Rimbey

# An Analysis of Public Rangeland Policies in the United States

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# AN ANALYSIS OF PUBLIC RANGELAND POLICIES IN THE UNITED STATES

# INTRODUCTION

Since western settlement, the extent, nature and importance of the western public rangelands has been insufficiently recognized by all but a relatively few individuals and groups. Lack of information, concern or interest on the part of the general public has contributed to this lack of understanding.

Until recently, rangeland was considered only as a source of forage for domestic livestock and habitat for various species of wildlife. In addition to these values, rangeland presently provides a multiplicity of other products and values. In the aggregate they are used for a variety of recreational pursuits such as camping, hiking, skiing, hunting, fishing, scenic viewing, rock hounding, and cycling as well as other forms of recreational activity. Some of the principal watersheds, which supply water for municipal, power, and irrigation uses occur on public and private grazing lands. Minerals and timber are important products of these lands. Some lands at present, however, have little or no other value than that of providing livestock forage.

At the twentieth annual meeting of the Society for Range Management held in Seattle, Washington, a former president of the Society indicated an urgent need for facts concerning rangelands; their importance, now and in the future, for livestock

grazing; for wildlife habitat; for outdoor recreation; and for other uses. 1/

Some 30 years ago, Mont Saunderson, an eminent range economist, suggested several objectives for a study dealing with the administration of western "wild" lands administered by the U. S. Forest Service and the predecessor agency of the Bureau of Land Management. 2/ He suggested that the first purpose of such a study should be to measure the degree of accomplishment of the objectives guiding the policy of these agencies. Appraisal of the policies themselves, in relation to the resource situation, the economy and the institutional background, was recommended. Saunderson suggested another objective for the study which he recognized would be more important in the future than at that time--1940. This study objective would ascertain the relation of the use of the public land resource to regional and national policies concerning commodity production supplies and supply costs, resource conservation, and choice among the different single or multiple alternatives of resource use.

There has been no comprehensive report on the rangelands of the country since "The Western Range" was published in 1936. 3/

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1/ Pechanec, Joseph H. 1967. The range society as at the crossroads. Journal of Range Management 20(3):125-129. p. 128.

2/ Saunderson, Mont H. 1940. Western wild lands. Land Policy Review 3(8):31-34.

3/ U. S. Dept. of Agriculture, Forest Service. 1936. The western range. 74th Congress, 2d Session. Senate Document 199. 620 pp.

In 1968 and 1969, the University of Idaho in cooperation with Pacific Consultants Incorporated, undertook a study for the Public Land Law Review Commission dealing with the forage resources of the public lands. [4/] This report provided information about the extent, nature and importance of the public rangelands. Policies for administering the public rangelands were examined and analyzed to:

1. Ascertain the objectives, past and present, of these policies,
2. Evaluate the policies as to the degree that attainment of the objectives was possible,
3. Evaluate the extent to which the objectives were attained,
4. Assess the relevance of the original objectives to current issues in land policy, and
5. Identify emerging issues and to evaluate them in the light of older objectives and future needs.

Because of the previous form of publication by the Clearinghouse for Federal Scientific and Technical Information and a number of requests received for the study results from livestock organizations, state legislators, Congressmen and others, the present publication was prepared.

The present study is largely based on the work conducted for the Public Land Law Review Commission in 1968 and 1969. Attempts have been made to update the data as much as possible where additional information could be obtained.

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[4/] University of Idaho with Pacific Consultants, Inc. 1970. Public land study: the forage resource. Clearinghouse for Federal Scientific and Technical Information. Springfield, Virginia. PB 189 249, PB 189 250, PB 189 251 and PB 189 252.

## NATURE OF RANGE RESOURCES

Rangeland is characterized by wide variation in physical factors and productive capabilities. The range of variation extends from highly productive grasslands and mountain meadows; through moderately productive grasslands and semi-arid lands; to low producing arid or desert types.

Resources derived from rangeland are renewable, non-renewable and a combination of the two. The non-renewable resources are often referred to as stock or fund resources. 5/ These resources do not increase significantly in quantity over time and are exemplified on rangelands by coal, oil, gas and mineral deposits. Use of such resources diminishes the quantity available for future time periods. In one sense, soil plant nutrients comprise a fund resource since the total quantity available is limited by the amount available in the mineral rock.

Renewable or flow resources are those in which different units become available for use in different time intervals. Examples on rangeland are precipitation, water flow, plants, animals, solar radiation and the like.

Soil is a composite of renewable and non-renewable resources. 6/

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5/ Ciriacy-Wantrup, S. V. 1952. Resource conservation, economics and policy. University of California Press, Berkeley, California. 395 pp. pp. 38-48.

6/ Ibid. p. 39.

The basic mineral material of a soil cannot be increased over time. Organic matter, soil microflora and fauna are aspects of soil which may function as a flow resource. Flow resources consist of two classes based on whether or not the flow can be influenced by the activities of man with his present technology. Winds and tides are examples of a flow resource in which man's activities do not affect the flow. Vegetation and animals are a type of flow resource in which the rate of flow can be strongly affected by man's influence. Such flow resources have a critical zone for rate of use, below which a decrease in flow rate cannot be reversed. Irreversibility may be because of natural, technological, or economic reasons.

On rangelands, vegetation is but one of the renewable resource units, but it is one on which many others depend. The recurring quantity of domestic and wild animals is basically conditioned by the kind and amount of recurring vegetation production. Harvesting the forage produced annually above the critical zone permits a continued annual rate of flow. Consumption of the vegetation production, that occurs annually, to the extent that the individual plants cannot maintain their life processes or provide the means for reproduction causes an irreversible decrease in annual rate of production. This reduced rate of production cannot be reversed by natural means because the source of germ material for production has been lost.

Man may reverse the decreased flow rate of vegetation production by introducing seed of adapted species. Technological irrever-

sibility of decreased annual vegetation production occurs when there is no source of plant material adapted to the area. Even though the technology for reversing the decreased rate of production may have been developed, the cost of applying that technology, in relation to the rate of increased vegetation production that can be anticipated, would make restoration economically irreversible. However, as Ciriacy-Wantrup points out, economic irreversibility depends on technology, wants, and social institutions which are constantly changing. 7/

Irreversible changes in the rate of production of a flow resource, such as vegetation or scenic attractiveness, may be brought about by use of stock or fund resources. Strip mining of coal, or open pit mining of phosphorus and other minerals on rangelands essentially destroys vegetation and the associated animal production. Scenic beauty, at least in the eyes of many, is irreversibly altered.

Rangeland use policies and programs derive most of their direction, promise, and urgency from the characteristics of the flow resources. The U. S. Forest Service indicated in 1936 that range depletion for the entire range area averaged "more than half". 8/ This was most serious on public domain land where depletion averaged 67 percent in contrast to 30 percent on national forests, and 50 percent on private, state and county lands.

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7/ Ciriacy-Wantrup, 1952. Op. Cit. p. 39.

8/ U. S. Dept. of Agriculture, Forest Service, 1936. Op. Cit. p. VII.

The depletion referred to consisted of areas where: (1) changes in the annual rate of herbage production had declined but could be reversed by natural means; (2) herbage production had declined and could not be reversed by natural means; and (3) herbage production had been so altered that irreversible changes were occurring because of accelerated soil erosion. These changes in rangeland productivity were largely attributed to overstocking by domestic animals. Programs were implemented to reduce overstocking by (1) reducing the number of animals, and (2) obtaining better distribution of animals through investments in range developments and improvements.

## PHYSICAL DESCRIPTION OF RANGELAND

Rangelands of the United States owe their existence to climatic, edaphic and topographic features that limit their use for other types of agricultural production. Much of the land in cropland agriculture would produce greater quantities of livestock forage than existing rangeland but the comparative advantage is with cash crop.

Physical conditions of western rangelands strongly influence the kinds and amounts of vegetation that occur. Range livestock production characteristics are in turn influenced by forage production characteristics and existing physical conditions.

The great plains portion of the western range region extends as a continuous belt 300 to 400 miles wide from Mexico into Canada. Roughly along the 100th meridian precipitation averages in the neighborhood of 20 to 22 inches annually. Annual precipitation decreases progressively westward to the Rocky Mountains where it approaches 10 inches. Rainfall over most of the great plains west of the 100th meridian averages less than 15 inches annually. Sixty-five to 70 percent of the annual precipitation occurs from April through September. Yearly variations in precipitation are extreme. Periods of drought cycle with periods of above-average precipitation. It may be as low as 5 or 6 inches in one year and more than 30 inches at another time. Hot summers and cold winters are also products of the continental climate of the great

plains. Summer temperatures may exceed 100°F. and winter temperatures may drop lower than -40°F. 2/

Soils of the great plains vary with precipitation, temperature and physiographic position. Deep, black and fertile soils occur along the eastern boundary. As precipitation decreases westward, soil organic matter and fertility decrease and the depth to restrictive layers comes closer to the surface. The vegetation is principally a grass type. Various short-grass species occur as a result of differences in soil, climate, and land form. Mid-grass types are found in more favorable situations. The products of these factors are ranges which may be grazed for 8 to 10 months in the northern plains and year-long in the southern plains.

Livestock ranch properties in the great plains consist of various mixtures of privately owned and leased, state leased, and federally owned land. Cow-calf operations predominate in this region. In the northern sections, spring calves are the main class of animal sold. Calving is less concentrated during one season of the year in the southern plains and a greater number of short and long yearlings are sent to market. It is not uncommon to find sheep grazing in fenced paddocks with cattle. This practice is more common in the southern than in the northern plains region.

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2/ Hamilton, John W. 1959. The past, present and future climates of the great plains. Proceedings of the 12th Annual Meeting of the American Society of Range Management, Tulsa, Oklahoma. January, 1959.

The mountainous or forest region of the west stretches from the Canadian to the Mexican border and follows generally the Rocky Mountain and Sierra-Cascade Cordilleras. The higher mountain ranges in the intermountain region of Nevada and parts of the Colorado Plateau belong to this range region. The area as a whole is rough and steep, but locally, plateaus, valley bottoms and gently sloping land occur. Elevations vary from sea level to in excess of 12,000 feet.

Climate of the mountain area is strongly influenced by elevation and latitude. Precipitation varies from 15 inches or less at lower elevations and southern latitudes to more than 80 inches at the higher elevations in the northern sections.[10/] Snow during the winter months provides most of the moisture in all except the more southern portions of the mountain systems. The frost-free period is of short duration at higher elevations and northern latitudes but may be as long as 180 days in the southern areas.[11/]

Soils vary from slightly weathered rock material and talus slopes to deep, well developed valley bottoms.

Vegetation types are as varied as the topography, soils and climate. In general, above the plain at the base of the mountains,

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10/ Stoddart, Laurence A. and Arthur D. Smith. 1955. Range management. 2nd ed. New York: McGraw-Hill Book Co., Inc. New York. 433 pp. p. 29.

11/ Daubenmire, Rexford F. 1943. Vegetational zonation in the Rocky Mountains. Botanical Review 9(6):325-393. p. 346.

a woody type of plant community occurs. In this zone, the juniper and pinyon, oak-brush, mountain brush or California chaparral may be found. Herbaceous vegetation varies in amount with the density of the woody species and the soil type. Above the woodland zone are found the ponderosa pine, Douglas fir, spruce-fir and alpine zones. In the northern regions, the cedar-hemlock zone is situated between the Douglas fir and the spruce-fir zones. The ponderosa pine and the Douglas fir zones are the most important grazing resource areas. Much of the forage productivity of the mountain region comes from the openings, valley bottoms and meadow areas interspersed in the forage range.

The mountainous or forest region is an important summer grazing area for ranches located in the intermountain and adjacent grassland areas. The lower elevations with shrub and pinyon-juniper cover are commonly used in the spring as animals move from winter areas to summer range. They are used again in the fall in the downward trek to winter range and the ranch headquarters. Relatively few of the western ranches are found within this mountain region. Those that are must provide feed for extensive periods of winter feeding.

A major portion of the mountain is in public ownership. Timber, watershed and wildlife are often important values of this area.

The intermountain shrub region occurs between the Rocky and the Sierra-Cascade mountain ranges. Nevada, Utah and southern Idaho contain the largest portion of the area but it is also represented in southwestern Wyoming, southeastern Wyoming, south-

eastern Oregon, northeastern California, northern Arizona, western Colorado, and the great bend of the Columbia River country in central Washington.

Eroded mountains, intermountain basins, desert plains and plateaus are common land forms of the region.

Annual precipitation varies from 4 inches or less upwards to 15 or 20 inches. Precipitation is most abundant in the winter and spring -- summers are hot and dry.

Soils at the lower elevations and in the drier parts of the area are poorly developed. Layers restrictive to root and water penetration vary in depth from the surface to about 18 inches below the surface. Salt concentrations in the soil profile are often high, particularly in the centers of the intermountain basins. Soil depths increase and salt concentrations decrease on the valley edges and in the northern parts of the region.

The vegetation in the intermountain region is dominated by a shrub aspect. A variety of shrub species occur. On the saline, alkaline and/or drier soils, greasewood, shadscale, saltsage and other salt or drought tolerant shrubs occur. Several species or varieties of sagebrush may be found, usually on the better developed soils and higher precipitation areas. The amount of grass and other herbaceous species associated with the woody plants varies with soil and moisture conditions as well as previous grazing practices.

