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Forest Grazing in California

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FOREST grazing has an important bearing not only on the livestock industry but on the whole economic and recreational life of California. The human population of the state has increased 2.5 million since 1941. It is now over 9.4 million and still growing. This increase has been accompanied by marked industrial and agricultural developments and greater demands for the products and values produced on forest ranges.

Forest ranges are the main sources of green summer range in the state. Because California is sorely deficient in summer ranges, they are especially important to the livestock industry. These forest ranges also produce

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most of the big game animals in the state, the most important of which is deer. In some places in the scenic high Sierras and in other areas, forage is becoming more valuable for recreational use than for the production of sheep or cattle. Furthermore, forest grazing influences the yield of water from the watersheds and therefore affects the agricultural and industrial development of the state.

California's forest ranges are not producing meat and other products up to their full capacity, primarily because of deterioration and of continuing close grazing by livestock in many places and also, in some places, by deer. This loss in production is keenly felt, because California for many years has not produced enough livestock to meet her needs.

In order to visualize more clearly the place and importance and some of the problems of forest grazing in the state, it is necessary to have a general idea of the topography, climate, and vegetation of the entire state.

TOPOGRAPHY AND CLIMATE

California has an area of a little over 100 million acres. Its range lands cover two long, rugged mountain systems and many valleys from sea level to 14,000 feet in altitude. The Coast Ranges extend along the Pacific Ocean from Oregon to Mexico in a belt about 50 miles wide and 800 miles long, and the Sierra Nevada and Cascade range form a chain in the eastern half of the state. These two mountain systems are joined together on the north, just below the Oregon border, by the Siskiyou mountains, and on the south, about two-thirds of the way down the state from the Oregon line, by the short Tehachapi range. These mountains are dissected by numerous streams and canyons and enclose the Sacramento and San Joaquin Valleys, which together make up the Great Central Valley. The southeastern corner of the state is desert. The northeastern corner—an extensive plateau area—is the western extension of the Great Basin.

Throughout California, precipitation falls mainly during the winter and spring months, from October until May. Below an altitude of about 3,000 feet, it falls mainly in the form of rain, and above 3,000 feet, mainly as snow. The period from June to September is hot and dry.

COVER TYPES

The vegetative and other cover types (Table 1) in the state are greatly intermingled and form a complicated pattern influenced by rainfall, soils, latitude, altitude, aspect, proximity to the ocean, and similar factors. In general, however, they are stratified into horizontal zones from the valleys to the mountain tops. About 14 million acres in the state, formerly grassland and woodland-grass types mainly, are in cultivation or in towns and industrial developments. Most of the cultivated areas lie in the Great Central Valley and on flat and gently sloping lands of the Coast Ranges and in southern California. Probably the most diversified agriculture in the world, depending heavily on irrigation water, has been developed on these areas. They produce about 200 specialized crops, including a large tonnage of hays and grains that are fed to livestock. About 4.5 million acres are planted to small grains, hay, and seed. About ~~500,000~~ 400,000 acres are

in irrigated pastures. A great variety of residues and by-products from farming also go into livestock production.

Natural grasslands, of which there are about 10.4 million acres in the state, surround most cultivated lands. Most of this acreage lies in the Great Central Valley and Coast Ranges from sea level to about 1000 feet in altitude. Smaller grassland areas are enclosed and intermingled with other vegetative types from the desert to the highest mountains. Above an altitude of about 3,000 feet, in the snow belt, grasslands consist mainly of perennial plants. The common mountain meadow is an example of this type of grassland. Below 3,000 feet, in the rainfall belt, annual plants dominate the cover. Grasslands furnish over half the rangeland grazing capacity for livestock in the state. Deer also make some use of the type.

A woodland-grass belt of about 7.6 million acres borders the main grassland area, extending upward to about 2,000 feet in altitude. The overstory in this type consists mainly of blue oak (*Quercus douglasii*), California live oak (*Q. agrifolia*), interior live oak (*Q. wislizenii*), Digger pine (*Pinus sabiniana*), and light stands of shrubs, like buckbrush ceanothus (*Ceanothus cuneatus*), manzanita (*Arctostaphylos* spp.), California buckthorn (*Rhamnus californica*), redberry buckthorn (*Rhamnus crocea*), and Pacific poison oak (*Rhus diversiloba*). The herbaceous ground cover consists of annual plants similar to those found in the annual-type grassland. The woodland-grass type furnishes about one-third of the rangeland grazing capacity for livestock in the state. It is used appreciably by deer in its upper reaches.

