

Historical Backgrounds of Range Land Use in California

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In the year 1769 a group of Spaniards was riding northward from San Diego, through the Coast Ranges, in search of the Port of Monterey. Members of that party, an expedition led by Don Gaspar de Portolá, were the first Europeans to gain any extensive, accurate knowledge of California. On Tuesday, July 18, 1769, one of these men, Miguel Costansó, wrote: "The place where we halted was exceedingly beautiful and pleasant, a valley remarkable for its size, adorned with groves of trees, and covered with the finest pasture . . ." (Constansó, 1911). Later, he said: "We then proceeded over high hills, and through canyons containing very good soil and good pasture. . . ." These statements struck a keynote that was echoed by early travelers throughout California, who uniformly were favorably impressed with the potentialities of the country for livestock grazing.

The Pristine Ranges of California

Early travelers in California were, for the most part, sturdy, experienced, and practical men—explorers, trappers, traders—who viewed the countryside with an eye to its ability to supply their immediate needs, and with regard to its potentialities for settlement. A great many of them had reason to give close attention to the forage resource: either directly as a source of feed for the animals which transported and fed them; or indirectly, as a possible means of livelihood through grazing of livestock.

The Spaniards, whose activities were confined principally to the region west of the San Joaquin Valley and south of San Francisco, left voluminous records of their first impressions of this country. Of the mission lands at San Diego,

Pedro Fages said: "For flocks and herds there are excellent places with plenty of water and abundance of pasture" (Fages, 1937). At San Luis Obispo, he wrote, "Abundant water is found in every direction, and pasture for the cattle, so that no matter how large the mission grows to be . . . the land promises sustenance" (Fages, 1937). But perhaps none of these accounts excelled the simple eloquence of Fray Juan Crespi, who wrote: "There is much land and good pasture" (Engelhardt, 1920).

The Spaniards did not occupy much of the Central Valley, or the Sierra Nevada-Cascade country. The best early records of those regions are in journals of American and Canadian fur trappers, who traveled here extensively after the first quarter of the nineteenth century. Jedediah Smith was interested primarily in trapping beavers. But he observed that there was feed for his horses in the lower San Joaquin Valley when he wrote, on February 12, 1828: "The winter in this valley is the best season for grass . . . the whole face of the country is a beautiful green, resembling a flourishing wheat field" (Sullivan, 1934). In 1833, John Work was marooned at Marysville Buttes by seasonal floods of Sacramento River, with a party of 163 persons and some 400 horses. On February 22 he noted: "We have been a month here and could not have fallen on a better place. . . . There was excellent feeding for the horses . . ." (Maloney, 1945). Edwin Bryant described the country southeast of Sacramento as a level plain covered with luxuriant grasses, and said that in the bottom lands along Mokelumne River the rich soil produced the finest qualities of grasses (Bryant, 1848).

While accounts of contemporary travelers are of great value in giving us an appraisal of the general nature of the forage cover at the time California was being settled they afford few details of its botanical composition or floristic characteristics. It is to early botanical collections that we must turn for these details. They range all the way from fragmentary collections such as those of the Beechey voyage to the more comprehensive work of the Pacific railroad surveys (Hooker and Arnot, 1841; Torrey, 1856). In a sense early plant collections are quite disappointing to a range man. They were made almost wholly to serve taxonomic or other special purposes; they are chiefly records of occurrence, yielding but meager information as to relative abundance and areal distribution of species. Nor do they ordinarily include introduced plants which shortly had so profound an effect on the forage of some localities.

Historical Resumé: The Livestock Industry of California

Ranching had its beginning as the first industry in California in 1769 when the Franciscan missionaries brought cattle and horses from Lower California to the mission being founded at San Diego. Provision for establishing a herd of livestock was an important element in the founding of every mission. Meat was necessary for subsistence of the mission community, while hides and tallow furnished raw materials essential in local economy. Long before the discovery of gold—even before cereals planted by the colonists yielded dependable harvests—the forage on the hills had begun to form the basis of a reliable economy.