Cattle ranches of the intermountain region are principally cow-calf operations. Sufficient deeded land is owned or leased

to provide feed or forage during the winter period. The lower drier areas are sometimes used for winter grazing. The sagebrush-grass ranges generally provide spring and fall grazing as cattle are moved to and from the higher mountain locations for the summer period. Sheep ranches use the desert areas for winter range, the sagebrush-grass type for spring and fall grazing, and the mountainous areas for summer grazing.

The southern desert shrub region extends from the southern tip of the Sierra-Cascade mountains in California through southern Arizona and southern New Mexico.

Isolated, roughly parallel mountain ranges separated by nearly level basins characterize the topography of the southern desert shrub region. 12/

This climate is arid with precipitation ranging from about 2 to 10 inches. Evaporation rates are high and this reduces the effectiveness of the small amounts of precipitation that occur. In the Mojave Desert area of California, most of the precipitation falls during the winter months. In the Sonoran Desert of western Arizona, the precipitation has a split distribution with winter and summer peaks. In the Chihuahuan Desert area of New Mexico, about 65 to 80 percent of the precipitation falls during the summer period.

Soils of the region are poorly developed and consist of

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12/ Fenneman, Nevin M. 1931. Physiography of the western United States. McGraw-Hill Book Co., Inc., New York. 534 pp.

largely unweathered or slightly weathered rock or alluvial material.

Vegetation consists largely of various species of shrubs and cacti. Annual forbs and grasses appear when sufficient rain falls at the proper time. The region has limited grazing value except during the time that the annual plants germinate and grow. When the annual plant species appear in sufficient amount, stocker animals are moved in to harvest the forage.

The desert grassland region occurs on an upland area in southwestern Arizona and southeastern New Mexico. This upland breaks the continuity of the southern desert shrub region across Arizona and New Mexico.

Broad basin with slightly sloping or nearly flat drainages characterize much of the desert grassland area but it is also found as broad belts around the bases of the southwestern mountain ranges. 13/

Precipitation ranges from 12 to 18 inches and falls during two seasons, summer and winter. It is largely the summer precipitation, which coincides with the growing season of the warm season grass species, that permits the grassland to develop. Temperatures are mild in the winter and hot in the summer.

Soils have limited development because of aridity and limited water penetration but are somewhat similar in characteristics to

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13/ Humphrey, Robert R. 1958. The desert grassland. Arizona Agricultural Experiment Station Bulletin 299. 62 pp. p. 2.

the soils of the short-grass plains. A carbonate layer commonly occurs at 10 to 24 inches. The vegetation may consist largely of grass species, but more commonly, the desert grassland is interspersed with low-growing shrubs or trees, or occurs as an open savanna with scattered oaks and mesquite. The grass species are somewhat similar to those of the plains. Because of climatic conditions, grazing is possible on a year-long basis.

Ranches of the desert grassland region are predominantly cattle operations, and bulls are generally with the cows throughout the year. Spring calves are sent to market in the fall. Late calves are sold in May of the following year or held until fall and sold as yearlings. The ranch unit commonly consists of privately owned and leased land, state leased land and public range.

The Pacific bunchgrass region extends through eastern Oregon and Washington, north-central Idaho and western Montana east of the Bitterroot range. Topography varies from the extremely steep breaks of the Salmon, Snake and Clearwater Rivers through relatively flat, often dissected, parts of the Columbia Plateau.

Average annual precipitation varies from about 2 inches in the west to 26 inches in some of the eastern sections. Precipitation occurs predominantly in winter with 65 to 70 percent falling from October through March. 14/

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14/ Daubenmire, Rexford F. 1942. An ecological study of the vegetation of southeastern Washington and adjacent Idaho. Ecol. Monographs 12:53-79. p. 59.

Soils in the western and drier portions of the region are generally similar to the drier portions of the great plains. Depth, organic matter content, and fertility increase eastward. In general, the fertility and productivity of the soils in the moister parts of the region are so high that only the rougher and drier parts remain as grazing land.

Bunchgrasses are the dominant components of the vegetation. Various mixtures of bluebunch wheatgrass, Idaho fescue and Sandberg's bluegrass comprise the important plant communities. Forbs and shrubs become conspicuous in the moist eastern sections.

The Pacific bunchgrass region is principally a spring-fall range area, but considerable winter grazing is practiced along the breaks of the Snake and Salmon Rivers. Ranches operate largely on deeded and leased lands during the spring, fall and winter periods, and move to the mountain areas for summer grazing. Cow-calf enterprises are most common but stocker animals may be purchased for use on some of the steeper areas. Sheep ranches are not uncommon.

California grasslands are found around the central valley and coastal ranges of California. The Sierra-Cascade Mountains on the east and the coast ranges on the west enclose a valley that is more than 400 miles long and about 50 miles wide. The central part of the valley is flat, but progressively steeper alluvial slopes are encountered as the mountains are approached. The valley floor is extensively cultivated and only the steeper parts or

or alkaline areas are used for grazing. 15/

Annual precipitation varies from 10 inches in the south central section to 35 inches or more in the foothill areas of the northern part. Winters are snow free and commonly frost free. Temperatures and moisture combine to make the winter and early spring period the principal season of growth.

Soils are similar to the Pacific bunchgrass soils of the northwestern areas previously described. Soil organic matter, depth, water holding capacity, and fertility vary with climatic conditions. Prairie-like and deep rich humus soils occur in the more favorable upland and terrace areas. Brown soil and alkali lands occur in the lower parts of the grassland area.

At the present time, the California grasslands are composed mainly of annual grasses and forbs. Many of the species present have been introduced from the Mediterranean region. Because of the annual nature of the vegetation, extreme fluctuations in production occur from year to year.

Cattle ranches in this region base their year-round stocking rate on the capacity of the range during the dry summer season. 16/ Stocker animals are shipped in from adjacent states for winter

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15/ Sampson, A. W., Agnes Chase and Donald W. Hedrick. 1951. California grasslands and range forage grasses. California Agricultural Experiment Station Bulletin 724. 130 pp. p. 7.

16/ Saunderson, Mont H. 1950. Western stock ranching. University of Minnesota Press, Minneapolis, Minn. 247 pp. p. 25.

grazing. Sheep ranches that operate in this region breed the ewes for fall lambing. Green feed during the winter produces a marketable lamb the following April or May. The Sierra Mountains are commonly used as a source of summer forage for these sheep operations.

## BRIEF RESUME OF THE DEVELOPMENT OF RANGELAND POLICIES

A century ago the western range livestock industry was in its formative stages. Except for the central and coastal valleys of California, the Willamette Valley of Oregon, eastern Texas, Indian mission locations and mining camps, only limited numbers of livestock were found west of the 98th meridian. [17] Texas trail herds, however, had begun moving north and westward shortly after the Civil War.

Subjugation of the western Indian tribes brought about by decimation of the buffalo herds and actions of the Army; extension of the railroads into the plains region, and farther west; and advancing settlement westward stimulated a rapid expansion of range livestock production in the plains and western states. Cattle numbers, other than milk cows, more than doubled between 1870 and 1900 [18] and most of the increase occurred in the plains and western states.

Governmental policies and guidelines for use of the extensive forage resources that existed were totally lacking. Competition among cattlemen for the resources became keen as expansion of livestock numbers continued through the last part of the 19th century. Eastern and European capital flowed to the developing range livestock region when high prices for cattle attracted attention to the glowing profits that could be made by such investments. Claimed annual profits of 30 to 40 percent or more [19] from investments in the western livestock business caused substantial increases in livestock numbers on western ranges in the early 1880's.

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[17] Dale, Edward Everett. 1930. The range cattle industry. University of Oklahoma Press, Norman, Oklahoma. 216 pp. p. 101.

[18] Ibid. pp. 101 and 109.

[19] Ibid. p. 96.

Severe losses of livestock occurred in the winter of 1886 in the northwestern states. Similar losses occurred in the southwest in 1893. [20/] As a consequence, the range livestock industry went through an adjustment period in which the ranchers surviving began to make provisions for feeding their animals during periods when snow covered the grass or when drought limited the amount that had grown. Thus, the basic structure of range livestock enterprises that exists today was generated.

During the period of expansion of the livestock industry in the plains and western states, the U. S. Government had developed a policy to stimulate settlement of the western lands. This policy took the form of free grants of land to settlers, and probably owed its inception to the Jeffersonian philosophy and belief that a causal relationship existed between family farming and the political system of democracy. [21/] The course of settlement stimulated under this policy had a profound influence on the western range livestock industry.

The Homestead Act of 1862, followed by the Timber Culture Act of 1873, the Desert Land Act of 1877, the Kinkaid Act of 1904, the Enlarged Homestead Act of 1909 and the Stock Raising Homestead Act of 1916 were the principal vehicles used by Congress to attain the goal of western settlement. The acreages granted or sold, at very nominal costs, ranged from 160 acres to 640 acres. Precedent for the 160 acre grant of land specified in the Homestead Act of 1862 is found in the series of acts passed by Congress between 1842 and 1853. These acts provided for the donation of land to settlers in lieu of possible military service in the

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20/ Barnes, Will C. 1913. Western grazing grounds and forest ranges. The Breeder's Gazette, Chicago, Ill. 390 pp. pp. 25-26.

21/ Brewester, John M. 1963. The relevance of the Jeffersonian dream today. In: Land Use Policy and Problems of the United States. Ed. by Howard W. Ottoson. University of Nebraska Press. pp. 86-137. p. 86.

protection of settlements from Indian attacks. [22] Donations in Florida, Washington, New Mexico and other areas specified 160 acres. In Oregon, a half section of land was donated to any single man who had settled prior to 1850 and half this amount after 1850. The National Land Reform Association, formed in 1844 [23] and championed by Horace Greeley, strongly advocated the granting of 160-acre tracts as free homesteads to actual settlers.

None of the land laws, designed mainly to multiply family-farm operations, recognized livestock ranching as a legitimate pursuit for the settler of the western lands. Horace Greeley, during a visit to California in 1859, reflected a prevailing philosophy about cattle ranching as a gainful pursuit when he wrote: [24]

> "I fear this cattle-ranching, with long intervals between the ranches, is destined to half-barbarize many thousands of the next generation, whom schools can scarcely reach, and to whom the sound of the church-going bell will be a stranger."

Thus, land policy makers generally viewed cattle ranching as a transient occupation to be replaced by family farms as settlement moved westward.

As Hibbard states: [25] "It took only the most superficial observation to convince one that the land laws made for the middle west did not fit the west." Some appreciation of the limitations imposed by climate, soil and topography on cropland agriculture in the region west of the 100th meridian was expressed in the 1870's. President Grant, after a visit to the mountain states in the autumn

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[22] Hibbard, Benjamin Horace. 1924. A history of public land policies. The MacMillan Company (1924) and the University of Wisconsin Press (1965). 579 pp. p. 352.

[23] Gates, Paul W. 1968. History of public land law development. U. S. Government Printing Office, Washington, D. C. 828 pp. p. 392.

[24] Cited in: Kollmorgen, Walter M. 1969. The woodsman's assaults on the domain of the cattleman. Annals of the Association of American Geographers 59(2): 215-239. p. 217.

[25] Hibbard, 1924. Op. Cit. p. 425.

of 1875, states in his annual message to Congress that: [26]

> "Land must be held in large quantities to justify the expense of conducting water upon it to make it fruitful or to justify using it as pasturage."

Land Commissioner S. S. Burdett in 1875 recommended unlimited sales in the semi-arid regions to enable livestock interests to legally acquire the acreage necessary for their operations. [27] Selling of the short-grass grazing lands west of the 100th meridian to ranchers, "so as to put an end to the one-hundred-and-sixty acre absurdity and legalize the business of cattle grazing," was recommended by President Rutherford B. Hayes in 1877. [28]

In 1874-75 Hayden, Powell and Wheeler were instructed to classify the land they surveyed as agricultural, timber, pastoral or barren. [29] In his report on the arid regions of the United States, John Wesley Powell recommended that lands classified as pasturage units should be granted in farm units of not less than 2,560 acres. [30] Powell, in this report to Congress, drafted two bills, one of which was to authorize the organization of pasturage districts by homestead settlement on the public lands. The other bill dealt with the organization of irrigation districts on the public lands. No significant legislation resulted from any of the suggestions made concerning the size of units for a livestock enterprise.

Concern over deterioration of rangeland productivity was expressed by the

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26/ Cited in Hibbard, 1924. Op. Cit. pp. 425-426.

27/ Gates, 1968. Op. Cit. p. 419.

28/ Lavender, David. 1965. The American Heritage history of the great west. American Heritage Publishing Company, Inc., New York. 416 pp. p. 357.

29/ Ibid. p. 350.

30/ Powell, John Wesley. 1878. Report on the lands of the arid region of the United States. Ex. Doc., 45th Congress, 2d Session. No. 73. 195 pp.

Secretary of the California Woolgrowers in 1863. [31] Department of Agriculture personnel were expressing alarm in the 1880's and 1890's at the injury occurring to rangeland because of overstocking. [32] The livestock industry in response to questionnaires sent out by the Public Land Commission, appointed by President Theodore Roosevelt in 1903, indicated overwhelmingly that the carrying capacity of the ranges had diminished because of overstocking. [33]

Although concern over rangeland deterioration because of overstocking of the rangeland was strongly developed, little was being done by the Congress to regulate grazing on the public lands to stop such injury. Concern by the livestock industry for the declining carrying capacity was expressed in a variety of ways. The request to the government of the cattlemen in southeastern Colorado, that 360,000 square miles of the "Buffalo Plains" be classified as pastoral lands and leased to stock raisers under 20-year terms, seemed monstrous to Congressmen of the east. [34] To exercise some control over use of the forage resources, stockmen bought, leased or entered on all the watering places in the vicinity of their operations. In other cases, purchases of railroad land, deserted homesteads and/or lease of school grant land provided some means of control. Fencing of the open range by cattlemen was used extensively to provide control of animals and range use. [35] In the early 1880's, widespread objection to this fencing occurred and

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[31] Talbot, M. W. and F. P. Cronemiller. 1961. Some of the beginnings of range management. Journal of Range Management 14(2):95-102. p. 97.

