

Long-Term Changes From Different Uses of Foothill Hardwood Rangelands¹

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In the late 1930's, photo stations were established on the San Joaquin Experimental Range in Madera County in central California for the purpose of recording effects of different types of management and land use. For this paper, three photo stations are shown representing no grazing and no fire, grazing and no fire, and grazing and fire. All were rephotographed in 1959 and again in 1985.

The San Joaquin Experimental Range consists of 4,500 acres in the lower foothills (700 to 1,700 feet in elevation) in the granitic soil area, 28 miles north of Fresno. Rainfall has averaged about 19 inches, with extremes of 9 and 37 inches since 1934, when private ranch holdings were purchased by the Forest Service for use as an experimental range for grazing, livestock and wildlife research. For over 50 years, a variety of studies have been conducted by Forest Service researchers and cooperators from other state and federal agencies, organizations and universities. In 1984 the Pacific Southwest Forest and Range Experiment Station and California State University, Fresno entered into a long-term cooperative agreement, with C.S.U. assuming the administration of the Experimental Range. It will continue to be used for research and education purposes, to contribute to the knowledge of the use and conservation of California's rangeland resources. Three recent California Agricultural Technology Institute (CATI) publications update lists of all plants, vertebrate fauna and

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Abstract: Photo stations on foothill hardwood rangelands representing different types of management and uses were established in the late 1930's on the San Joaquin Experimental Range in Madera County in central California. The stations were rephotographed 20 years later: and again in 1985. After almost 50 years, the grazed areas, whether burned or unburned, show remarkably little change. They still have an open, parklike appearance with scattered oaks (primarily Quercus douglasii). The Research Natural Area, which has been neither grazed nor burned since 1935, presents quite a contrast, with a distinct change to woody vegetation. Digger pine (Pinus sabiniana) and wedgeleaf ceanothus (Ceanothus cuneatus) have increased dramatically. The differences in wildfire hazards between grazed and ungrazed areas are obvious in the photographs.

publications from 50 years of research at the Experimental Range; all are available at CATI, Calif. State University, Fresno, 93740. They are Larson and others 1985, Duncan and others 1985, and Duncan and Coon, 1985.

The story here is basically an update of the "Then and Now" publication by Woolfolk and Reppert (1963) now out of print; indeed the 1930's and 1959 photos are the same as the 1963 note. Photo Station 2 its what is now the Research Natural Area, which simply has been neither grazed by livestock nor burned since 1934 (fig. 1). Two decades later (1959) figure 2 indicates that lack of grazing and no fire favors the woody plants. The 1985 photo (fig. 3) shows a lot more of the same! The differences in wildfire hazards between this ungrazed area and the grazed areas that follow in the text and figures are so apparent that further comment is unnecessary. Most of the dramatic increase in woody vegetation is made up of digger pine (Pinus sabiniana) and wedgeleaf ceanothus (Ceanothus cuneatus). There has been little change in the scattered blue oak (Quercus douglasii). There has been little, if any, establishment of blue oaks with no cattle and no fire since 1934. Thus, blaming cattle grazing for lack of blue, oak reproduction simply does not hold up; in this particular area, at least for a 50-year period. The same may be said of results at the Hastings Natural History Reservation in the Santa Lucia Mountains. Under the heading of oak regeneration, the Range and Public Lands Committee for the California Association of Resource Conservation Districts reported in 1986: "Much has been said about the problems of oak regeneration and much of the blame for the poor survival of our blue and valley oaks has been attributed to cattle grazing. This does not appear to stand up under scrutiny. Studies by Dr. James Griffin at the Hastings Natural History Reservation in the Santa Lucia Mountains--an area which has not had any agricultural use for over 40 years--have shown little or no change in regeneration of oaks following the removal of agriculture. He has postulated that high rodent populations may be responsible



Figure 1--(Station 2 - Photo 1. October 20, 1938) at the San Joaquin Experimental Range, a view of the Research Natural area, ungrazed since 1934, and unburned since a wildfire in the late 20's.



Figure 2--(Station 2 - Photo 2. December 8, 1959) after Photo 1, another 21 years of no grazing and no fire resulted in great increases in digger pine (Pinus sabiniana) and wedge leaf ceanothus (Ceanothus cuneatus).