TABLE 1.—CALIFORNIA COVER-TYPE AREAS¹

Cover type	State total	Forest range total
	1,000 acres	
1. Pine	4,586	4,586
2. Redwood	1,788	1,788
3. Douglas-fir	2,289	2,289
4. Fir	1,757	1,757
5. Pine-Douglas-fir-fir	7,236	7,236
6. Lodgepole pine-whitebark pine	2,032	2,032
7. Pinyon pine-juniper	3,200	3,200
8. Minor conifers	405	405
9. Chaparral	9,866	9,866
10. Woodland (hardwoods)	2,457	2,457
11. Grass	10,375	457 ²
12. Great Basin Sagebrush	5,071	1,575 ²
13. Barren	1,414	1,354 ²
14. Coastal sagebrush	2,249
15. Woodland-grass	7,570
16. Desert	24,276
17. Marsh	79
18. Cultivated, urban & industrial	13,704
Total	100,354	39,002

¹Wieslander, A. E. and Herbert A. Jensen, Forest areas, timber volumes, and vegetation types in California. Calif. Forest and Range Expt. Sta. Forest Survey Release No. 4, 66 pp. March 1, 1946.

²Estimated on basis county type acreages in Forest Survey Release No. 4 and national forest data, Region 5.

The woodland-grass type merges into three types above it: about 2 million acres of coastal sagebrush, nearly 2.5 million acres of woodland, and about 9.9 million acres of chaparral.

The coastal sagebrush type consists of such species as California sagebrush (*Artemisia californica*), sage (*Salvia* spp.), lupine (*Lupinus* spp.), and coyote brush (*Baccharis pilularis*). It occupies steep slopes mainly and its chief value is for watershed protection, but it provides some forage for livestock and game.

The woodland type, which consists of dense stands of hardwoods, occurs as small, widely scattered islands on the mountain slopes and as ribbons along the sides and bottoms of canyons. Some of the important species found in this type are California black oak (*Quercus kelloggii*), tanoak (*Lithocarpus densiflora*), Pacific madrone (*Arbutus menziesii*), giant chinquapin (*Castanopsis chrysophylla*), and California buckeye (*Aesculus californica*). The value of the type for either livestock or game is low, because the dense stand of trees prevents the growth of much understory vegetation.

The chaparral type covers extensive areas of rolling to very steep and rough topography, and is made up primarily of species of manzanita, greasewood chamise (*Adenostoma fasciculatum*), ceanothus, and California scrub oak (*Quercus dumosa*). These species grow in thin or very dense stands, singly or in combination, and cover some fertile, but mainly poor soils. Some grow from seed, and others sprout from the root crown. Over 2.5 million acres of chaparral occupy commercial timber sites. The chaparral type supports few livestock, but is highly valuable for game and watershed protection.

In the Sierras, about 3,000 feet above sea level, the woodland and chaparral types grade upward into the coniferous forest belt. Within this timber belt, on the west slopes of the Sierra-Cascades, timber types merge into one another from lower to higher elevations as follows: (1) Pine, principally ponderosa pine (*Pinus ponderosa*); (2) mixed conifer, consisting of different mixtures of ponderosa pine, jeffrey pine (*P. jeffreyi*), sugar pine (*P. lambertiana*), Douglas-fir (*Pseudotsuga taxifolia*), California incense-cedar (*Libocedrus decurrens*), and white fir (*Abies concolor*); (3) fir, mainly white fir but some California red fir (*A. magnifica*); and (4) lodgepole pine-whitebark pine, which includes lodgepole pine (*Pinus contorta latifolia*), whitebark pine (*P. albicaulis*), limber pine (*P. flexilis*), and Western white pine (*P. monticola*). Timber line is reached at about 10,000 feet. More than 1 million acres above this altitude is barren—mainly rock. The minor conifers type, which consists of small areas of knobcone pine (*P. attenuata*), Monterey pine (*P. radiata*), Bishop pine (*P. muricata*), Coulter pine (*P. coulteri*), bigcone-spruce (*Pseudotsuga macrocarpa*), or cypresses (*Cupressus* spp.) is distributed throughout the state at altitudes mainly below 4,000 feet. East of the Sierra-Cascades the coniferous types grade up from singleleaf pinyon (*Pinus monophylla*) to Sierra juniper (*Juniperus occidentalis*) and then into ponderosa and jeffrey pine types and others, as on the west slope. A dense forest of redwood (*Sequoia sempervirens*) lies along the Pacific Ocean in the north Coast Ranges and an extensive Douglas-fir