[32] Ibid.

[33] U. S. Dept. of Agriculture, Forest Service. 1905. Grazing on the public lands. Extracts from the Report of the Public Lands Commission. Forest Service Bulletin No. 62. 67 pp. p. 13.

[34] Lavender, 1965. Op. Cit. p. 345.

[35] Cotton, J. S. 1907. Range management. In: U. S. Dept. of Agriculture Yearbook, 1906. pp. 225-238. p. 226.

the U. S. Department of Interior declared fencing of the public domain illegal and took steps to correct this abuse.

The first organized attempts at regulating grazing on the public lands by a government agency did not occur until after 1897. The Forest Reserve Act of 1891 provided for the setting aside of reserves but no specific authority for their management. 36/ The then Secretary of Interior believed that creation of the reservations withdrew them from any form of utilization. Regulations issued April 14, 1894 governing all forest reserves, among other details, prohibited the driving, feeding, grazing, pasturing or herding of cattle, sheep or other livestock within any of the reserves. 37/ The Forest Reserve Act of 1897 designated the purpose for which forest reserves may be established as follows: 38/

> No public forest reservation shall be established, except to improve and protect the forest within the reservation, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States; but it is not the purpose or intent of these provisions, or of the Act providing for such reservations, to authorize the inclusion therein of lands more valuable for the mineral therein, or for agricultural purposes, than for forest purposes.

The Secretary of the Interior was instructed, among other things, to:

> make such rules and regulations and establish such services as will insure the objects of such reservations, namely, to regulate their occupancy and use and to preserve the forests thereon from destruction; and any violation of the provisions of this Act or such rules and regulations shall be punished as is provided for in the Act of June fourth, eighteen hundred and eighty-eight, amending section fifty-three hundred and eighty-eight of the Revised Statutes of the United States.

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36/ Dana, Samuel Trask. 1956. Forest and range policy. Its development in the United States. McGraw-Hill Book Company, Inc., New York. 455 pp. p. 102.

37/ U. S. Dept. of Agriculture, Forest Service, Division of Range Research. 1944. The history of western range research. Agricultural History 18:127-143. p. 129.

38/ Stat. 34 Ch. 2, 1, 30 (June 4, 1897).

None of the provisions in the Forest Reserve Act referred specifically to grazing in the forest reserves.

Organized opposition developed to destructive grazing in the High Sierra wilderness in 1897 through efforts of John Muir and the Sierra Club which he had founded in 1892. 39/ Objections by irrigationists to sheep grazing on the Black Mesa and San Francisco Mountain forest reserves in Arizona followed creation of these reserves in 1898. 40/

A joint study of the grazing situation in the southwest by Gifford Pinchot, Chief of the Division of Forestry; Dr. Fredrick V. Coville, Chief of the Division of Botany; E. C. Bunch, representative of the Salt River Valley Water Users Association; 41/ and Albert F. Potter 42/ a representative of the stockmen of the southwest, was made in June of 1900 at the request of Secretary of the Interior Ethan A. Hitchcock. 43/ Rules and regulations governing all affairs of grazing within the reserves were published in a circular dated November 6, 1900 and specified: 44/

> "Pasturing of Livestock. -- The pasturing of sheep and goats on the public lands in the forest reservations is prohibited: Provided, That in the States of Oregon and Washington, here the continuous moisture and abundant rainfall of the Cascade and Pacific Coast ranges make rapid renewal of herbage and undergrowth possible, the Commissioner of the General Land Office may, with the approval of the Secretary of the Interior, allow the limited grazing of sheep within the reserves,

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39/ Talbot and Cronemiller, 1961. Op. Cit. p. 98.

40/ Division of Range Research, Forest Service, 1944. Op. Cit. p. 129.

41/ Talbot and Cronemiller, 1961. Op. Cit. p. 99.

42/ Potter joined the Division of Forestry at the request of Pinchot, and became Head of the Branch of Grazing in 1901.

43/ Division of Range Research, Forest Service, 1944. Op. Cit. p. 130.

44/ Roth, Filbert. 1902. Grazing in the forest reserves. In: Yearbook of the U. S. Dept. of Agriculture, 1901. U. S, Government Printing Office, Washington, D. C. 888 pp. p. 337.

or parts of reserves, within said States. And also provided, That when it shall appear that the limited pasturage of sheep and goats in a reserve, or part of a reserve, in any State or Territory will not work an injury to the reserve, that the protection and improvement of the forests for the purpose of insuring a permanent supply of timber and the conditions favorable to a continuous waterflow, and the water supply of the people will not be adversely affected by the presence of sheep and goats within the reserve, the Commissioner of the General Land Office may, with the approval of the Secretary of the Interior, also allow the limited grazing of sheep and goats within such reserve. Permission to graze sheep and goats within the reserves will be refused in all cases where such grazing is detrimental to the reserves or to the interests dependent thereon, and upon the Bull Run Forest Reserve in Oregon, and upon and in the vicinity of Crater Lake and Mount Hood, or other well-known places of public resort or reservoir supply. The pasturing of livestock, other than sheep and goats, will not be prohibited in the forest reserves so long as it appears that injury is not being done the forest growth and water supply, and the rights of others are not thereby jeopardized. Owners of all livestock will be required to make application to the Commissioner of the General Land Office for permits to graze their animals within the reserves. Permits will only be granted on the express condition and agreement on the part of the applicants that they will agree to fully comply with all and singular the requirements of any law of Congress now or hereafter enacted relating to the grazing of livestock in forest reserves, and with all and singular the requirements of any rules and regulations now or hereafter adopted in pursuance of any such law of Congress; and upon failure to comply therewith, the permits granted them will be revoked and the animals removed from the reserves. Permits will also be revoked for a violation of any of the terms thereof, or of the terms of the applications on which based."

Subsequently, the Secretary of the Interior announced that: [45/]

(1) The Government, through its forest officers, after consultation with the representatives of the various interests involved, should decide on the number of head to be grazed in each forest reserve, or each subdivision of the reserve, and should establish the boundaries between cattle range and sheep range.

(2) The local association should assign ranges to owners within the limits thus laid down, subject to official approval. . . . .

(5) Permits should run for five years.

(6) Residents should have precedence in all cases over tramp owners and owners from other states.

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45/ Roth, 1902. Op. Cit. pp. 337-338.

Roth summarized the order or priorities in obtaining a permit to graze the forest reserves as follows: [46]

> " . . . . As in the case of sheepmen, preference is given to the different cattlemen in the following order: (a) residents within the reserve; (b) persons owning farms or lands within the reserve, (c) persons living near the reserves; (d) persons living distant from the reserve.
>
> Persons not residing in the State where the reserve is located and persons not citizens of the United States are debarred entirely."

Studies made by Dr. Coville in 1897 [47] and the survey of the condition of the public lands by Potter and Coville at the request of the 1903 Public Lands Commission showed that the range livestock interests were strongly in favor of some form of government regulation of grazing on public lands. [48]

Grazing regulations for the national forests, after transfer from the Department of the Interior to the Department of Agriculture in 1905, were guided by a letter from Secretary James Wilson to the Chief of the Forest Service dated February 1, 1905. This letter stated in part that: [49]

> "You will see to it that the water, wood, and forage of the reserves are conserved and wisely used for the benefit of the home builder, first of all, upon whom depends the best permanent use of lands and resources alike. * * * All land is to be devoted to its most productive use for the permanent good of the whole people and not for the temporary benefit of individuals or companies. All of the resources * * * are for use, and this use must be brought about in a thoroughly prompt and businesslike manner, under such restrictions only as will insure the permanence of these resources. The permanence

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[46] Roth, 1902. Op. Cit. p. 347.

[47] Coville, Fredrick V. 1898. Forest growth and sheep grazing in the Cascade Mountains of Oregon. U. S. Dept. of Agriculture Bulletin No. 15.

[48] U. S. Dept. of Agriculture, Forest Service, 1905. Op. Cit.

[49] U. S. Dept.of Agriculture, Forest Service, 1936. Op. Cit. pp. 253-254.

> of the resources * * * is therefore indispensable to continued prosperity. * * * The continued prosperity of the agricultural, lumbering, mining, and livestock interests is directly dependent upon a permanent and accessible supply of water, wood, and forage * * * (made available) under businesslike regulations enforced with promptness, effectiveness, and common sense.
>
> Local questions will be decided upon local grounds, the dominant industry will be considered first, but with as little restriction to minor industries as may be possible."

The multiple use concept was thus laid down for use of the national forests.

The permit system, designated when the forest reserves were under the administration of the Department of Interior, was continued as a policy for allocating and regulating grazing use on the national forests. 50/ Permits issued showed the number of stock to be grazed and specified the range on which the animals were to be grazed. In the granting of permits, priority in the use of the range was considered first. 51/ To prevent monopoly of the range, maximum limits were specified. Maximum limits were to be established by districts, forests, or groups of forests. It was conceded that they should not be so low as to restrict sales in permitted stock unnecessarily nor so high as to restrict unduly the distribution of grazing preferences. 52/

In addition to the maximum limits established, other limits were often specified. 53/ Protective limits defined the maximum number of livestock that

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50/ Barnes, 1913. Op. Cit. p. 216.

51/ Ibid.

52/ U. S. Forest Service. 1924. National Forest Manual -- Grazing. 104 pp. p. 27.

53/ Ibid.

an individual, partnership, or corporation could own and be in Class A. [54] It was designed to provide the number of stock that could be handled at a profit as a subsidiary farm enterprise and, thus, contribute its proper share toward maintaining the productivity of a farm devoted to diversified crops.

In some areas, exemption limits were also established. This limit recognized that: [55]

> There are localities where the number of permittees is so large in relation to the amount of range available that the average number owned by the permittees is very small, and a very low productive limit is advisable. Yet within these same localities there are ranches devoted primarily to the production of livestock and often unsuitable to diversified farming. In such cases an exemption limit may be established. It should ordinarily be figured at the number which will constitute an economic unit or herd of stock. An economic unit or herd of stock is the smallest number that can be run at a reasonable per capita cost and in accordance with good livestock and range management.
>
> An exemption limit will be established wherever needed to prevent inequitable reductions in herds operated on dependent and commensurate ranches devoted primarily to live stock production, unless the same purpose is served by the protective limit in that range unit. Where both stock ranches and diversified farms are dependent upon the National Forest range, both limits will be established, the exemption limit applying to the former and the protective limit to the latter.

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54/ U. S. Forest Service, 1924. Op. Cit. p. 29

A classification of applicants for grazing privileges was established as follows:

Class A. Persons owning and residing upon improved ranch property which is dependent upon the National Forest, and who are owners of not more than the established exemption limit number of stock, or the protective limit number in the absence of an exemption limit.

Class B. Prior users of National Forest range who do not own improved ranch property; and persons owning such property who own stock in excess of the established exemption limit, or the protective limit in the absence of an exemption limit.

Class C. Persons who are not regular users of National Forest range and who do not own improved ranch property. This class cannot acquire an established preference in the use of National Forest range.

55/ Ibid. p. 26.

These provisions were designed to stabilize the livestock industry. 56/

In spite of the recognition of the livestock operator dependent primarily on the sale of livestock products in the exemption limit, concessions to the homesteader or homebuilder over the established livestock producer prevailed. Barnes states: 57/

> "In order to allow the use of a portion of the range on fully stocked forests by new settlers all permits above the protective limit are scaled down each year on a certain well-defined percentage, which must be no greater than will result in a total reduction, equaling 3 percent of all the stock allowed to graze upon that particular forest during the year. Thus if the forest is carrying 100,000 sheep the gross reduction from the larger permittees will accumulate surplus range for 3,000 sheep to be taken up by new applicants. This makes the change come more gradually and allows time for the larger owners to regulate business.
>
> The number of stock thus gained is given to the new men, who must in every case be bona fide settlers and home-builders, depending on their lands for their living. In many instances the number of new applicants is far in excess of the capacity of the range to care for them, and in such event the needs of each individual applicant are considered and those who in the judgment of the Forest officers are most dependent on the range are granted the permits. Of course where the range is not fully stocked these protective and maximum limits are not always strictly enforced."

Commensurate property -- the requirement that permittees own a certain amount of cultivated land and water for livestock, and produce sufficient forage to carry their stock through the winter period -- became a part of the rules and regulations for grazing permits shortly after the national forests were established. 58/

Although grazing regulations governing use of the forest reserves were well

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56/ Greeley, W. B. 1925. The stockmen and the national forests. The Saturday Evening Post. November 14, 1925. p. 80.

57/ Barnes, 1913. Op. Cit. p. 217.

58/ Barnes, Will C. 1926. The story of the range. Reprinted, 1926, from Part 6 of the Hearings before a Subcommittee on Public Lands and Surveys, United States Senate, Sixty-ninth Congress, First Session. 60 pp. p. 10.

along in formulation by 1905, there were essentially no policy directives for the grazing use of the unreserved public domain. The predominant goal of federal land policy with respect to these lands remained that of providing the poor, the homeless and the immigrant with free land on which to settle and establish a family-farm enterprise.

