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SOME EFFECTS OF FIRE ON A PERENNIAL RANGE TYPE

CLIVE M. COUNTRYMAN AND DONALD R. CORNELIUS

*Forester, California Forest and Range Experiment Station<sup>1</sup>; Forest Service, U. S. Dept. of Agriculture, Berkeley, California; and Range Conservationist, Field Crops Research Branch, Agricultural Research Service, U. S. Dept. of Agriculture, Berkeley, California.*

Loss of forage in wild-land fires is often an important part of the total fire damage. Evaluating this damage where perennial plants predominate requires estimates not only of the loss in grazing capacity but also of the time required for the area to regain its pre-burn capacity. To provide some guides to the effect of fire on one northern California perennial range type, study plots have been established in and adjacent to an area burned by a wildfire in August 1949

<sup>1</sup> The California Forest and Range Experiment Station is maintained at Berkeley in co-operation with the University of California.

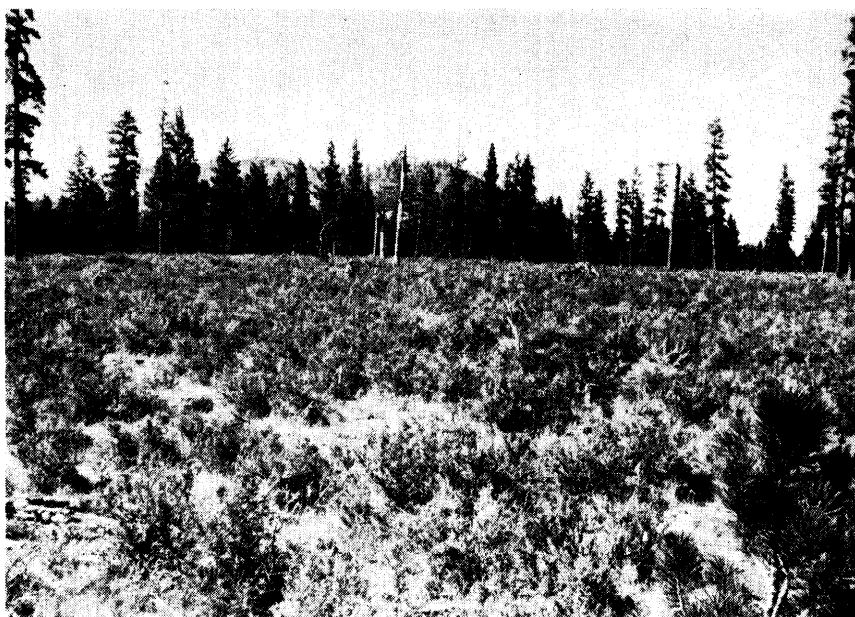


FIGURE 1. Unburned plots in 1950. Predominant shrub is bitterbrush.

(Sheep Well Fire, Goosenest Ranger District, Klamath National Forest). Study of these plots is continuing, but the results to date provide some useful information on the changes in range vegetation.

The plots were established in August 1950 in an area that had burned with moderate intensity. Five plots, each 5 feet by 50 feet, were established near the fire line inside the burn. Five similar plots

were established across the fire line in an unburned area. They served as check plots, and it is reasonable to assume that they had vegetation of about the same composition and density as that on the burned plots before the fire. The unburned plots also provided a means of determining any long-term trends in general range condition not attributable to the fire.

The study area is typical north-



FIGURE 2. Close-up of burned plot in 1951. Light colored grass in background is cheatgrass.

Table 1. Number of plants and basal or crown area of plants, range resource damage plots. Sheep Well Fire, Klamath National Forest\*