forest clothes the backbone of these ranges. Altogether, these timber types cover about 23 million acres. The pine, mixed conifer, Douglas-fir, fir, and redwood types constitute the commercial forest types, and the lodgepole pine-whitebark pine, pinyon pine-juniper, and minor conifer types the non-commercial forest types. Only the pine, mixed conifer and pinyon pine-juniper types, produce appreciable forage for grazing by livestock and game. The other conifer types have relatively little value for either livestock or game, even when cut over.

Besides grassland and conifer types, the plateau in the northeastern corner of the state supports about 5 million acres of the Great Basin sagebrush type, which is used by both livestock and game. The desert type, which totals about 24 million acres, is mainly waste but it supports some grazing in limited areas.

As used in this paper, forest ranges refer broadly to mountain ranges, and encompass a gross area of about 39 million acres (see Table 1). They include all the national forests—about 25 million acres—and 2 out of 5 million acres in state and national parks. They occupy the principal watersheds and include all the cover types from the chaparral and woodland to the tops of the mountains. The cover types that lie outside this forest range zone are woodland-grass, coastal sagebrush, marsh, desert and cultivated, about 9.9 million acres of low elevation grasslands, and about 3.5 million acres of Great Basin sagebrush. Approximately 92 percent of the forest zone is in conifer forest, chaparral and woodland types, 5 percent in grassland and sagebrush types, and 3 percent is barren.

A MAJOR PROBLEM OF THE LIVESTOCK INDUSTRY

One of the big problems that has confronted the livestock industry since it grew to appreciable size in California has been the scarcity of summer forage. About 90 percent of the rangeland grazing capacity in California is on low elevation winter-spring ranges and only 10 percent on summer ranges.

The winter-spring ranges support a dense cover of annual plants like filaree (*Erodium cicutarium*, *E. botrys*), wild oat (*Avena fatua*), slender oat (*A. barbata*), soft brome (*Bromus mollis*), foxtail brome (*B. rubens*), foxtail fescue (*Festuca megalura*), various clovers (*Trifolium* spp.), including California bur-clover (*Medicago hispida*), which is one of the most prized plants on this type of range, and many other species. This type of herbaceous cover occupies about 25 million acres in the grassland, woodland-grass, coastal sagebrush, and chaparral types in the Great Central Valley and Coast Ranges.

Annual-type forage starts to grow with the first rains in October or November, matures in April, and dries up by the middle of May. In drying, it loses most of its nutritive value and by about August fails to maintain livestock weights. The principal food elements that become deficient are protein and phosphorus⁴. These can be provided in cottonseed cake and other concentrates. In limited areas where there is browse in the overstory or bur-clover in the herbaceous stand, livestock may gain weight through the summer. Aside from losses in nutritive value of the forage, many of these ranges become unsuitable for grazing, especially by

sheep, as early as May because of the development of objectionable plant awns and burs and because the water dries up. Stockmen located on this type of range have great need for green forage during the summer.

Stockmen located in the snow belt in the upper foothills and along the base of the east slope of the Sierra-Cascade ranges, are even harder pressed for summer range. These mountain ranchers use most of their cultivated lands and natural meadows to provide feed to carry livestock through the winter. They do not have the opportunity that the valley operators have to develop irrigated pastures. Both land and water are more limited in the mountains, and the ranchers do not have ready access to a wide variety of products from agricultural lands.

Because of these situations most ranchers in the state have had to turn to forest ranges in the mountains, to irrigated pastures and other feed stuffs in the valleys, and to improved supplemental feeding practices to carry their herds through the summer satisfactorily.

SIGNIFICANCE OF FOREST GRAZING TO LIVESTOCK INDUSTRY

Appreciable livestock grazing started in the mountains of California about 1865, after a severe drought that was felt most acutely in the lowlands. Heavy, unregulated use of forest ranges followed. Many of these ranges were greatly deteriorated by the time most of the national forests were established in the state in the period from 1892 to 1910. In many cases, livestock numbers still exceed the capacity of the range, and the range has had little chance to recover.