Many attempts [59] were made to bring the western lands under grazing regulations following the report of the Public Land Commission appointed in 1879. [60] Suggested reasons for the lack of action on the part of Congress to provide some control over the unreserved and unappropriated public domain until 1934 are many and varied.

The western livestock interests through their National Livestock Association began agitating for some effective control of the public domain in the late 1880's. [61] Bills for leasing the grazing lands of the west were advocated by Congressmen beginning in 1889. [62] Senator Foster of Washington State introduced a bill in that year to provide for the leasing of public lands for grazing purposes

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59/ One of the earliest suggestions was the bill drafted by John Wesley Powell in his report to Congress on the lands of the arid region of the United States.

Powell, 1878. Op. Cit.

A summary of legislation suggested between 1889 and 1925 is given by Barnes, 1926. Op. Cit. p. 55.

See Peffer, E. Louise. 1951. The closing of the public domain. Stanford University Press. 372 pp. pp. 190-214. (For bills or proposals considered after 1925).

60/ See Gates, 1968. Op. Cit. pp. 422-434.

61/ Roberts, Paul H. 1963. Hoof prints on forest ranges. The Naylor Company, San Antonio, Texas. 151 pp. p. 18.

62/ For a listing of bills introduced between 1889 and 1925 see: Barnes, 1926. Op. Cit. pp. 51-55.

For a listing of bills or proposals considered after 1925 see: Peffer, 1951. Op. Cit. pp. 191-224.

and to produce revenue for agricultural purposes. Despite the continuous attempts to introduce bills in Congress that would allow leasing or some sort of permit system on the unreserved public lands, no concrete action was taken until passage of the Taylor Grazing Act of June 28, 1934. Only two of the bills suggested between 1889 and 1925 were accorded a public hearing 63/ -- Senator Burkett's bill of 1907 64/ and the Kent Grazing Bill of 1913. The Colton Bill, introduced in the 73d Congress 65/ by Don B. Colton early in 1933, was the first bill to pass either House of Congress. It failed to pass the Senate prior to March 3, 1933 when the new administration was sworn in. Representative Edward T. Taylor of Colorado reintroduced the Colton Bill, with a minor change, in the first session of the 73d Congress and it was signed into law on June 28, 1934.

Cattle owners were more consistently in favor of some form of range control than sheep owners. Conflicts between cattle and sheep raisers arose when the sheep industry expanded into the domain of the cattlemen. As with cattlemen, many of the sheep owners established a headquarters through homesteading and/or purchase of land and used this in conjunction with the public domain. Cattlemen and sheepmen, by common agreement, often worked out an allocation of the federal range. These groups tended to support regulation of the federal lands. Another faction of the sheep industry consisted of owners based nowhere, paying no taxes and living off the land. 66/ This faction of the sheep industry was presumably

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63/ Barnes, 1926. Op. Cit. p. 55.

64/ Senator Burkett of Nebraska introduced bills on four different occasions from 1906 to March 22, 1909.

65/ Stated by Clarence L. Forsling, Former Director, Grazing Service, in a panel discussion of: Public Land Policy Problems in a Time Perspective. In: Public land policy. Ed. by Phillip O. Foss. 1968. Proceedings of the Western Resources Conference, Fort Collins, Colorado. 290 pp. p. 90.

66/ Wentworth, Edward Norris. 1948. America's sheep trails. The Iowa State College Press, Ames, Iowa. 667 pp. p. 526.

strongly opposed to any regulation on the public domain. Strong feelings against these "tramp sheep operators" existed and often erupted into violence. The early grazing policies established by the U. S. Forest Service, requiring commensurate property and specifying maximum limits, adversely affected these individuals.

Transfer of the forest reserves from the Department of Interior to the Department of Agriculture established stresses that had an impact on proposed legislation to regulate the public domain. Differences of opinion, of which department should administer grazing regulations on the public domain lands, had much to do with the failure of Congress to act. [67] Proposals introduced, specifying administration by the Department of Agriculture, were opposed by the Department of Interior and vice versa.

Perhaps the "geographic perceptions colored by eastern conditions," [68] and the belief that the establishment of grazing districts would interfere with the process of future homestead settlement, had more than a slight impact on failure of range control regulations to be adopted. Because eastern and midwestern perceptions of 160 acres as an economic unit for a family, the disposition of land in blocks of several thousand acres was inconceivable. Although the amount of land required to justify a complete range livestock production unit varies greatly in various sections, Cotton [69] states:

> ". . . . In the northern range states, where stock must be fed for a period of three or four months during the winter season, and where the rainfall is fairly abundant, 2,500 to 4,000 acres of land ordinarily would be needed to make a fair living for a family. If the settler were fortunate in selecting a range that had not been very much overgrazed and on which there was very little waste land, he might be able to get along with only 2,000 acres. Such

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67/ Peffer, 1951. Op. Cit. p. 172.
68/ Kollmorgen, 1969. Op. Cit. p. 216.
69/ Cotton, 1907. Op. Cit. p. 235.

> areas will, however, be difficult to find. In the more southern range states, where the rainfall is much less and not so well distributed throughout the season, the number of acres required for an animal will be much greater. Here the area required to support a family will vary from 16,000 acres in the better sections to 25,000, and in some cases as much as 40,000 acres are required."

Feeble recognition that 160 acres was insufficient for conditions in the western range area led to passage of the Enlarged Homestead Act of 1909 and the Grazing Homestead Act of 1916. These Acts aggravated the problem of range overstocking in that they reduced the grazing area available for the existing operations and created new livestock operations. On the average, Barnes [70] estimated that a 640-acre grazing homestead on the 20 million acres of public land suitable for settlement under the Act would support no more than ten animals yearlong. If a family-operation were to survive, access to public grazing land was necessary. These Acts alienated the support of some factions of the livestock industry for a grazing control law.

Proposals that failed to specify the amount of the charge to be made in leasing or using the public domain under a permit system were either opposed or not enthusiastically supported by livestock interests.

Until 1924, within the livestock industry were some of the most ardent advocates of grazing control. Congress, in an attempt to tap every source of revenue for handling the building national debt, eyed the grazing fees on national forests and expressed an intent to have them raised to equal commercial rates. Strong opposition to this proposal was directed at the U. S. Forest Service by the livestock industry. [71] In the process, support for U. S. Forest Service attempts to bring about grazing regulations on the public domain were dropped.

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[70] Barnes, 1913. Op. Cit. p. 50.

[71] Peffer, 1951. Op. Cit. pp. 186-187.

A combination of circumstances made possible passage of the Taylor Grazing Act in 1934. It was becoming apparent to Congressmen, who had been indifferent or opposed regulation of the unreserved public domain, that such a policy was creating difficulties for conservation of the resource and that disposal of the remaining land under the Homestead Acts was not feasible. Experiments in grazing control, such as the Mizpah-Pumpkin Creek Grazing District in Montana, were demonstrating the benefits of regulated grazing control on the unreserved public domain. [72] Suggestions by President Hoover's Commission on the Conservation and Administration of the Public Domain that the areas valuable chiefly for the production of forage should be granted to the states willing to accept these lands met with considerable opposition from a number of quarters. [73] Senator Taylor's zeal and skill in presenting a bill for control, along with the support of Secretary Ickes, paved the way for passage of the Taylor Grazing Act.

Goals for the administration of the unreserved public lands as specified by Congress in the preamble of the Act are: [74]

1. To stop injury to the public grazing lands by preventing overgrazing and soil deterioration;
2. To provide for their orderly use, improvement, and development;
3. To stabilize the livestock industry dependent upon the public range; and
4. For other purposes.

This Act officially recognized that some lands were chiefly valuable for grazing and provided for regulation and use of such unreserved and unappropriated lands until disposal.

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[72] Peffer, 1951. Op. Cit. pp. 186-187.

[73] Ibid.

[74] U. S. Dept. of the Interior, Bureau of Land Management. 1971. The Taylor Grazing Act. Information Bulletin No. 5. 8 pp.

Allocations for the use of these grazing lands were largely patterned after the allocation procedure used by the U. S. Forest Service.

The Act specified that the Secretary of the Interior was authorized to issue, or cause to be issued, permits to graze livestock on grazing districts to bona fide settlers, residents or other stock owners. Only citizens of the United States, or those who had filed necessary declarations of intention to become citizens and groups, associations or corporations authorized to conduct business under the laws of the State in which grazing districts were located were eligible for grazing permits.

The system of allocating range permits among qualified applicants was based on the following order of priorities: 75/

1. Free use licenses for applicants with Federal range in the immediate neighborhood of the applicants residence.

2. Regular licenses and permits issued to the extent Federal range was available. Regular licenses and permits were issued to qualified applicants with those having dependency by use of land or water (Class 1) receiving permits before those having base property dependent by location (Class II).

Upper or lower limits were not specified for permit holders as they were in U. S. Forest Service regulations.

No great demand for uses other than grazing developed on the lands administered under the Taylor Grazing Act until the 1960's. Many interests now vie for the space, resources and beauties of the western rangelands. 76/

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75/ U. S. Dept.of the Interior, Bureau of Land Management. 1956. The federal range code for grazing districts. Circular No. 1948. 26 pp. p. 6.

76/ Love, Merton R. 1970. The rangelands of the western United States. Scientific American 222(2):89-98. p. 89.

## LOCATION, EXTENT AND OWNERSHIP OF RANGELAND

The 17 western states contain 61 percent, and the 11 western states 39.6 percent of the total land area found in the 48 contiguous states (Table 1 ).

Table 1. Percent of total, federal and state owned land in the 11 and 17 western states. a/

| Location | Percent of: Total Land Area | Federal Land Area | State Owned Land | Federal and State Owned Land |
|---|---|---|---|---|
| 11 Western States | 39.6 | 88.4 | 58.0 | 83.1 |
| 17 Western States | 61.0 | 91.2 | 68.8 | 87.5 |
| Other States | 39.0 | 8.8 | 31.2 | 16.9 |
| 48 States | 100.0 | 100.0 | 100.0 | 100.0 |

a/ Excludes Alaska and Hawaii.

Because of inherent low productivity, misconceptions about size of unit needed to structure an economic livestock enterprise, and land disposal laws designed for areas where intensive agriculture was possible, less of the land passed from public to private ownership in the western range states than the more humid sections of the country.

Federal ownership comprises 32 percent and state ownership 4.8 percent of the total land area in the 17 western states (Table 2 ). The 6 states of the great plains, however, have a relatively low percentage of total area (5 percent) in public ownership. By contrast, 54 percent of the land area in the 11 western states falls under the jurisdiction of state and federal governments.

Table 2. Land area and ownership for the 11 and 17 western states. [a]

(1000 Acres)

| State | Total Land Area [b] | Federal Land Area [b] | Percent Federal Ownership | State Ownership [c] | Percent State Ownership | State & Federal Ownership | Percent Public Ownership | Private & Municipal Ownership [d] | Percent Private and Municipal |
|---|---|---|---|---|---|---|---|---|---|
| Arizona | 72,688 | 32,646 | 44.9 | 9,222 | 12.7 | 41,868 | 57.6 | 30,820 | 42.4 |
| California | 100,207 | 44,889 | 44.8 | 2,110 | 2.1 | 46,999 | 46.9 | 53,207 | 53.1 |
| Colorado | 66,486 | 24,196 | 36.4 | 3,233 | 4.9 | 27,428 | 41.3 | 39,057 | 58.7 |
| Idaho | 52,933 | 33,827 | 63.9 | 2,755 | 5.2 | 36,581 | 69.1 | 16,352 | 30.9 |
| Montana | 93,271 | 27,625 | 29.6 | 5,275 | 5.7 | 32,899 | 35.3 | 60,372 | 64.7 |
| Nevada | 70,264 | 60,885 | 86.6 | 86 | 0.1 | 60,971 | 86.8 | 9,294 | 13.2 |
| New Mexico | 77,766 | 26,347 | 33.9 | 11,032 | 14.2 | 37,380 | 48.1 | 40,387 | 51.9 |
| Oregon | 61,599 | 32,184 | 52.2 | 1,652 | 2.7 | 33,835 | 54.9 | 27,763 | 45.1 |
| Utah | 52,697 | 34,838 | 66.1 | 4,923 | 9.3 | 39,761 | 75.5 | 12,936 | 24.5 |
| Washington | 42,694 | 12,571 | 29.4 | 3,237 | 7.6 | 15,807 | 37.0 | 26,886 | 63.0 |
| Wyoming | 62,343 | 30,175 | 48.4 | 3,902 | 6.3 | 34,076 | 54.7 | 28,267 | 45.3 |
| 11 Western States | 752,948 | 360,181 | 47.8 | 47,426 | 6.3 | 407,607 | 54.1 | 345,341 | 45.9 |
| Kansas | 52,511 | 674 | 1.3 | 119 | 0.2 | 793 | 1.5 | 51,718 | 98.5 |
| Oklahoma | 44,088 | 1,436 | 3.3 | 1,155 | 2.6 | 2,591 | 5.9 | 41,496 | 94.1 |
| Nebraska | 49,032 | 718 | 1.5 | 1,697 | 3.5 | 2,415 | 4.9 | 46,617 | 95.1 |
| North Dakota | 44,452 | 2,137 | 4.8 | 889 | 2.0 | 3,026 | 6.8 | 41,426 | 93.2 |
| South Dakota | 48,882 | 3,412 | 7.0 | 1,492 | 3.1 | 4,904 | 10.0 | 43,978 | 90.0 |
| Texas | 168,218 | 3,041 | 1.8 | 3,448 | 2.0 | 6,488 | 3.9 | 161,729 | 96.1 |
| 6 Plains States | 407,182 | 11,418 | 2.8 | 8,800 | 2.2 | 20,218 | 5.0 | 386,964 | 95.0 |
| 17 Western States | 1,160,130 | 371,599 | 32.0 | 56,226 | 4.8 | 427,825 | 36.9 | 732,305 | 63.1 |

Table 2 . (Continued)

| State | Total Land Area[b] | Federal Land Area[b] | Percent Federal Ownership | State Ownership[c] | Percent State Ownership | State & Federal Ownership | Percent Public Ownership | Private & Municipal Ownership[d] | Percent Private and Municipal |
|---|---|---|---|---|---|---|---|---|---|
| Other States | 741,626 | 35,802 | 4.8 | 25,518 | 3.4 | 61,320 | 8.3 | 680,306 | 91.7 |
| United States (Ex. Alaska & Hawaii) | 1,901,756 | 407,401 | 21.4 | 81,744 | 4.3 | 489,145 | 25.7 | 1,412,611 | 74.3 |

[a] Data are not strictly comparable as state and federal land acreages used were reported in different years. The differences that may exist, however, are judged to be of a minor magnitude.