Additional settlements followed San Diego in rapid succession. By 1823 there was a chain of 21 missions stretching from San Diego to Sonoma; presidios had been established at four strategic spots along the coast. As colonizing agents of the Spanish government, missions were not intended to be permanent, nor was their establishment accom-

panied by any conveyance of land from the crown to the mission. Under both Spanish and Mexican governments missions were permitted to occupy and use certain lands for the benefit of the Indians: in theory, when the Indians had been Christianized and civilized mission settlements were to become *pueblos* (towns) (Robinson, 1948). The missions soon extended their occupation of land so that boundaries of one tended to coincide with the next, despite the fact that much intervening land was not in actual use. Ultimately, missions asserted claim to a major part of all lands in the coastal strip from Sonoma southward, embracing about one-sixth of the total area of the state. At its height this mission-dominated pastoral empire probably controlled in excess of 400,000 head of cattle and 300,000 sheep (Gordon, 1883).

Ranching was not a prerogative of the missions. Livestock soon were acquired by soldiers and settlers of the frontier establishment. In 1784, Governor Pages submitted to his superiors in Mexico the first petition concerning private use of land for ranching in California; it came from one Juan José Domínguez "who was a soldier in the presidio of San Diego and who at this moment has four herds of mares and about 200 head of cattle on the river below San Gabriel" (Cleland, 1941). At least thirty concessions of land for ranching—nearly all to veterans—were made during the Spanish period, ending in 1822 (Robinson, 1948). The Mexican government was more generous in its grants; but the land grant movement did not become really active until after about 1836. From then until the end of Mexican rule practically anyone could obtain a grant of a square league of land if he would put up a house and place a hundred cattle on it. More than 500 ranchos existed in California in 1846; nearly all had their origin in Mexican grants, mainly from former mission controlled lands (Robinson, 1948).

Acquisition of California by the United States occurred almost simultaneously with the discovery of gold. Almost overnight a prodigious market for meat was created—on the very doorstep of the California rancher. The spectacular livestock boom which marked the decade that followed was a natural outgrowth of the Gold Rush. The seemingly insatiable demand for meat in mining camps, and in such mushrooming metropolitan centers as San Francisco, Sacramento and Stockton furnished the incentive. Ranchers sent their stock to markets in northern California in drives comparable in economic significance and picturesque detail to those over the Abilene Trail of Kansas (Cleland, 1941). Nor could the demand for meat be satisfied by local production. Large herds were driven from Texas, Mexico, Arizona and New Mexico, while more than 150,000 head of cattle entered the state from the Middle West during the years 1852 and 1853 (Cleland, 1941; Sampson, 1952).

In spite of the enormous demand for meat, and of droughts which created serious shortages of range feed during the late 1850's, the cattle population increased from about a quarter of a million animals in 1850 to nearly one million head by 1860; sheep increased by nearly 1.1 million head (U. S. Census Office, 1853; 1864). The higher livestock population of the early 1860's coincided with a marked slackening in demand for meat; reduction in sales meant more breeding animals on the ranges—numbers soared tremendously. Generally accepted estimates place the cattle population at three million head in 1862 (Cleland, 1941; Gordon, 1883). The next two years brought the most critical period of drought in the history of the livestock industry in this state; great numbers of stock perished from lack of feed and water. William Brewer wrote: "May 27 [1864] we came up the San José valley. . . . The drought is terrible. In this fertile valley . . . during the past few days' ride we have seen

dead cattle by the hundreds" (Brewer, 1949). Results of this drought were so drastic that cattle production on a speculative basis was permanently curbed in California. But it had beneficial aspects; many ranchers realized they no longer could depend solely on range feed for production of livestock and began to plant alfalfa and other forage crops to supplement natural vegetation, thereby laying a firmer foundation for the range industry. Many ranchers now shifted their interest to sheep, believing these animals were better suited to the semi-arid climatic conditions. By 1870, cattle numbers had decreased to less than half a million head, while the sheep population had risen above 2.7 million animals.

