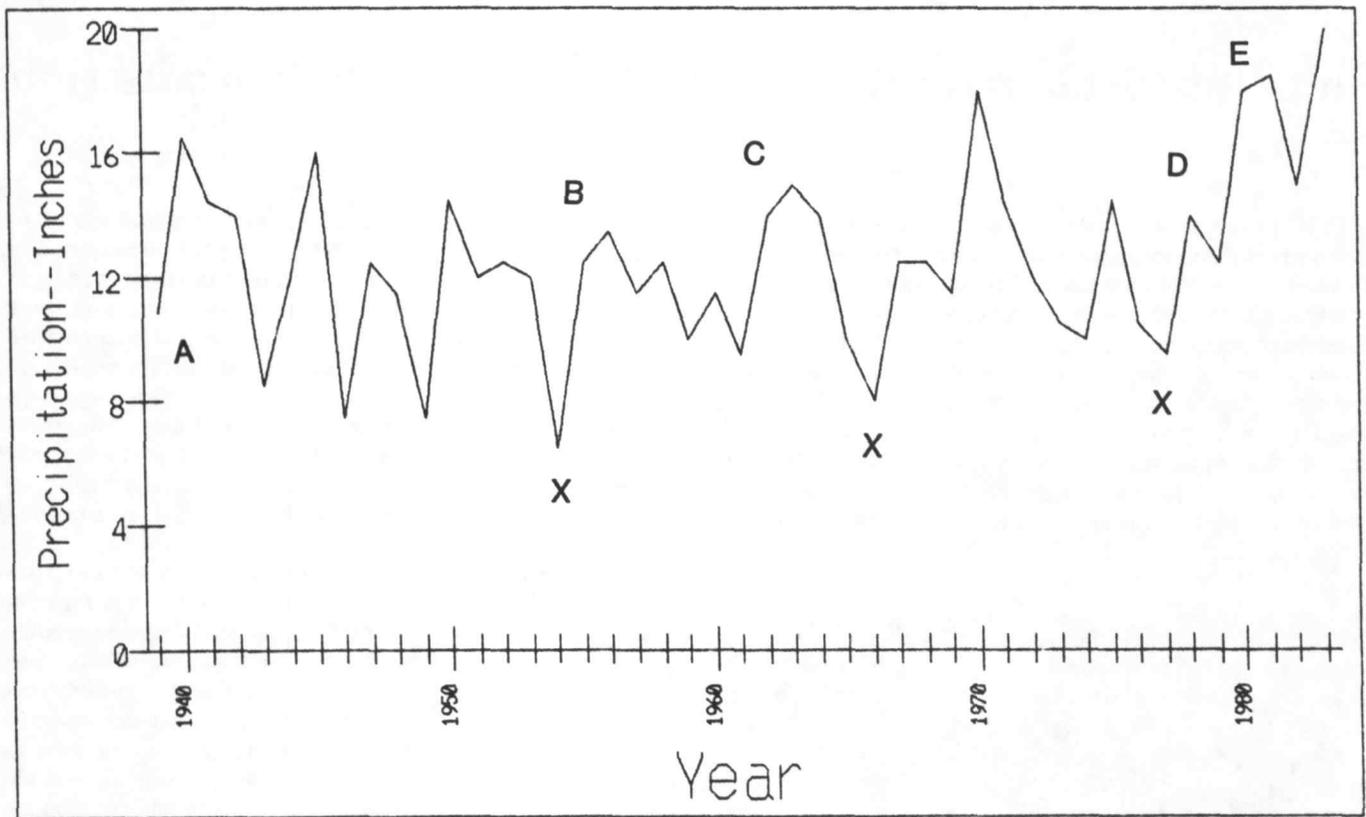


Fig. 2. Annual precipitation at the Danner, Oregon, weather station: 1939-1983.



Fig. 3. In 1984, young bitterbrush outside the enclosure averaged 21 inches tall and 4 years of age. Bitterbrush reproduction was 4 times more frequent outside the enclosure than within.

within the enclosure following severe drought and grazing conditions of the 1930's. Subsequent spread of this browse species to areas outside the enclosure followed a similar pattern after the 1977 drought and a major change in the livestock grazing system.

Survival of seedlings requires continued favorable weather and low utilization levels from herbivores such as deer,



Fig. 4. Bitterbrush within the Sagehen Enclosure in 1985 was typically mature and stagnant after 45 years of protection from livestock use. The site was nearly fully stocked with climax perennial plants. Bitterbrush reproduction was only 25% of that outside the enclosure.

rodents, and domestic livestock. Rarely, perhaps at 20 to 40-year intervals for a specific site, does such a combination of environmental factors occur. Resultant stands of bitterbrush tend to be even-aged with little subsequent reproduction—until the next favorable cycle.