[b] Source: U. S. Dept. of the Interior, Bureau of Land Management. Public land statistics, 1970. U. S. Government Printing Office, Washington, D. C. p. 10. (Statistics are as of June 30, 1969).

[c] Source: Staff Public Land Law Review Commission. 1970. Inventory Information on public lands, Vol. I. U. S. Dept. of Commerce, National Technical Information Service, Springfield, Va. PB 194 197. p. 49. (Statistics for the year 1968). Estimates were obtained from Governor's Representatives to the Public Land Law Review Commission.

[d] Source: By difference.

Livestock grazing has been and remains an important use of the lands of the United States. More than 885 million acres, or about 46 percent, of all land in the 48 contiguous states furnishes forage for domestic livestock (Table 3).

The great bulk, about 85 percent, of the land used for grazing, however, occurs in the 17 western states. Physical characteristics -- climate, soil, vegetation, and topography -- are largely responsible for this situation. Settlers from western Europe and the Scandanavian countries, arriving in the eastern United States, found a physical environment not dissimilar to the one which they had left. Ample rainfall, wooded terrain with game, and soils suitable for the growth of a variety of familiar food crops were the conditions that provided similar physical surroundings to the western European immigrants. Cattle in the agriculture enterprises of the eastern states provided the means, as work animals, to clear the land of trees, till the soil and harvest the crops. They were bartered and sold primarily for this purpose, rather than as a food item.

As settlement progressed westward from the moist wooded areas of the eastern states, a different physical environment was encountered at the eastern edge of the great plains region. Westward through the plains states, trees became scarce, soils were shallower and less fertile, and rainfall decreased. Major Stephen H. Long, in his 1820 report on explorations over the great plains, painted so bleak a picture of the region from about the 98th meridian to the Rockies that it became designated on maps as the Great American Desert. 77/ Long described this area as unfit for agriculture and primarily suitable as a barrier to prevent an extension of the population westward.

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77/ Lavender, 1965. Op. Cit. p. 111.

Table 3. Land area used for grazing by domestic livestock.

(1000 Acres)

| State | Land area of State[a] | Range & pasture in Farms[b] | Federal Land Allocated for grazing[c] | Total Grazed | Percent of Land Area Grazed |
|---|---|---|---|---|---|
| Arizona | 72,688 | 35,398 | 25,441 | 60,839 | 83.7 |
| California | 100,207 | 20,957 | 21,169 | 42,126 | 42.0 |
| Colorado | 66,486 | 27,159 | 20,492 | 47,651 | 71.7 |
| Idaho | 52,933 | 8,952 | 23,934 | 32,886 | 62.1 |
| Montana | 93,271 | 49,057 | 16,546 | 65,603 | 70.3 |
| Nevada | 70,264 | 6,937 | 48,712 | 55,649 | 79.2 |
| New Mexico | 77,766 | 44,486 | 22,326 | 66,812 | 85.9 |
| Oregon | 61,599 | 14,410 | 24,111 | 38,521 | 62.5 |
| Utah | 52,697 | 10,865 | 29,600 | 40,465 | 76.8 |
| Washington | 42,694 | 10,368 | 5,110 | 15,478 | 36.3 |
| Wyoming | 62,343 | 30,814 | 25,011 | 55,825 | 89.5 |
| 11 Western States | 752,948 | 259,403 | 262,452 | 521,855 | 69.3 |
| Kansas | 52,511 | 20,339 | 198 | 20,537 | 39.1 |
| Nebraska | 49,032 | 25,115 | 478 | 25,593 | 52.2 |
| North Dakota | 44,452 | 14,017 | 1,315 | 15,332 | 34.5 |
| Oklahoma | 44,088 | 23,805 | 491 | 24,296 | 55.1 |
| South Dakota | 48,882 | 26,319 | 2,410 | 28,729 | 58.8 |
| Texas | 168,218 | 111,609 | 1,357 | 112,966 | 67.2 |
| 6 Plains States | 407,182 | 221,204 | 6,249 | 227,453 | 55.9 |
| 17 Western States | 1,160,130 | 480,607 | 268,701 | 749,308 | 64.6 |
| Other States | 741,626 | 130,370 | 4,900 | 135,270 | 18.2 |
| 48 States | 1,901,756 | 610,977 | 273,601 | 884,578 | 46.5 |

(Columns may not total due to rounding)

Table 3 . Footnotes:

a/ Source: U. S. Dept. of Interior, Bureau of Land Management. Public land statistics, 1970. U. S. Government Printing Office, Washington, D. C. p. 10.

b/ Source: U. S. Dept. of Agriculture, Economic Research Service. 1968. Major uses of land and water in the United States with special reference to agriculture, summary for 1964. Economic Report No. 149. U. S. Government Printing Office, Washington, D. C. pp. 61-62. Values for range and pasture in farms given in this report included state and scattered areas of federal land grazed under lease. Values reported above have been reduced by the acreage of grazing leases in force by the Bureau of Land Management in 1964. Some land utilization project areas or national grassland areas may still be duplicated in range and pasture in farms and federal land allocated for grazing.

c/ Source: From data supplied to the University of Idaho by the Public Land Law Review Commission. Data are for 1966.

Early settlement of the western country was stimulated by furs, precious minerals and a search for sanctuary from religious persecution as in the case of the Mormons. Grazing, as a specialized agricultural pursuit, began to develop along the fringes of the established settled areas of the eastern and southern states in the late 18th and early 19th centuries. Large numbers of cattle grazed the southern states and colonies prior to the widespread use of the land for cotton.

Few cattle were found in the great plains, except along the fringe, prior to 1865. 78/ West of the Rocky Mountains, small populations of livestock were found around the settled areas of western Oregon, western Washington and Utah; in the vicinity of the mining camps of Nevada and California; and in the central and coastal valleys of California.

Conclusion of the Civil War; subjugation of the western Indian tribes brought about by decimation of the buffalo herds and actions of the Army; extension of the railroads into the plains region, and farther west; and advancing settlement westward stimulated a rapid expansion of range livestock production in the plains and western states. Cattle numbers, other than milk cows, more than doubled between 1870 and 1900 79/ and most of the increase occurred in the plains and western states.

Free grants of land under the Homestead Act and various other land disposal laws stimulated great plains and western settlement. Substantial acreages of land passed to private ownership and intensive agricultural enterprises developed in parts of the region as a consequence of this governmental policy. In spite of the rain maker's claim that intensive agriculture would change the climate

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78/ Clawson, Marion, R. Burnell Held and Charles H. Stoddard. 1960. Land for the future. John Hopkins Press, Baltimore, Md. 570 pp. p. 369.

79/ Dale, 1930. Op. Cit. pp. 101 and 109.

favorably in the semi-arid and arid regions [80] and irrigation projects designed to do so artificially, a large portion of the great plains and western states was unsuited to intensive agriculture. Grazing was and remains a primary use on the land of this region. Over two-thirds (69.3 percent) of the land in the 11 western states and nearly two-thirds (64.6 percent) in the 17 western states is still grazed by domestic livestock (Table 4). More of the area in the 6 states of the great plains is suitable for intensive agriculture because of climate, soils and topography than in the more western states. Still, over 50 percent of this land area is used for grazing by livestock.

Table 4. Area of land grazed and the percent of the total land area that is grazed.

| | Land Area Grazed | Percent of Total Land Area Grazed |
|---|---|---|
| | (1000 Acres) | |
| 11 Western States | 521,855 | 69.3 |
| 6 Plains States | 227,453 | 55.9 |
| 17 Western States | 749,308 | 64.6 |
| 48 States | 884,578 | 46.5 |

Very little land is used for grazing if it is suitable for intensive agriculture and there is an active demand for this kind of agriculture. [81] During the period of western settlement, the great plains was more extensively homesteaded than the more mountainous western states. Essentially level terrain, and a semi-arid rather than an arid climate were partially responsible for the greater transfer from public to private ownership of land in the great plains than in the 11

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80/ Kollmorgen, 1969. Op. Cit. pp. 215-239.

81/ Clawson, Held and Stoddart, 1960. Op. Cit. p. 403.

western states. About 97 percent of all range and pasture in the 6 plains states is included in farms, while about 50 percent is in farms and 50 percent is under federal ownership in the 11 western states (Table 5 ).

Table 5 . Percent of land grazed that is in farms (largely private ownership) and in federal ownership.

| | Percent Grazing Land In: | |
|---|---|---|
| | Farms | Federal Ownership |
| 11 Western States | 49.7 | 50.3 |
| 6 Plains States | 97.3 | 2.7 |
| 17 Western States | 64.1 | 35.9 |

Nearly 79 percent of all privately owned [82/] rangeland and 98 percent of all federally owned range in the 48 contiguous states is found in the 17 western states (Table 6 ).

Table 6 . Percent of all range and pasture in farms, percent of all federal land allocated for grazing, and the percent of all land grazed by domestic livestock occurring in the 11 and 17 western states.

| Location | All Range and Pasture in Farms | All Federal Land Allocated for Grazing | Percent of Total Land Area Grazed[a/] |
|---|---|---|---|
| 11 Western States | 42 | 96 | 59 |
| 17 Western States | 79 | 98 | 85 |
| 48 Conterminous States | 100 | 100 | 100 |

a/

82/ Includes some state leases and national grassland areas under federal jurisdiction designated as range and pasture in farms.

As indicated previously, 85 percent of the approximately 885 million acres of land grazed is found in the 17 western states and 59 percent in the 11 western states.

The U. S. Forest Service and the Bureau of Land Management administer 87 percent of all federal land in the 11 western states, about 86 percent in the 17 western states, and 84 percent in the 48 contiguous states (Table 8 ).

A number of federal agencies permit domestic livestock grazing on the land under their control. Two federal agencies, however, control and regulate domestic livestock grazing on the majority of the federal land. The U. S. Forest Service and the Bureau of Land Management administer 96 percent of all federal land allocated for grazing in the 48 states (Table 7 ).

Table 7 . Percent of federal land allocated for grazing, administered by the U. S. Forest Service and the Bureau of Land Management.

| Location | Percent of federal grazing land administered by: | | |
|---|---|---|---|
| | BLM | USFS | Total |
| 11 Western States | 59.9 | 36.8 | 96.7 |
| 17 Western States | 58.5 | 37.6 | 96.2 |
| 48 States | 57.5 | 38.5 | 96.0 |

Over half (57.5 percent) of the total land area in the 48 states, allocated for grazing, is under control of the Bureau of Land Management. About 60 percent of all federal range in the 11 western states is administered by the Bureau of Land Management and 37 percent by the U. S. Forest Service.