As permanent settlement of the state proceeded increased emphasis was placed on farming, large tracts of fertile valley land being diverted from range use to crop production. The pastoral industry shifted to grassland and woodland ranges of the foothills, and to plateau and mountain areas not generally tillable, where it has become relatively stabilized.

Major Factors Affecting the Range Resource

Nearly two centuries of use have vastly altered the range resource of California from the pristine condition seen by Spanish pioneers. What we see today is the result of interaction of many factors operating during the course of our range use history. In a situation of this sort the effect of two unfavorable factors is not the simple arithmetic of one plus one equals two. When one adverse factor is added to another under circumstances such as existed here there is a cumulative effect that assumes aspects of a geometric ratio. When certain factors are singled out for individual inspection, this combined, cumulative effect must be kept in mind.

Major factors affecting California's range resource during the development of the livestock industry have included limited precipita-

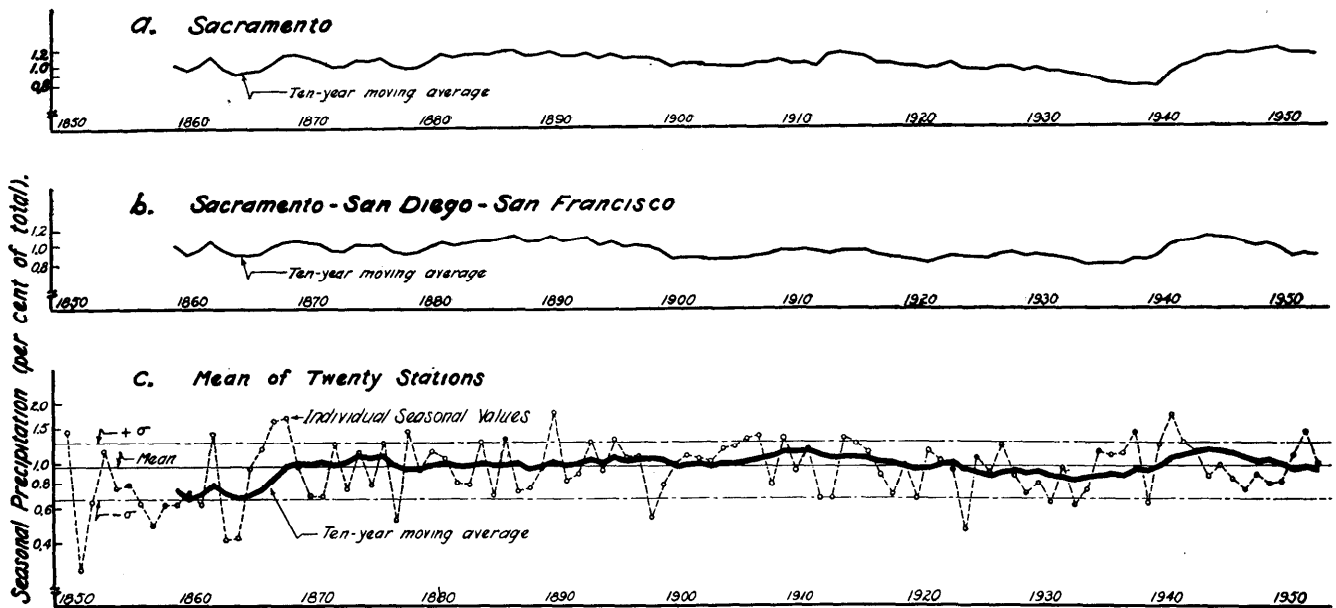


FIGURE 1. Trends in seasonal precipitation on California range lands: 1849-50 to 1952-53, inclusive.

tion with irregular distribution, seasonal and long-time variations in temperature, replacement of native vegetation by introduced species, rates of stocking, changes in size of grazing animals, nutritional deficiencies in the forage, types and patterns of land ownership, changes in land use, and changes within the livestock industry itself. Only a few of them can be touched upon here.