The 39 million acres in the forest zone is estimated to have a livestock grazing capacity at present of about 75,000 animal units² on a yearlong basis. This is probably less than half of what it was originally. Most of the reduction in grazing capacity is attributed to heavy grazing by livestock, but some of it is due to encroachment of undesirable brush onto grazing sites, to thickening of timber stands and to exclusion of livestock from about 2.5 million acres in parks and other areas. Only about one-third of the total area is open to livestock grazing or produces enough forage to justify livestock grazing. It is estimated that less than half of the 23.3 million acres in conifer types, and only a little over a half million acres of the 12.4 million acres in woodland and chaparral can be grazed by livestock in their present condition. It is assumed that all of the grassland and sagebrush types are or can be used.

Approximately 175,000 beef cattle, 233,000 sheep, and 6,000 horses and mules graze in the forest zone during the summer, usually from June to September. Experimental work has shown that cattle gain weight throughout this period in most years. Probably sheep do also. Most rapid weight gains are made in June and July as the forage makes its surge of growth and develops seed. The rate of weight gain declines slowly in August and more rapidly in September. By the first of October the forage is nearly dry; cold weather, rains, and snows set in, and the animals start to lose weight. Cattle for beef and lambs are usually marketed from the range in July or early August and only the younger

²One animal unit equals 1 cow, horse, or mule, or 5 sheep.

animals, breeding, and hold-over stock are kept on the range the remainder of the season.

The summer forage provided by the forest zone is not nearly enough to meet the needs of the livestock industry, which supports about 3.26 million animal units of grazing animals annually, represented in 1946 by 1,579,000 beef cattle, 1,360,000 dairy cattle, 2,298,000 sheep, and 158,000 horses and mules¹. The 75,000 animal units grazing capacity of forest ranges is only 10 percent of the total number of animal units estimated to be grazed on rangelands in the state, and represents 3.8 percent of the total sheep and beef cattle population.

POSSIBILITIES OF INCREASING FORAGE ON FOREST RANGES

The present capacity of forest ranges can be increased substantially by intensification of management and by artificial reseeding. Most of the high value grazing sites still have appreciably fertile soils left to produce a good forage cover, but some sites have been eroded so badly that little forage can be grown on them even with artificial reseeding.

Two essential steps must be taken before even the better sites can be expected to yield more forage than at present. Stocking rates must be reduced to the present capacity of the forage. And some form of deferred and rotation grazing must be initiated to give the plants a chance to recover and reseed. One of the strong characteristics of mountain grazing is uneven use of the range and forage. Even when the range as a whole is moderately or even lightly grazed, some portions of the range and some species are heavily grazed. On cattle ranges especially, this pattern of use is the same from year to year, and some portions of the range and some species are slowly destroyed. This can be prevented by deferred and rotation grazing.

The possibility of increasing forage in the different vegetation types differs widely.

Grassland, sagebrush, and pinyon-juniper types.—These open types cover about 13 percent of the forest zone. They produce about 58 percent of the present grazing capacity, or about 44,000 animal units on a year-long basis. These types are chiefly valuable for livestock grazing and have always supplied the highest grazing values in the mountains. They have borne the brunt of heavy grazing. In many areas the density of the forage cover has been greatly reduced and the forage composition changed. Much top soil has been washed away; the fertility of many sites has been lowered. There is much room for improving these types and increasing grazing capacity. It is estimated that, through better management and artificial reseeding, the grazing capacity of these types can be more than doubled. Many grassland and sagebrush sites lend themselves to artificial reseeding. Just getting under way in California, work in this field looks promising.

Chaparral and woodland types.—These types cover about 31 percent of the forest zone; they contain about 10 percent of the total grazing capacity of the zone, and have an estimated livestock grazing capacity of about 7,000 animal units yearlong. About 250,000 acres in these types have possibilities of being cleared and planted to desirable forage, increas-

ing the total capacity by about 8,000 animal units. The degree of success in clearing chaparral and woodland varies with the character of the cover, depth of soil, slope, and similar site factors, and the method of clearing. In some cases fire may be a safe and useful tool for clearing land, where the fire can be kept under control and where adequate safeguards against accelerated runoff and erosion can be insured^{3,2}. The land may also be cleared by hand tools or heavy machinery. Some areas require a second or third clearing at 4- or 5-year intervals to control most of the brush. Goats may have to be employed to kill sprouting species. In most cases, these areas have to be reseeded to insure the growth of a reasonably dense forage cover. Then, to establish permanent grazing values, clearing and planting must be followed by good management. Only a small acreage of the woodland and chaparral types can bear the expense of this conversion. Outside the forest range zone, a much larger acreage in the woodland-grass type can also be improved for grazing by taking those measures.