The Bureau of Land Management controls use on about 10 million more acres than the U. S. Forest Service, and allows grazing use on a much greater portion. About 90 percent of all Bureau of Land Management administered land is used for domestic livestock grazing, while about 70 percent in the western states and 64

Table 8. Public land administered by the U. S. Forest Service and the Bureau of Land Management, and public land allocated for grazing, 1966.

| State | Public Land Administered by:[a] | | | | Percent USFS & BLM is of Total Fed. Land | Public Land Allocated for Grazing by:[b] | | | | Percent USFS & BLM is of Total Fed. land Allocated for Grazing |
|---|---|---|---|---|---|---|---|---|---|---|
| | USFS | BLM | Other Agencies | Total | | USFS | BLM | Other Agencies | Total | |
| | (100's of Acres) | | | | | (100's of Acres) | | | | |
| Arizona | 11,422.3 | 12,956.1 | 8,072.4 | 32,450.8 | 75.1 | 11,338.0 | 12,465.0 | 1,638.2 | 25,441.2 | 93.6 |
| California | 19,990.5 | 15,172.2 | 9,204.0 | 44,366.7 | 79.3 | 11,963.4 | 8,412.0 | 793.2 | 21,168.6 | 96.3 |
| Colorado | 14,337.2 | 8,294.6 | 1,406.6 | 24,038.4 | 94.1 | 12,400.9 | 7,758.0 | 333.4 | 20,492.3 | 98.4 |
| Idaho | 20,341.5 | 12,204.3 | 1,469.8 | 34,015.6 | 95.7 | 11,822.6 | 11,590.0 | 521.2 | 23,933.8 | 97.8 |
| Montana | 16,669.9 | 8,225.0 | 2,744.0 | 27,638.9 | 90.1 | 7,672.5 | 7,788.6 | 1,085.1 | 16,546.2 | 93.4 |
| Nevada | 5,059.5 | 47,750.0 | 8,161.8 | 60,971.3 | 86.6 | 4,863.5 | 43,201.0 | 647.8 | 48,712.3 | 98.7 |
| New Mexico | 9,099.1 | 13,613.6 | 4,014.0 | 26,726.7 | 85.0 | 8,351.6 | 13,522.0 | 451.9 | 22,325.5 | 98.0 |
| Oregon | 15,464.5 | 15,673.6 | 1,046.7 | 32,184.8 | 96.7 | 9,855.6 | 13,859.8 | 395.4 | 24,110.8 | 98.4 |
| Utah | 7,972.0 | 22,967.6 | 4,241.1 | 35,180.7 | 87.9 | 7,122.7 | 21,106.0 | 1,371.5 | 29,600.2 | 95.4 |
| Washington | 9,691.2 | 274.7 | 2,587.8 | 12,553.7 | 79.4 | 4,434.8 | 223.0 | 451.9 | 5,109.7 | 91.2 |
| Wyoming | 9,143.6 | 17,434.5 | 3,426.2 | 30,004.3 | 88.6 | 6,829.8 | 17,286.0 | 895.4 | 25,011.2 | 96.4 |
| 11 Western States | 139,191.3 | 174,566.2 | 46,374.4 | 360,131.9 | 87.1 | 96,655.4 | 157,211.4 | 8,585.0 | 262,451.8 | 96.7 |
| Kansas | 107.3 | 1.5 | 534.0 | 642.8 | 16.9 | 106.7 | 0.0 | 91.3 | 198.0 | 53.9 |
| Nebraska | 339.7 | 7.8 | 376.8 | 724.3 | 48.0 | 330.4 | 0.0 | 147.3 | 477.7 | 69.2 |
| North Dakota | 1,105.0 | 76.0 | 902.7 | 2,083.7 | 56.7 | 1,104.3 | 42.0 | 168.4 | 1,314.7 | 87.2 |
| Oklahoma | 285.1 | 17.8 | 1,081.9 | 1,384.8 | 21.9 | 245.7 | 10.0 | 235.3 | 491.0 | 52.1 |
| South Dakota | 1,987.0 | 278.4 | 1,136.0 | 3,401.4 | 66.6 | 1,942.7 | 28.0 | 439.0 | 2,409.7 | 81.8 |
| Texas | 775.3 | 0.0 | 2,181.8 | 2,957.1 | 26.2 | 705.1 | 0.0 | 652.0 | 1,357.1 | 52.0 |

Table 8 . Continued.

| State | Public Land Administered by:[a] USFS | BLM | Other Agencies | Total | Percent USFS & BLM is of Total Fed. Land | Public Land Allocated for Grazing by:[b] USFS | BLM | Other Agencies | Total | Percent USFS & BLM is of Total Fed. Land Allocated for Grazing |
|---|---|---|---|---|---|---|---|---|---|---|
| 17 Western States | 143,790.7 | 174,947.7 | 52,587.6 | 371,326.0 | 85.8 | 101,090.3 | 157,291.4 | 10,318.3 | 268,700.0 | 96.2 |
| Other States[c] | 21,891.1 | 56.6 | 13,439.3 | 35,387.0 | 62.0 | 4,349.0 | 12.0 | 539.1 | 4,900.1 | 89.0 |
| 48 States[c] | 165,681.8 | 175,004.3 | 66,026.9 | 406,713.0 | 83.8 | 105,439.3 | 157,303.4 | 10,857.4 | 273,600.1 | 96.0 |

[a] Source: U. S. Dept. of the Interior, Bureau of Land Management. 1967. Public land statistics. U. S. Government Printing Office, Washington, D. C. Table 9.

[b] Source: From material supplied the University of Idaho by the Public Land Law Review Commission.

[c] Excluding Alaska and Hawaii.

percent in the 48 states, of the land controlled by the U. S. Forest Service, is grazed by domestic livestock (Table 9).

Table 9. Percent of all federal land administered by the Bureau of Land Management and the U. S. Forest Service allocated for grazing.

| Location | Percent of Land Area Allocated for Grazing | |
|---|---|---|
| | BLM | USFS |
| 11 Western States | 90.0 | 69.4 |
| 17 Western States | 89.9 | 70.3 |
| 48 States | 89.9 | 63.6 |

Federal agencies such as the National Park Service, Bureau of Sport Fisheries and Wildlife, Bureau of Reclamation, and agencies of the Department of Defense permit grazing on lands under their control when it does not interfere with the primary objectives of the agency. Since only 4 percent of all federal land used for grazing domestic livestock, and the grazing land policies of these agencies are incidental to other purposes, consideration of grazing land policies will be concentrated on federal lands administered by the U. S. Forest Service and the Bureau of Land Management.

## GRAZING PERMITS ON PUBLIC LANDS

### Number of permits

In 1901, 2,317 permits were issued to graze livestock on the forest reserves. 83/ The number of grazing permits increased to 7,981 in 1905, 24,127 in 1908 and reached a high of 39,152 in fiscal year 1918-19. Since 1918 the number of permits have declined to a level of 15,354 paid permits in 1970 (Table ).

After passage of the Taylor Grazing Act, the activities of the Division of Grazing were directed to putting the Act into operation. Establishing grazing district boundaries, drafting regulations and apportioning the range for issuing licenses occupied much of the time of the personnel in the newly created organization. It was estimated in 1936 84/ that 15,000 grazing licenses had been issued for 8 million head of livestock to use the 80 million acres of public domain in grazing districts. Federal range administered for grazing under the Taylor Grazing Act increased to 140.8 million acres in 1940, and 20,609 licenses were issued for the grazing of livestock. 85/ The maximum number of permits were issued in 1944 86/ and have declined from the high of 22,562 to 14,455 in 1970 (Table 10).

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83/ U. S. Dept. of Agriculture. 1924. Yearbook of Agriculture, 1923. U. S. Government Printing Office, Washington, D. C. 1284 pp. p. 1062.

84/ U. S. Dept. of Interior, Division of Grazing. 1936. District Advisors Conference, Salt Lake City, Utah. January 13 and 14. Mimeo. 94 pp. p. A. 5.

85/ U. S. Dept. of Interior. 1940. Annual report of the Secretary. U. S. Government Printing Office, Washington, D. C. p. 342.

86/ U. S. Dept. of Interior. 1944. Annual report of the Secretary. U. S. Government Printing Office, Washington, D. C. p. 181.

Table 10. Number of paid grazing permits issued by the U. S. Forest Service and the Bureau of Land Management to use national forests a/ and grazing districts. b/

| | Cattle and Horses | | | Sheep and Goats | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1947 | 1960 | 1970 | 1947 | 1960 | 1970 | 1947 | 1960 | 1970 |
| National Forests | 18,494 | 15,596 | 14,034 | 3,248 | 2,006 | 1,320 | 21,742 | 17,602 | 15,354 |
| Grazing Districts | 14,694 | 13,264 | 12,011 | 5,361 | 2,900 | 2,444 | 20,055 | 16,164 | 14,455 |
| TOTAL | 33,188 | 28,860 | 26,045 | 8,609 | 4,906 | 3,764 | 41,797 | 33,766 | 29,809 |

a/ Does not include national grasslands or land utilization project areas.

b/ Source: U. S. Dept of Agriculture. 1948. Our national forests. Report of the Chief of the Forest Service. U. S. Government Printing Office, Washington, D. C.;

U. S. Dept. of Interior, Bureau of Land Management. 1948. Report of the Director, Statistical Appendix. p. 81.;

U. S. Forest Service. 1961. Annual grazing statistical reports. Processed.;

U. S. Dept. of Interior, Bureau of Land Management. 1962. Statistical appendix to the annual report of the Director, Bureau of Land Management. U. S. Government Printing Office, Washington, D. C. 198 pp. p. 150.;

U. S. Dept. of Agriculture, Forest Service. 1971. Annual grazing statistical report, 1970. 102 pp. p. 2.;

U. S. Dept. of Interior, Bureau of Land Management. 1972. Public land statistics, 1971. U. S. Government Printing Office, Washington, D. C.

Permit size

From the time that grazing permits were first issued on the national forests, special consideration was given to the settler and small farmer. 87/ In areas where the national forests were fully stocked, new settlers were provided for by scaling down the larger operations in the area. 88/ The small stockman and home-builder was given free grazing for his work and milk stock up to 10 head. 89/ In 1908, about 20,000 permits were issued for grazing cattle and horses and 12,600 of these were for less than 40 head. 90/ This was interpreted as showing that the U. S. Forest Service policy of providing for the small man -- the home builder -- was succeeding. In 1970, 17,872 paid permits were issued by the U. S. Forest Service and 80,901 were issued to exempt owners of livestock using national forest system lands.

Available data on the size distribution of cattle and horse permits issued by the U. S. Forest Service show a slight decline between 1909 and 1965 in the percentage of permittees with 1 to 40 head of permitted animals (Table 11). The number of permittees with permits for over 200 head increased from 7 to 9 percent during the same period. In 1965, 9 percent of the permittees had permits for 45 percent of the cattle allowed on national forest system lands.

The number of sheep operators on national forests running less than 1,000 head increased 48 to 57 percent between 1909 and 1965 (Table 11). The percent of operators having permits in excess of 4,000 head of sheep changed but slightly

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87/ Hibbard, 1924. Op. Cit. p. 485.

88/ Barnes, 1913. Op. Cit. p. 217.

89/ Ibid. p. 211.

90/ U. S. Dept. of Agriculture. 1909. Yearbook of Agriculture, 1908. U. S. Government Printing Office, Washington, D. C. 822 pp. p. 541

Table 11. Distribution of grazing permits on the national forests according to size classes. [c]

Cattle [a]

| Year | Class I (1-40 head) | | | Class II (41-100 head) | | | Class III (101-200 head) | | | Class IV (Over 200 head) | | | Average size of permits of all grades |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of permittees | Number grazed | Average size of permit | Number of permittees | Number grazed | Average size of permit | Number of permittees | Number grazed | Average size of permit | Number of permittees | Number grazed | Average size of permit | |
| | Percent | Percent | Number | Percent | Percent | Number | Percent | Percent | Number | Percent | Percent | Number | Number |
| 1909 | 64 | 15 | 16 | 20 | 19 | 68 | 9 | 18 | 149 | 7 | 48 | 501 | 72 |
| 1914 | 66 | 15 | 16 | 19 | 18 | 67 | 8 | 18 | 145 | 7 | 49 | 484 | 68 |
| 1919 | 65 | 16 | 17 | 20 | 20 | 67 | 8 | 17 | 146 | 7 | 47 | 497 | 69 |
| 1924 | 64 | 15 | 17 | 20 | 20 | 67 | 9 | 18 | 144 | 7 | 47 | 476 | 69 |
| 1929 | 64 | 15 | 16 | 20 | 18 | 66 | 9 | 20 | 144 | 7 | 47 | 445 | 70 |
| 1934 | 62 | 15 | 17 | 21 | 20 | 66 | 10 | 21 | 146 | 7 | 44 | 425 | 69 |
| 1960 | 56 | 12 | 17 | 23 | 21 | 68 | 12 | 24 | 145 | 8 | 43 | 383 | 75 |
| 1965 | 55 | 11 | 16 | 23 | 20 | 68 | 13 | 24 | 150 | 9 | 45 | 382 | 79 |

Sheep [b]

| Year | Class I (1-1,000 head) | | | Class II (1,001-2,500 head) | | | Class III (2,501-4,000 head) | | | Class IV (Over 4,000 head) | | | Average size of permits of all grades |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of permittees | Number grazed | Average size of permit | Number of permittees | Number grazed | Average size of permit | Number of permittees | Number grazed | Average size of permit | Number of permittees | Number grazed | Average size of permit | |
| | Percent | Percent | Number | Percent | Percent | Number | Percent | Percent | Number | Percent | Percent | Number | Number |
| 1909 | 48 | 13 | 422 | 38 | 39 | 1,596 | 8 | 17 | 3,160 | 6 | 31 | 7,386 | 1,541 |
| 1914 | 47 | 13 | 416 | 39 | 42 | 1,550 | 8 | 16 | 3,102 | 6 | 29 | 7,005 | 1,469 |
| 1919 | 57 | 18 | 381 | 32 | 41 | 1,529 | 6 | 15 | 3,204 | 5 | 26 | 6,667 | 1,207 |
| 1924 | 61 | 19 | 356 | 29 | 38 | 1,534 | 6 | 16 | 3,222 | 4 | 27 | 6,783 | 1,159 |
| 1929 | 64 | 22 | 359 | 27 | 40 | 1,508 | 5 | 15 | 3,120 | 4 | 23 | 6,690 | 1,042 |
| 1934 | 62 | 21 | 368 | 29 | 42 | 1,528 | 5 | 14 | 3,178 | 4 | 23 | 6,647 | 1,071 |
| 1960 | 58 | 24 | 535 | 30 | 38 | 1,604 | 8 | 20 | 3,098 | 4 | 18 | 5,606 | 1,274 |
| 1965 | 57 | 23 | 529 | 30 | 37 | 1,618 | 9 | 21 | 3,126 | 5 | 19 | 5,336 | 1,304 |

[a] Includes a relatively small number of horses and a few swine, not segregated.