As a whole, California is an area of relatively low rainfall. "About 55 percent of all seasons yield less rainfall than the average rainfall record" (Lynch, 1931). When several such seasons follow one another, as has happened frequently, difficulties arise for the stockman. Deficiencies in precipitation plagued him almost from the moment of his arrival. They were especially severe from 1828 to 1830; in 1840-41; and from 1845 through 1847 (Bryant, 1848; Lynch, 1931; Wentworth, 1948).

Gray (1934) demonstrated a downward trend in mean annual precipitation for California amounting to about eight inches for the 80 years between 1850 and 1930. His conclusion is open to question because his trend line is based upon solution of a least squares equation, the results of

which may be influenced by selection of points between which the trend line is calculated.

An analysis of precipitation records from stations located in the primary range area of California, covering more than a century, indicates there has been no pronounced trend in precipitation (Fig. 1). All stations used in this analysis have records of 74 years or longer; three of them extend back well over 100 years. The analysis was based on "seasonal precipitation"—from July 1 through June 30 the following year. The curves show seasonal precipitation as a percentage of total precipitation for the entire period of record, smoothed by use of a ten-year moving average, as follows: for a single station (Fig. 1a); for three stations with records of more than 100 years (Fig. 1b); and for twenty stations in the grassland and woodland range areas of the state (Fig. 1c, solid line). Statistical analysis showed that the composite curve (Fig. 1c) constitutes a homogenous record for the entire period, despite the fact that data from a variable number of stations were used for seasons prior to 1878-79, and from all twenty stations after that time. From these data the conclusion is reached that

while there have been considerable fluctuations of precipitation during the past century they are rather evenly distributed about the mean, and there has been no pronounced trend in precipitation within the area, and during the time, included in this study. Fluctuations of precipitation greater than one standard deviation from the mean, plus or minus, indicate a condition of surplus, or of deficiency, throughout the primary range area of the state at the same time; fluctuations of less than that amount were of lesser areal extent.

While there has been no pronounced trend in precipitation in our primary range area during the past century, there is much evidence of wide variation in amounts received in different seasons. The greatest deficiency to appear in the records studied occurred during the twelve-year period from 1853-54 through 1864-65. During eleven of these seasons rainfall was below the mean, and in seven it was less than the mean minus one standard deviation. This deficiency was significant in the major disruptions of the livestock industry occurring at that time.

Today the herbaceous cover of the principal range lands of California is dominated by annual

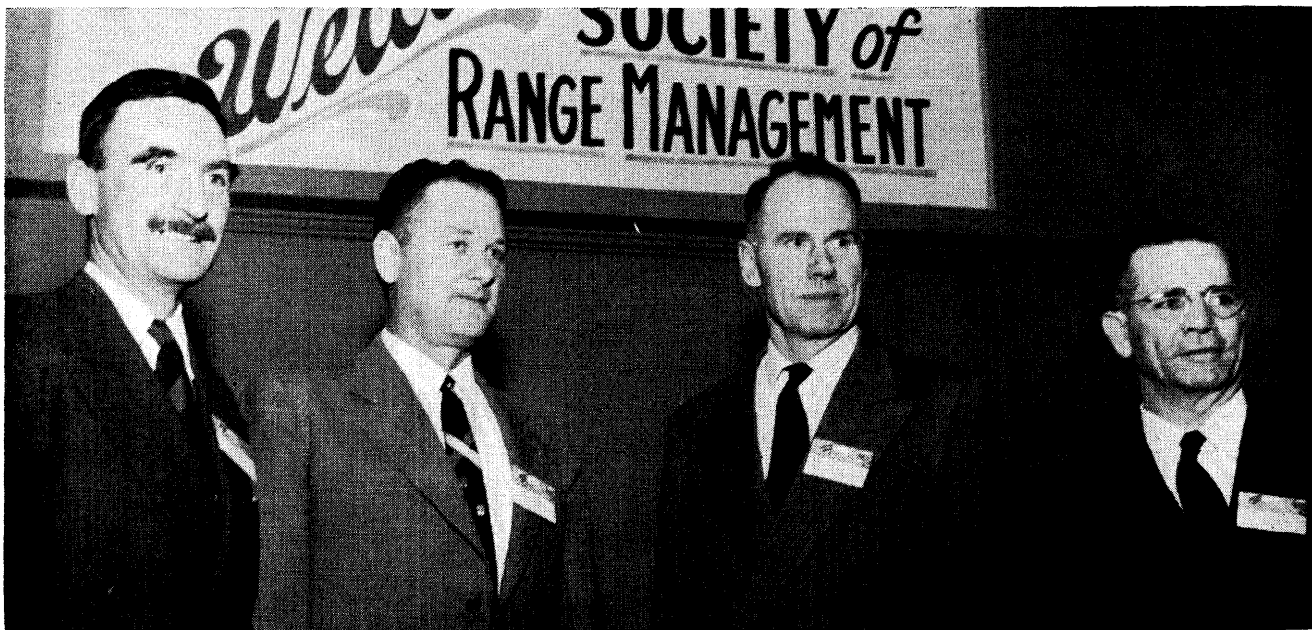
plants, more than half of them species introduced from the Old World (Talbot, *et al.*, 1939). Apparently replacement of native vegetation by introduced plants began about the time the first Spanish settlers arrived. Studies of plant remains in adobe bricks used in construction of the oldest portions of the earliest missions indicate introduced species such as annual bluegrass (*Poa annua*), wall barley (*Hordeum leporinum*), and ryegrass (*Lolium multiflorum*) became abundant concurrently with the advent of settlers, while red-stem filaree (*Erodium cicutarium*), curly dock (*Rumex crispus*), and prickly sow thistle (*Sonchus asper*) may have preceded Europeans (Hendry, 1931).