Timber types.—The grazing capacity of the commercial timber types is roughly 24,000 animal-unit years. There is little opportunity of increasing forage in these types, since timber management holds first priority in the management of the sites. However, more efficient use can be made of the forage that grows in these types. Most of the grazing capacity in the timber types is created when the overstory of trees is removed or thinned out by logging, fires, insect depredation, and similar factors. It is created at the expense of timber production and is of relatively short duration. In the redwood region, for example, grazing on logged-over sites is usually crowded out in less than 5 years by timber and brush growth. In the pine and mixed conifer types, grazing may last as long as 15 to 20 years in particular areas, depending on the degree and nature of disturbance to the timber stand.

When trees are removed, some sites grow up to dense stands of unpalatable shrubs, like manzanita and ceanothus, scrubby woodland species, or other low value grazing plants. Even where palatable browse, like deerbrush ceanothus (*Ceanothus integerrimus*) takes over the area, grazing values may decline in a relatively few years, because the forage stand grows out of reach of livestock or becomes dense and impenetrable. Furthermore, the opportunity for grazing may last for so short a time that it may not be practical to utilize the forage. Many timber sites that develop grazing values cannot be utilized because of steep topography or lack of water. Over 2 million acres of the commercial forest types are practically worthless for grazing, because they cover steep, rocky, and inaccessible areas.

The lodgepole pine-whitebark pine and minor conifers types produce little or no forage in the understory. The forage supply within the general boundaries of these types is limited mainly to small pockets of grassland. East of the Sierra-Cascades, about 2 million acres of the pine type support a reasonably stable and permanent forage cover in the understory because of the open nature of the timber stands. Grazing values increase sharply after logging in most instances. These values may last considerably more than 20 years, depending on the degree of opening of the

stand and rate of establishment of reproduction, which in this region is very slow. Greater production of livestock can be obtained from this type, primarily by making more efficient use of the forage.

As silvicultural practices are intensified and the loss of timber-producing ground to shrubs and other non-timber cover is reduced, the grazing capacity of timber sites can be expected to decline. This loss in capacity may be counterbalanced to some extent by more efficient use of the forage in the eastside pine types, and other readily accessible areas.

To sum up, the present livestock grazing capacity of the forest range zone can probably be increased twofold or more, but this will take many years. However, even doubling the capacity will give little relief to the livestock industry. Its main supply of forage and feed stuffs for summer use will have to be developed, as heretofore, on cultivated lands or on local ranges by reseeding or supplemental feeding. To follow out a supplemental feeding program, ranchers would have to reduce livestock numbers to compensate for the volume of roughages usually taken on mountain ranges and other areas.

Meanwhile, although the present grazing capacity of forest ranges is low, it is badly needed by the livestock industry, especially by ranchers located in or adjoining the forest range zone. Without these ranges, about 175,000 cattle, 233,000 sheep, and 6,000 horses would have to be taken care of in some other way during the summer.

OTHER USES OF THE FOREST RANGE ZONE

Deer.—Forest ranges produce a great variety of wildlife. Of these, deer are the most important users of forage. The exact number of deer in the state is not known. Population estimates range up to 650,000. It is estimated that the equivalent of 650,000 deer graze in the forest range zone for an average season of about 10 months or more. Assuming 4 deer equal 1 animal unit, this is equivalent to 135,000 animal units on a yearlong basis, or almost double the number of animal units of cattle and sheep grazed within this zone.

Practically nothing is known of the grazing capacity that the different vegetative types have for deer, and only a small amount of information has been gathered so far on species utilization. Most of the forage eaten by deer is produced in the chaparral, sagebrush, juniper, and grassland types and in logged-over areas or natural openings and thin stands in timber types.