[b] Includes a relatively small number of goats, not segregated from sheep.

[c] Source: Values from 1909 to 1934 were taken from: U. S. Dept. of Agriculture, Forest Service. 1936. The western range. Senate Document 199. 74th Congress, 2d Session. 620 pp. p. 270 and includes all regions. Values in 1960 and 1965 were supplied by the U. S. Forest Service to the Public Land Law Review Commission and include only regions 1 through 6.

between 1909 and 1965, but the average size of permit in this category decreased from 7,386 to 5,336 head. In contrast to cattle permittees, sheep operators with the largest permit size grazed the smallest percentage -- 19 percent -- of all sheep on national forests in 1965. Operators with 1 or 2 bands of sheep (1,001 - 2,500) comprised 38 percent of all sheep operators in 1909, and 30 percent in 1965. These permittees grazed the most sheep on national forests through the years -- between 37 and 42 percent of all sheep permitted.

Data are less readily available for permit size distribution on Bureau of Land Management administered land. Comparison of data from 1950 to 1960 on size class distribution of cattle grazing permits show the number of permittees in the smallest permit size class (1 to 50 head) increased 4 percent between 1950 and 1960 (Table 12). Permittees in the other size classes decreased 1 to 2 percent during this period. Although the percentage of permittees in the smallest size class increased 4 percent, the proportion of the total animals that they grazed on grazing districts did not change between 1950 and 1960. Eighteen percent of all cattle permittees had permits for over 200 head, but grazed 68 percent of all the cattle on grazing districts in 1960. Forty-seven percent of all permittees had permits for 50 head or less and grazed only 7 percent of the total permitted cattle.

The average size of permits for all permittees was 152 head in 1950 and 149 head in 1960. This average permit size was about twice the average permit size on national forest lands in 1960.

When permit size is considered with regard to animal unit months of grazing, both the U. S. Forest Service and the Bureau of Land Management show a greater concentration of permits in the smaller size classes (Table 13). This tendency is more pronounced with the U. S. Forest Service than the Bureau of Land Management.

Table 12. Class size distribution of cattle grazing permits in Bureau of Land Management grazing districts for two years, 1950 and 1960. a/

| Year | Class I 50 or less | | | Class II 51-100 | | | Class III 101-200 | | | Class IV Over 200 | | Average size of permits of all grades |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of permittees | Number grazed | Average size of permit | Number of permittees | Number grazed | Average size of permit | Number of permittees | Number grazed | Average size of permit | Number of permittees | Number grazed | Average size of permit |
| | Percent | Percent | Number | Percent | Percent | Number | Percent | Percent | Number | Percent | Percent | Number | Number |
| 1950 | 43 | 7 | 25 | 20 | 10 | 74 | 17 | 16 | 143 | 20 | 67 | 491 | 152 |
| 1960 | 47 | 7 | 21 | 19 | 10 | 74 | 16 | 15 | 147 | 18 | 68 | 556 | 149 |

a/ Source: U. S. Dept. of Interior, Bureau of Land Management. 1962. Adjustments in grazing use. An evaluation of adjustments in grazing use as they occur in the management of the federal range of the Bureau of Land Management. Processed. 100 pp. p. 8.

Table 13. Percentage of AUM's permitted in the 11 western states by size class and agency. a/

| Permit Size (AUM's) | USFS | BLM | Total |
|---|---|---|---|
| 0- 50 | 22.9 | 15.4 | 19.5 |
| 51- 100 | 12.2 | 11.8 | 12.0 |
| 101- 200 | 17.1 | 14.7 | 16.0 |
| 201- 500 | 26.3 | 21.8 | 24.2 |
| 501-1000 | 13.0 | 14.0 | 13.5 |
| 1001-2000 | 5.1 | 11.0 | 7.8 |
| 2001-3000 | 1.8 | 4.5 | 3.0 |
| 3001-4000 | 0.6 | 2.2 | 1.3 |
| 4001-5000 | 0.3 | 1.4 | 0.8 |
| Over 5000 | 0.5 | 3.3 | 1.8 |
| TOTAL | 100.0 | 100.0 | 100.0 |

a/ Data furnished the University of Idaho from the 1966 Grazing Fee Study by the Public Land Law Review Commission.

Approximately 48 percent of the permits issued by the Bureau of Land Management and the U. S. Forest Service are for less than 200 AUM's of use. A greater percentage of the permits issued by the Bureau of Land Management (29.3 percent) is in excess of 500 AUM's than those issued by the U. S. Forest Service (21.5 percent).

The U. S. Forest Service maintains an upper limit on the size of permit issued, but the Bureau of Land Management does not. This policy causes a greater concentration of permits in the smaller size classes and a lesser concentration in the larger sizes of those issued by the U. S. Forest Service than those issued by the Bureau of Land Management. The U. S. Forest Service policy, in the past, of making distribution cuts in the larger permit sizes also contributed to this permit size class distribution.

## Transfer of permits

Transfer of grazing privileges from one holder to a new holder, or from one base property to another base property, has been possible since the time grazing privileges were originally granted by the U. S. Forest Service and the Bureau of Land Management.

The policy of the U. S. Forest Service, with regard to permit transfers, has been to interfere as little as possible with the legitimate transactions of the range livestock operator. 91/ However, since the grazing preference or permit on public land is considered a privilege and not a right, it must be waived by the transferee to the Government. The U. S. Forest Service, in turn, renews it to the purchaser. He must also be purchasing either the dependent and otherwise qualified ranch property or the permitted livestock of the transferee. In the latter case, the purchaser must presently own qualified ranch property.

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91/ U. S. Dept. of Agriculture, Forest Service, 1936. Op. Cit. p. 268.

At the time permits were first issued on the national forests or forest reserves, all stockmen making bona fide grazing use for a number of years were granted permits. 92/ It was a practice of the U. S. Forest Service to reduce the size of permits on transfer if the range was overstocked or there was a demand by other better qualified users. Better qualified users presumably were new settlers and the small rancher. Some support for this practice was expressed by stockmen holding permits. Early permit holders expressed a feeling that purchasers of permitted livestock should not receive as much consideration as permittees from whom the stock was purchased. 93/

The practice of reducing permits at the time of transfer came to be strongly protested by stockmen in later years. A revised policy was tentatively approved in 1953 that reductions would be made as and when needed without relation to transfer of privileges. 94/

The Bureau of Land Management allows permit transfers from one qualified base property to another qualified base property, or from an existing permittee with qualified base property to the purchaser of said base property. Transfers are not mandatory, but are generally approved by the district manager provided they do not interfere with the stability of livestock operations or with proper range management and will not adversely affect the established local economy. 95/

Data obtained from the Interdepartmental (Departments of Agriculture, Defense, and Interior) Fee Study of 1966 show that 20 percent of the ranches in the 11 western states had permit transfers over a 5 year period (Table 14). Nine percent

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92/ U. S. Dept. of Agriculture, Forest Service, 1936. Op. Cit. p. 268.

93/ Roberts, 1963. Op. Cit. p. 118.

94/ U. S. Dept. of Agriculture. 1954. Report of the Chief of the Forest Service, 1953. U. S. Government Printing Office, Washington, D. C. pp. 11-12.

95/ Bureau of Land Management. 4115.22C-1.

Table 14. U. S. Forest Service and Bureau of Land Management livestock grazing permit transfers. a/

| State | Ranches with Transfers | Percent of Transfers with: | | | |
|---|---|---|---|---|---|
| | | Land | Livestock | Land and Livestock | Neither |
| | (Percent) | | | | |
| Arizona | 26 | 8 | 26 | 44 | 22 |
| California | 17 | 12 | 24 | 59 | 6 |
| Colorado | 26 | 11 | 39 | 46 | 4 |
| Idaho | 22 | 7 | 42 | 48 | 4 |
| Montana | 13 | 21 | 10 | 65 | 4 |
| Nevada | 25 | 10 | 26 | 58 | 5 |
| New Mexico | 17 | 6 | 32 | 57 | 4 |
| Oregon | 20 | 12 | 23 | 62 | 3 |
| Utah | 22 | 4 | 59 | 31 | 6 |
| Washington | 20 | 25 | 30 | 44 | 1 |
| Wyoming | 18 | 10 | 32 | 52 | 6 |
| 11 Western States | 20 | 9 | 37 | 48 | 5 |

a/ Source: Data from Interagency Fee Study of 1966 supplied to the University of Idaho by the Public Land Law Review Commission. Transfers during a five year period preceeding 1966.

of these went with transfer of the land base, 37 percent were transferred with the livestock and 48 percent transferred with the land and livestock.

These data indicate an increasing size of individual range livestock enterprises. Presumably, permit transfers with livestock only are for enlarging an existing operation with more than adequate commensurate property. Some of the permit transfers involving both land and livestock are also for the purpose of enlarging the existing operation.

Because of the transferability of grazing privileges and the charges made for grazing use of the public lands, these privileges or permits have taken on a value that can be bought and sold.

Purchase price of livestock grazing permits

Permits to graze livestock on public lands began to take on a cash value soon after they were issued. Barnes 96/ in 1913 made the observation that,

> "The advantages of grazing stock on the National Forests are so apparent that the permit has come to have a great pecuniary value, resulting in the premium on both ranches and stock located within or adjacent to the National Forest ranges. Instances are known where sheep grazing under permit on a forest have been sold for as much as $2 per head more than the market value. . ."

Data from the interdepartmental fee study completed in 1966 show that prices paid for livestock permits averaged $14.41 per AUM on land administered by the Bureau of Land Management and ranged from $6.25 per AUM in California to $30.68 in Arizona (Table 15). Permits to graze cattle on land administered by the U. S. Forest Service sold for an average of $24.69 per AUM. The range in values was from $7.47 in some California forests to $32.00 in northern Idaho forests (Table 16).

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96/ Barnes, 1913. Op. Cit. p. 218.

Table 15. Purchase prices of Bureau of Land Management Permits per AUM by state. a/

| State | Permit Value |
|---|---|
| Arizona | $30.68 |
| California | 6.25 |
| Colorado | 22.43 |
| Idaho | 22.52 |
| Montana | 22.30 |
| Nevada | 10.08 |
| New Mexico | 16.47 |
| Oregon | 15.68 |
| Utah | 11.77 |
| Washington | --- |
| Wyoming | 16.87 |
| Average | $14.41 |

a/ Source: Bureau of Land Management. 1967. Average costs per AUM from 1966 grazing fee study. Mimeo. p. 6.

Table 16. Purchase prices of U. S. Forest Service permits per AUM for cattle by market areas. a/

| Market Area | National Forests | Permit Value |
|---|---|---|
| A | Umpqua, Willamette, Mt. Hood, Deschutes, Umatilla, Wallowa Unit, Payette, Boise, Nez Perce, Rogue River, Winema, Six Rivers, Klamath, Shasta-Trinity, Mendocino, Los Padres, Siskiyou | $20.84 |
| B | Angeles, Cleveland, San Bernardino | --- |
| C | Tahoe, Eldorado, Stanislaus, Sierra, Inyo, Sequoia | 7.47 |
| D | Modoc, Lassen, Plumas, Fremont, Ochoco, Malheur | 24.32 |
| E | Okanogan, Mt. Baker, Gifford Pinchot, Snoqualmie, Siuslaw, Wenatchee | 12.99 |
| F | Clearwater, St. Joe, Coeur d'Alene | 32.20 |
| G | Colville, Kaniksu, Kootenai | 16.44 |
| H | Flathead, Lolo, Lewis & Clark | 16.24 |
| I | Custer, Black Hills, Bighorn, Medicine Bow | 19.49 |
| J | Nebraska | --- |
| K | Deerlodge, Helena, Bitterroot, Beaverhead, Targhee, Teton, Shoshone, Bridger, Caribou, Ashley, Sawtooth, Gallatin | 21.77 |
| L | Salmon, Challis | 21.13 |
| M | Toiyabe, Humboldt, Dixie | 28.72 |

Table 16. Continued.

| Market Area | National Forests | Permit Value |
|---|---|---|
| N | Wasatch, Cache, Uinta, Manti-LaSal, Fishlake | $15.42 |
| O | Kaibab, Prescott, Coconino, Tonto, Coronado | 31.80 |
| R | Sitgreaves, Apache, Cibola, Gila, Lincoln | 32.15 |
| S | Carson, Santa Fe | 19.00 |
| T | San Juan, Rio Grande, San Isabel, Gunnison, Grand Mesa, White River, Pike, Arapaho, Routt, Roosevelt | 26.54 |
| Survey Average | | $24.69 |

a/ Source: Statement on grazing fee programs prepared by the U. S. Forest Service for the October 1967 Fees and Directives Conference with the American National Cattlemen's Association and the National Wool Growers' Association.

Table 17. Purchase prices of U. S. Forest Service permits per AUM for sheep by market area. a/

| Sheep Market Areas | National Forests | Permit Value b/ |
|---|---|---|
| X | Medicine Bow National Forest, Wyoming<br>All Colorado, New Mexico, Arizona, California National Forests<br>Toiyabe National Forest, Nevada<br>Deschutes, Freemont and Winema National Forests in Oregon | $20.47 |
| Y | All National Forests in Oregon except Deschutes, Freemont and Winema<br>All Washington, Montana, Idaho and Utah National Forests<br>All Wyoming National Forests except Medicine Bow<br>Humboldt National Forest in Nevada<br>Black Hills National Forest in South Dakota | 19.02 |
| Average | | $19.42 |

a/ Source: Statement prepared by the U. S. Forest Service on the present U. S. Forest Service user fee study for livestock for presentation to the Secretary of Agriculture's Advisory Committee on Multiple Use of the National Forests, December 12-14, 1967.

b/ Ibid. Appendix Table E.