Certain introduced annuals achieved virtual dominance of range lands at various times. Wild oats (*Avena fatua* and *A. barbata*) first became generally widespread, and perhaps captured and maintained a hold on a larger territory than any other species. As early as 1833 wild oats was an important element in the plant cover of large areas, including portions of the San Joaquin Valley (Leonard,

1934). "It was most abundant between 1845 and 1855, when hundreds of thousands of acres were clothed with it thick as a meadow" (Brewer, 1883). Black mustard (*Brassica nigra*) was an important dominant over large areas at this same time (Bryant, 1848; Cleland, 1941). By the mid-1860's wild oats was fast disappearing (Bolander, 1866; Perkins, 1863). Wild oats and mustard were succeeded by filaree, which increased in abundance until about 1865 to 1870 (Brewer, 1883); it was associated with bromegrasses (*Bromus*), wild barleys (*Hordeum*), and some of the weedier native annuals, such as nitgrass (*Gastridium ventricosum*) (Bolander, 1866; Brewer, 1883). The third phase in this succession was marked by species of comparatively little value for grazing: red brome (*Bromus rubens*), certain native and introduced wild barleys, and native broad-leaved weeds like tarweed (*Hemizonia*) and turkey mullein (*Eremocarpus setigerus*); this phase first became distinct about 1900. At the present time appreciable portions of our range lands are in this stage. In certain areas there is evidence of a fourth

phase of succession, marked especially by grasses such as medusa-head (*Elymus caput-medusae*) and barb goatgrass (*Aegilops triuncialis*) in the Sacramento Valley and Northern Coast Ranges, and by dogtail (*Cynosurus echinatus*) in northern Mendocino and Humboldt counties.

It is significant that this historical sequence in dominance corresponds to the descending scale of annual plant successions on California range lands under different intensities of use. Wild oats, soft chess (*Bromus mollis*), rip-gut grass (*Bromus rigidus*), and bur clover (*Medicago hispida*) are typical of the highest stage of succession on ranges dominated by annual plants; the intermediate stage is characterized by foxtail fescue (*Festuca megalura*), filaree and red brome; the low stage is indicated by plants such as tarweed, silver hairgrass (*Aira caryophyllea*), and turkey mullein (Sampson, 1952). Since this sequence of succession is intimately related to condition and productivity of the range it affords a clear indication of the fact there has been a steady downward trend in the range resource.