Deer and livestock graze some areas and some forage species in common. For example, many of the limited winter ranges for deer are also grazed by livestock. Bitterbrush (*Purshia tridentata*), one of the most important browse plants on the extensive summer ranges, is eaten closely by both deer and livestock.

In the main, however, deer and livestock graze on different areas and species—or graze the same areas and species to different degrees. Large numbers of deer subsist in the chaparral types. Because of the density of the cover, character of species, topography and other factors, livestock make little use of this type. In northeastern California, many upper mountain slopes are heavily grazed and trampled by deer and only lightly

grazed by livestock. On the other hand, the valleys and lower mountain slopes are grazed mainly by livestock and to a much lesser degree by deer.

Deer winter ranges are only a small fraction of the size of summer ranges. Many of them are heavily overgrazed and in poor condition, and are the bottlenecks in deer production. The condition of many of these ranges has been brought about by both deer and livestock use. The utilization of forage by deer and by livestock is being studied by various agencies at the present time to get at a sound basis of stocking the range with deer and livestock.

In 1946, licensed hunters reported killing 47,419 deer, a greater number than has been taken in any of the past eight years.³ With this kill, only about one deer in 14 gets into the hunter's bag. At an estimated 90 pounds per dressed carcass, the total meat harvest amounted to 4,267,710 pounds. When more is known of deer numbers and habits and of the forage they subsist on, perhaps more deer could be produced and harvested. Even now, however, deer is an important crop from forest ranges.

Recreation.—Deer hunting alone provides recreation for about 270,000 hunters in California each year. In an intangible way, the presence of deer and other forms of wildlife, and even a natural setting of grass along a stream or lake shore on forest ranges, have recreational values to millions of vacationists. Because of these values, forage is diverted from livestock use for recreational purposes in many ways. Almost 2 million acres within the forest zone are in state and national parks. Livestock are excluded from an additional 500,000 acres of high value recreational land in the national forests. In the high Sierras and other mountain areas, more and more meadows are being used to provide forage for riding horses and pack trains. In some areas this change is causing considerable tension between recreationists and stockmen at the present time. The proportion of the total range capacity that has this type of recreational value is very small however. The great bulk of forage produced on forest ranges has, and will continue to have, greatest value for livestock and wildlife production and for regulating the flow of water from the mountains.

Water.—California's growth and development is limited more by her water supply than by any other single factor. Water is already short in the state. Some is being imported from other states, and every effort is being made to conserve and make efficient use of local supplies.

The flow of water from the mountains is strongly influenced by the vegetative cover. Maintenance of a reasonably heavy vegetative mantle retards runoff, induces greater percolation, reduces erosion, and favors the yield of a maximum amount of usable water.

Many forces have been operating on California's watersheds over a long period of time to open up and thin the vegetative cover. In many areas this has caused heavy erosion, accompanied by site deterioration, more rapid, muddy runoff, resulting in loss of water to the ocean, and even destructive floods. Fires, logging, and grazing by both livestock and game and other factors have contributed to the reduced efficiency of the watersheds in supplying clear water to the valleys below.

It is difficult to determine or estimate how much grazing has contributed

³Source: California Division of Fish & Game, San Francisco, Calif.

to this picture. Sheet erosion is general in the open grazing types. Deep gullies dissect many of the meadows even in the high mountains above the commercial timber belt. Here grazing is the main factor causing accelerated erosion. Tons of soil are being pushed into stream and river channels each year by livestock trampling. The water storage capacity and regulating effect of these meadows on runoff waters have been materially reduced, and the silt and debris carried downstream is reducing the storage capacity of reservoirs. Many of the natural habitats favoring a high fish population in the streams have been destroyed.

Fortunately, range use conducive to maximum livestock (and game) production also creates conditions that favor efficient functioning of the watersheds. There is no conflict, therefore, between livestock and game production, on the one hand, and water production on the other, if livestock and game are properly managed. Satisfactory grazing, however, has not been obtained yet on most forest rangelands.

Forest ranges in California, then, have far-reaching importance to the people of the state. They furnish a small but very important portion of the forage needed by the beef cattle and sheep industries to round out their yearlong operations. They produce a heavy population of big game, principally deer and other forms of wildlife, and a wealth of recreational values. They influence the yield of water from the mountains and therefore bear directly on the state's agricultural and industrial development. California will benefit greatly as she improves and intensifies the management of these ranges.

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