Figure 3--(Station 2 - Photo 3. December 12, 1985) Much of the ungrazed, unburned area is almost impassable, with large amounts of live and dead woody vegetation. There has been little or no natural reproduction of blue oak.



Figure 4--(Station 3 - Photo 1. August 30, 1937) This station represents moderate to light livestock grazing and no fire since a wildfire in the late 1920's.



Figure 5--(Station 3 - Photo 2. December 15, 1959) Twenty-two years later, very little change was evident in the woody vegetation. Obviously, no new woody plants had become established.

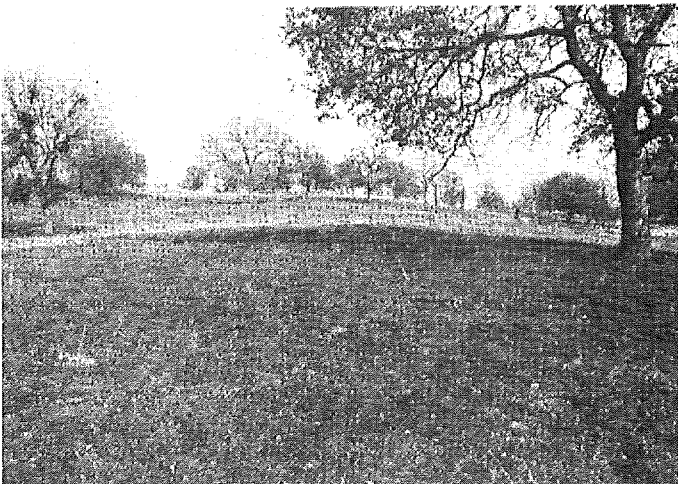


Figure 6--(Station 3 - Photo 3. December 10, 1985) After 48 years, still very little change. A close look at the blue oak (*Quercus douglasii*) trees shows amazingly little change.

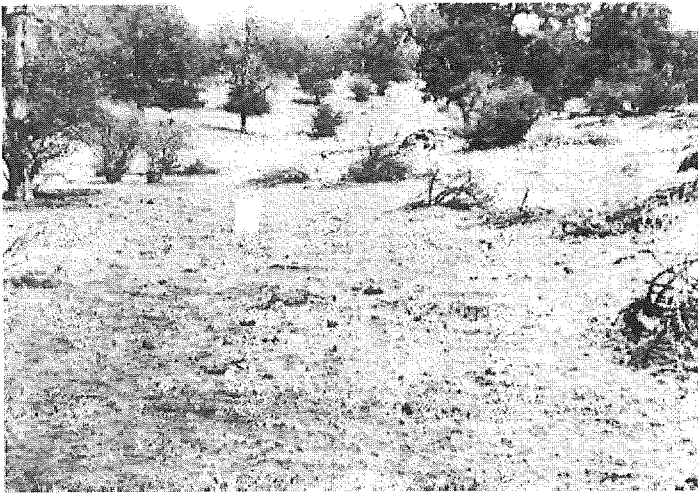


Figure 7--(Station 5 - Photo 1. August 10, 1939) This station represents moderate to close yearlong livestock grazing, with fire (after this photo was taken.)



Figure 8--(Station 5 - Photo 2. December 30, 1959) Continued livestock grazing, plus fire (in 1934) resulted in a decrease of the smaller woody plants, mostly Ceanothus cuneatus.



Figure 9-- (Station 5 - Photo 3. December 11, 1985) A wildfire (1974) burned this area again. The weather each year has more influence on the annual plant vegetation than prior grazing or fires, or both.

for most of the seedling oak predation and loss that he has observed." Griffin (1980), at an earlier oak symposium, noted that exclusion of cattle at Hastings had not resulted in oak reproduction. At the same symposium Duncan and Clawson (1980) reviewed livestock utilization of California's oak woodlands.

Photo Station 3 represents an area grazed at a light to moderate rate (locally heavy use in some years) and no fire. Figures 4, 5, and 6 speak for themselves; there was practically no change. Perhaps the most important points in this series of photos are that blue oaks in this area didn't change much in almost 50 years, and that lack of fire did not result in any establishment of new blue oaks.