Newly elected officers of the American Society of Range Management at the Ninth Annual Meeting, Denver, Colorado: Left to right, JOHN M. CROSS, Director, Nanton, Alberta; J. D. "DANNY" FREEMAN, President, Prescott, Arizona; E. W. TISDALE, Vice President, Moscow, Idaho; LYMAN L. RICHWINE, Director, St. Anthony, Idaho.

In the early days, when livestock was bought and sold by the head instead of by the pound, the stockman placed emphasis on the number of animals produced and placed as many animals on his range as he thought it would support. The range was stocked without sufficient margin for natural fluctuation of climatic factors. Evidence of local overgrazing appeared almost at the outset of stock raising in California. Horses belonging to some of the missions multiplied so rapidly that by 1815 wholesale slaughter was necessary in order to save forage for cattle and sheep (Wentworth, 1948). This condition recurred a number of times before 1850; some missions kept men regularly employed to shoot wild horses grazing on their cattle ranges (Engelhardt, 1920; Sullivan, 1934; Wentworth, 1948). Actual data on rates of stocking the ranges, prior to about 1900, are quite sketchy. In the early 1860's a ranch east of Pacheco Pass contained nearly 50,000 acres and ran 10,000 head of cattle—not more than five acres per cow, for yearlong grazing (Brewer, 1949). In 1880, it was common belief among ranchers that the best grazing lands of the San Joaquin plains required only ten acres per animal unit per year; that seven acres per head was a sufficient allowance for cattle in Humboldt and Mendocino counties; and that as little as three acres per animal unit per year was adequate on certain range lands of Los Angeles County (Gordon, 1883). As late as 1900, practical stockmen in the Northern Coast Ranges believed their lands would sustain grazing when stocked at the rate of eight acres per cow on a yearlong basis (Davy, 1902). But, as early as 1863, certain members of the livestock industry were cognizant of deterioration in range vegetation and rightly ascribed the cause to overstocking (Bidwell, 1866; Perkins, 1863).

A fact of some significance, not commonly taken into account, is the increase in size of livestock

using the range during the past century. Spanish livestock were significantly smaller than modern animals. In 1837, at San Francisco "fine fat bullocks, weighing from four to five hundred pounds, hide included, were purchased at five dollars each" (Belcher, 1843). "Describing a herd of 'large steers' in 1861, Abel Sterns wrote, 'The cattle are large and fat [and] will weigh from six hundred to eight hundred pounds'" (Cleland, 1941). From this and similar evidence the conclusion has been reached that until after about 1870—when they were supplanted by heavier, modern breeds—most of the cattle on California ranges probably averaged about 600 pounds live weight. The same situation obtained with regard to sheep, the common breeds ". . . weighing from fifty-five to eighty pounds at maturity" (Wentworth, 1948). The significance of this fact is that since the feed requirement of an animal is a function of body weight these smaller animals required appreciably less range forage. The Spanish steer which averaged 600 pounds live weight would require only about 75 percent of the feed needed by the 1,000-pound animal of today (Gilbert, *et al.*, 1951). In practical application, this means that a piece of range which was properly stocked with 100 steers in 1855 should carry only about 75 head in 1955—assuming that the range has not deteriorated in the meanwhile!

Today the range livestock industry constitutes an important segment in the agricultural activity of the state. Our range lands have significant economic advantages over those of other areas. Whereas grazing regions of other states must look largely to more distant markets, our rancher has within the borders of his own state and relatively close at hand, a market for all the livestock he can produce. "The cattle and sheep industries of California steeped in tradition and for more than a century concerned chiefly with pro-

duction problems, are entering in a big way a new, modern era of high powered consumer promotion for their products" (Hintz, 1954).

The stockman has come to a realization that he is producing a commodity in a highly competitive age, and is preparing to meet the competition face to face. The transition to this new promotional era has been preceded by a realization that the range resource is definitely limited in both quantity and quality; by a growing awareness that this resource is renewable. It is accompanied by an increasing consciousness that ownership of land imposes responsibility for its stewardship. Much constructive work is being initiated to put range management on a practical basis; to maintain and increase the productivity of range lands in our state. The ranchers themselves are in the forefront, making the major contribution to these efforts.

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