	Unburned		Burned		Burned		Burned		Burned		Burned	
	plots	Basal	plots	Basal	plots	Basal	plots	Basal	plots	Basal	plots	Basal
	1950	area	1950	area	1951	area	1952	area	1953	area	1955	area
	Num- ber of plants	sq. in.	Num- ber of plants	sq. in.	Num- ber of plants	sq. in.	Num- ber of plants	sq. in.	Num- ber of plants	sq. in.	Num- ber of plants	sq. in.
Perennial grasses												
<i>Festuca idahoensis</i> (Idaho fescue)	225	1,444	43	262	47	216	38	181	27	131	15	345
<i>Stipa occidentalis</i> (western needlegrass)	149	683	90	236	249	346	530	809	505	1,216	323	1,007
<i>Sitanion hystrix</i> (squirrel tail)	468	1,756	583	1,910	476	1,483	514	1,586	250	1,335	53	142
<i>Carex douglasi</i> (sdcg)	185	1,618	27	136	13	65	18	107	28	190	9	171
<i>Poa secunda</i> (Sandberg bluegrass)	22	21	8	21	15	10	9	8	3	4	—	—
<i>Koeleria cristata</i> (June grass)	3	1	—	—	—	—	—	—	—	—	—	—
Subtotal:	1,052	5,523	751	2,565	800	2,120	1,109	2,691	813	2,876	400	1,665
Browse species												
<i>Purshia tridentata</i> (bitterbrush)	73	88,811	80**	—	—	—	—	—	—	—	—	—
Weed species												
<i>Achillea millefolium</i> (yarrow)	99	183	3	29	9	101	88	531***	269	252	48	1,391***
<i>Chrysothamnus bloomeri</i> (rabbit brush)	32	2,745	2	2	2	481	28	531	69	931	55	4,955
Subtotal:	131	2,928	5	31	11	582	116	1,062	338	1,183	103	6,346
TOTAL:	1,256	97,262	756	2,596	811	2,702	1,225	3,753	1,151	4,059	503	8,011
<i>Bromus tectorum</i> (cheatgrass)	—	—	—	—	955	—	1,668	—	618	—	—	—

\*Total area 180,000 sq. in. \*\*All dead. \*\*\*Measured in clumps instead of by individual plants as in other years.

eastern California plateau; the ground is nearly level. Predominant cover is bitterbrush (*Purshia tridentata*) with various perennial bunchgrasses around and between the bitterbrush clumps (Fig. 1). Scattered living trees and stumps and snags indicate that the area once supported an open stand of ponderosa pine. The area is used as a cattle range.

When the plots were established, all perennial plants within each set of plots were counted. The basal areas of the grasses and crown areas of the brush species at their greatest spread were measured. The burned plots were remeasured in July 1951, in August 1952,

August 1953, and again in August 1955. Table 1 is a summary of these 5 years' measurements.

In 1951 and 1952, the unburned plots did not appear to have changed sufficiently to justify re-measurement. A check measurement of two of the unburned plots in 1953 showed a small increase in the number of perennial grasses but no material change in the total basal area. In 1955, the markers for the unburned plots had been destroyed. However, two plots were laid out in as near the same area as possible, and these, too, showed no material change since 1950 in the total basal area of perennial grasses.

When the plots were established, cheatgrass (*Bromus tectorum*) was not present on the burned plots and only a few plants were found on the unburned plots. There was a heavy invasion of cheatgrass on the burned plots in 1951 (Fig. 2). Cheatgrass plants increased in number in 1952, but they were smaller and covered less area. The number decreased greatly in 1953, and in 1955 only a few plants remained at the time of measurement.

It is too early in the study to draw definite conclusions regarding the full effects of fire on this range. It is obvious from Table 1 and from comparing Figure 3 with



FIGURE 3. Burned plots in 1955. Dark-colored bushy plants are rabbit brush.

Figure 1, however, that the cover density of the burned area is still far less than that of the unburned. A notable feature of the burned plots is the complete loss of bitterbrush. This species occupies 91 percent of the vegetated area on the unburned plots and supplies a very large part of the available forage. The palatable grasses on the burned plots 6 years after the fire had only about 30 percent of the basal area of those on the unburned plots. Between 1953 and 1955 the number and basal area of the perennial grasses decreased about 40 percent on the burned plots. Because of this reduction and the complete loss of bitterbrush, after 6 years the grazing capacity of the burned range is far below that of the unburned area. The reduction in perennial grasses appeared to be largely the result of changes in the microclimate and the closer grazing resulted from the removal of the brush cover by fire. It seems probable that much of the area formerly in bitterbrush will be taken over, temporarily at least, by low value species such as yarrow (*Achillea millefolium*), rabbit brush (*Chrysothamnus bloomeri*), cheatgrass, and annual weeds.

### BITTERBRUSH SEED DORMANCY BROKEN WITH THIOUREA<sup>1</sup>

BENNETT O. PEARSON

*Range Conservationist, California Forest and Range Experiment Station, Forest Service, U. S. Dept. of Agriculture, Berkeley, California.*

Bitterbrush (*Purshia tridentata*) is one of the most important western browse species on winter ranges used by deer. On some ranges severe reduction of bitterbrush stands has resulted from fire, overbrowsing, and insect defoliation. Restoration through natural seeding is slow and uncertain, especially if the seed-producing plants are few, are low in vigor, or if browsing continues. Artificial

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