A combination of moderate to close livestock utilization and fire is shown in Photo Station 5. Several years of close utilization in the late 1930's appeared to be detrimental to the ceanothus plants in the 1939 photo (fig. 7). A wildfire removed the woody debris before the 1959 photo (fig. 8) and another wildfire occurred in 1974, before the 1985 photo (fig. 9). This series of photos also illustrates the very slow growth, (or lack of change) in blue oaks. Note the small branches "hanging down" on the right side of the closest oak in figure 8 (1959). Compare with the 1985 photo (fig. 9). Many of the small branches seem to be almost the same after 26 years.

An early photo of the rodent enclosure shown in figure 10 could not be found, but old records indicate the same thing happens on a very small area protected from grazing and fire as shown in the larger Research Natural Area (figs. 1, 2, and 3). This rodent enclosure was "mostly open," probably 75-85 percent when established in the late 1930's. When Howard (1959) reported on a hamster survival study inside the enclosure, he described the 50 x 100 foot pen, in 1950, as follows: "About 2/3 of the pen is covered with annual grasses and herbs; the remainder has a canopy of woody vegetation: One 30 foot blue oak

(*Quercus douglasii*) a 15 foot digger pine (*Pinus sabiniana*), two coffee berries (*Rhamnus californica*), and 20 wedgeleaf ceanothus (*Ceanothus cuneatus*)."

The 1985 photo (fig. 10) shows this "mini-natural area" deserves a caption "bursting at the seams." We could not resist the temptation for a hasty "comparison" with Howard's description of the woody vegetation present in 1950. Today, about 1/3 of the pen is annual grasses and forbs, and 2/3 is under the canopy of woody vegetation: One 30 foot blue oak, one 45 foot digger pine, 2 coffee berries, and 29 wedgeleaf ceanothus (21 live, 2 decadent, and 6 dead).

Additional photographs will be featured in a more detailed publication for the California Agricultural Technology Institute Series (in press).

We hope this paper, with its long-term pictorial evidence of what has happened in one part of California's oak woodlands, will add in some small way toward a better understanding of this important resource. As a matter of interest, the Research Natural Area at the San Joaquin Experimental Range, along with grazed areas, is being used, by cooperating scientists from four other universities and CATI scientists in a number of investigations recently funded as Hardwood Range Research Projects. These studies include oak woodland regeneration, wildlife-habitat relationships in oak woodlands, ecology and regeneration of hardwoods rangelands, overstory effects on forage production, quality and utilization, soil characteristics on hardwood rangelands, and breeding habitat of cavity nesting birds.

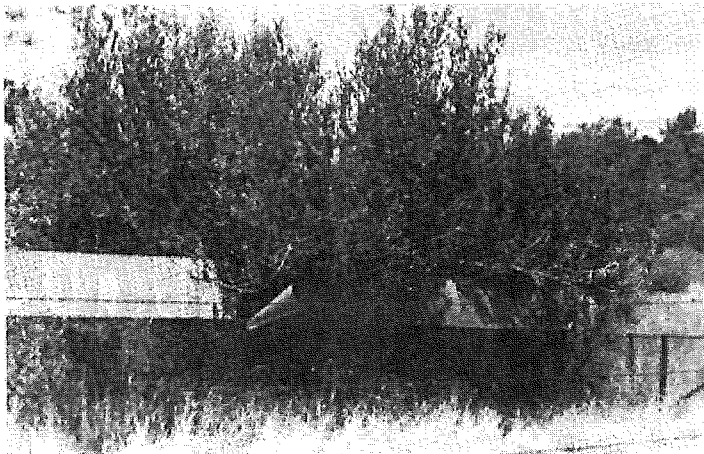


Figure 10--(A "Mini-Natural Area". December 11, 1985) This 50 x 100 foot rodent-proof pen was mostly open when established in the 1930's. By the early 1950's, it was 2/3 open area and 1/3 under the canopy of tree and brush species. Today it is "bursting at the seams," with woody species, mainly *Ceanothus*, and is only 1/3 open area.

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