U. S. Forest Service sheep permits sold for an average of $19.42 per AUM, and varied by only $1.45 between the two market areas.

A number of factors probably prevent permit values from being greater than those reported. Calculations of expected permit values under free transferability of permits showed them to be higher than values in actual transfers. 97/ The differences were attributed to the dependency, commensurate property and priority requirements in the allocation of permits. The previous practice of reducing size by the U. S. Forest Service at time of transfer and other reasons for reducing livestock numbers had had an impact on lowering actual permit values over estimated values.

Grazing permits issued and number of livestock ranchers

The number of paid or regular permits issued in 1964 by the U. S. Forest Service and the Bureau of Land Management in the 11 western states was 31,664 (Table 18). In addition to these permits, about 28 thousand free use permits were issued along with 3 thousand exchange or private land permits by the two agencies.

The number of ranch or farm firms holding permits is less than the total number of permits issued by the two agencies because some operators have permits with more than one agency and/or more than one permit with the same agency. The magnitude of this error in relating number of permits to the number of ranch firms holding permits is not known, but may be as high as 25 percent or more. From an examination of data collected by the University of Idaho from 327 ranches in 8 western counties, about 30 percent of the ranchers held permits with more than one agency. 98/

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97/ Gardner, B. Delworth. 1962. Transfer restrictions and misallocation in grazing public range. Journal Farm Economics 44(1):50-63.

98/ University of Idaho, 1970. Op. Cit. p. III-36.

Table 18. Number of permits issued for the grazing of domestic livestock by the U. S. Forest Service and the Bureau of Land Management and the number of ranchers in the 11 western states, 1964.

| Agency | Cattle and Horses | Sheep and Goats | Total |
|---|---|---|---|
| U. S. Forest Service [a] | | | |
| Paid Permits | 14,764 | 1,766 | 16,530 |
| Private Land Permits | 1,538 | 205 | 1,743 |
| Exempt Owners | [b] | [b] | 26,432 |
| Total | 16,302 | 1,971 | 44,705 |
| Bureau of Land Management [a] | | | |
| Regular Permits | 12,721 | 2,413 | 15,134 |
| Exchange of Use Permits | 988 | 305 | 1,293 |
| Free Use Permits | 284 | 1,328 | 1,612 |
| Total | 13,993 | 4,046 | 18,039 |
| Total USFS & BLM | | | |
| Paid and Regular Permits | 27,485 | 4,179 | 31,664 |
| Private Land and Exchange of Use Permits | 2,526 | 510 | 3,036 |
| Exempt Owners & Free Use Permits | [b] | [b] | 28,044 |
| Total | | | 62,744 |
| Commercial Livestock Farm and Ranch Operators | | | 62,006 [c] |
| All livestock farm and ranch operators except abnormal operators | | | 100,076 [c] |

[a] Source: U. S. Dept. of Agriculture, Forest Service. 1965. Annual grazing statistical report, 1964. Mimeo--includes national grassland and land utilization project permits.
U. S. Dept. of Interior, Bureau of Land Management. 1965. Public land statistics, 1965. U. S. Government Printing Office, Washington, D. C. p. 151.

[b] Not separated by kind of animal.

[c] Census of Agriculture, 1964. Includes commercial livestock farms and livestock ranches.

Estimates of the total number of livestock ranchers or operators in the 11 western states was obtained from the 1964 Census of Agriculture and was 62,006 in 1964. This value includes commercial livestock farms and livestock ranches. Commercial livestock farms are defined as farms that raise cattle (non-dairy), calves, hogs, sheep, goats, wool, and mohair that do not qualify as livestock ranches. Livestock ranches, in the 11 western states, are so classified if the sales of livestock, wool, and mohair represented 50 percent or more of the total value of farm products sold and if pastureland or grazing land amounted to 100 or more acres and was 10 or more times the acreage of cropland harvested.

Comparing this value with the number of permits issued indicated that a large proportion of the livestock ranchers in the western states have public land grazing permits. However, in 1965, 55 percent of the U. S. Forest Service permits issued were for less than 40 head of livestock and 78 percent were for less than 100 head. In 1960, 47 percent of the permits issued on Bureau of Land Management grazing district lands were for less than 50 head, and 66 percent were for less than 100 head. Many of these permittees would probably not qualify as commercial livestock farms or ranches. When all livestock farm and livestock ranch operators, including part-time and part-retirement operators, are included as a total estimate of the number of livestock ranchers, public land permits decline in importance to the total ranching community.

These data point out the difficulty in attempting to make a valid comparison between the number of livestock ranchers having permits on the public lands and the number of non-permitted ranchers. Many permit holders are not primarily in the livestock business, but may use livestock to supplement other types of farm income. On this basis, the permit is of economic importance to them. In addition, there are some permit holders who derive essentially all their income from non-ranch or farm work and for these the permit is of only slight importance as a source of income.

## PUBLIC LAND GRAZING CHARACTERISTICS

### Public land grazing by kind of animal

Common use of rangeland by both cattle and sheep was more prevalent in former years than it is today. It was this competition for forage on the public lands that gave rise to the bloody range wars of the past. Although there is still common use on these rangelands, the tendency is to segregate the two kinds of animals. Estimates by the U. S. Forest Service and the Bureau of Land Management show that in 1966 about 78 percent of the land was used by cattle and horses, and 22 percent by sheep and goats. The relative amounts used by the two kinds of animals was about the same for the two agencies (Table 19).

Table 19. Percent of grazing land administered by the U. S. Forest Service and the Bureau of Land Management grazed by cattle and horses, and sheep and goats, 1966.

| | BLM | | USFS | | TOTAL | |
|---|---|---|---|---|---|---|
| | C & H | S & G | C & H | S & G | C & H | S & G |
| 11 Western States | 77 | 23 | 78 | 22 | 77 | 23 |
| 17 Western States | 77 | 23 | 79 | 21 | 78 | 22 |
| 48 States | 77 | 23 | 80 | 20 | 78 | 22 |

Sheep populations in the western United States have been declining in recent years with a consequent shift to a greater use of the public lands by cattle. 99/

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99/ The federal agencies designate two kinds of domestic animal permits, i.e., cattle and horses, and sheep and goats. The principal kinds of animals grazing the public lands, however, are cattle and/or sheep. Where cattle or sheep is used in this chapter, with reference to permits on public lands, it is to be interpreted as referring to the combined designation of cattle and horses, and sheep and goats.

The acreage that is grazed by cattle is four to five times as great as that grazed by sheep (Table 20). This ratio is about the same for the 11 western states as for all states. Sheep grazing is more important in those states (Idaho, Wyoming, Colorado and Utah) that have quantities of semi-desert (sagebrush-grass and salt-desert shrub) rangeland balanced with higher mountain summer range types. Sheep grazing on public land is of minor importance in Arizona, Washington, Oregon and the 6 plains states.

## Public land grazing by season of use

The public lands of the western states are grazed by livestock at different times of the year in various locations. The high mountains of the west are principally summer range areas. Snow prevents their use in the winter in all but the most southern sections. Lack of, or limited, plant growth in the spring largely prevents use of these areas during this season. The mountain areas are found largely within the national forests and, consequently, over 75 percent of the area that is administered by the U. S. Forest Service is grazed during the summer period (Table 21). Yearlong and winter use of national forest land in the 11 western states occurs primarily in Arizona and New Mexico. The southeastern states of Alabama, Florida, Louisiana, and Mississippi are also predominantly yearlong grazing areas. Yearlong grazing occurs on national grasslands in Colorado, North Dakota, New Mexico and Texas.

Lands administered by the Bureau of Land Management are primarily the lower elevation lands of the west. In general, these were the least productive of the public lands and constituted, in 1934, the residue remaining after the better lands had been reserved, homesteaded or granted to states, railroads, etc., In the intermountain region, these lands consist, for the most part, of sagebrush grass, salt-desert shrub and pinyon-

Table 20. Land allocated for grazing by the U. S. Forest Service and the Bureau of Land Management, by kind of animal, 1966. a/

(1000 Acres)

| | Cattle and Horses | | | Sheep and Goats | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | USFS | BLM | Total | USFS | BLM | Total | USFS | BLM | Total |
| Arizona | 10,606.0 | 12,243.0 | 22,849.0 | 732.0 | 222.0 | 954.0 | 11,338.0 | 12,465.0 | 23,803.0 |
| California | 10,629.2 | 7,155.0 | 17,784.2 | 1,334.4 | 1,257.0 | 2,591.4 | 11,963.6 | 8,412.0 | 20,375.6 |
| Colorado | 8,224.2 | 5,383.0 | 13,607.2 | 4,176.7 | 2,375.0 | 6,551.7 | 12,400.9 | 7,758.0 | 20,158.9 |
| Idaho | 6,913.2 | 8,009.0 | 14,922.2 | 4,909.4 | 3,581.0 | 8,490.4 | 11,822.6 | 11,590.0 | 23,412.6 |
| Montana | 6,790.5 | 6,664.6 | 13,455.1 | 882.1 | 1,124.0 | 2,006.1 | 7,672.6 | 7,788.6 | 15,461.2 |
| Nevada | 3,924.7 | 35,965.0 | 39,889.7 | 938.8 | 7,236.0 | 8,174.8 | 4,863.5 | 43,201.0 | 48,064.5 |
| New Mexico | 7,891.5 | 11,472.0 | 19,363.5 | 460.1 | 2,050.0 | 2,510.1 | 8,351.6 | 13,522.0 | 21,873.6 |
| Oregon | 7,638.6 | 13,189.8 | 20,828.4 | 2,217.0 | 670.0 | 2,887.0 | 9,855.6 | 13,859.8 | 23,715.4 |
| Utah | 4,870.6 | 12,241.0 | 17,111.6 | 2,252.1 | 8,865.0 | 11,117.1 | 7,122.7 | 21,106.0 | 28,228.7 |
| Washington | 3,635.6 | 216.0 | 3,851.6 | 799.2 | 7.0 | 806.2 | 4,434.8 | 223.0 | 4,657.8 |
| Wyoming | 4,287.8 | 8,706.0 | 12,993.8 | 2,542.0 | 8,580.0 | 11,122.0 | 6,829.8 | 17,286.0 | 24,115.8 |
| 11 Western States | 75,411.9 | 121,244.4 | 196,656.3 | 21,243.8 | 35,967.0 | 57,210.8 | 96,655.7 | 157,211.4 | 253,867.1 |
| Kansas | 106.7 | 0.0 | 106.7 | 0.0 | 0.0 | 0.0 | 106.7 | 0.0 | 106.7 |
| Nebraska | 327.5 | 0.0 | 327.5 | 2.9 | 0.0 | 2.9 | 330.4 | 0.0 | 330.4 |
| North Dakota | 1,102.8 | 42.0 | 1,144.8 | 1.5 | 12.0 | 13.5 | 1,104.3 | 54.0 | 1,158.3 |
| Oklahoma | 245.7 | 10.0 | 255.7 | 0.0 | 0.0 | 0.0 | 245.7 | 10.0 | 255.7 |
| South Dakota | 1,867.1 | 26.0 | 1,893.1 | 75.6 | 2.0 | 77.6 | 1,942.7 | 28.0 | 1,970.7 |
| Texas | 705.1 | 0.0 | 705.1 | 0.0 | 0.0 | 0.0 | 705.1 | 0.0 | 705.1 |
| 17 Western States | 79,766.8 | 121,322.4 | 201,089.2 | 21,323.8 | 35,981.0 | 57,304.8 | 101,090.6 | 157,303.4 | 258,394.0 |
| Other States | 4,347.3 | 0.0 | 4,347.3 | 1.4 | 0.0 | 1.4 | 4,348.7 | 0.0 | 4,348.7 |
| 48 States | 84,114.1 | 121,322.4 | 205,436.5 | 21,325.2 | 35,981.0 | 57,306.2 | 105,439.3 | 157,303.4 | 262,742.7 |

a/ Source: Data supplied to the University of Idaho by the Public Land Law Review Commission.

Table 21. Percent of land allocated for grazing by the U. S. Forest Service that is grazed in the various seasons of the year, 1966. [a]

(1000 Acres)

| | All Animals | | | | | |
|---|---|---|---|---|---|---|
| | Spring Fall | Spring Summer | Summer | Winter | Yearlong | Total [b] |
| Arizona | 5.2 | 1.1 | 27.1 | 18.5 | 48.2 | 100.1 |
| California | 3.7 | 17.0 | 74.3 | 0.9 | 4.1 | 100.0 |
| Colorado | 2.3 | [c] | 96.3 | 0.4 | 1.0 | 100.0 |
| Idaho | 2.4 | 3.7 | 92.1 | 1.5 | 0.3 | 100.0 |
| Montana | 0.7 | 0.8 | 98.1 | 0.3 | 0.1 | 100.0 |
| Nevada | 3.3 | 1.0 | 88.0 | 6.5 | 1.1 | 99.9 |
| New Mexico | 5.7 | 6.7 | 31.9 | 6.8 | 49.0 | 100.1 |
| Oregon | 2.0 | 3.9 | 84.8 | 2.4 | 6.9 | 100.0 |
| Utah | 0.3 | 2.1 | 97.0 | 0.5 | - | 99.9 |
| Washington | - | 2.4 | 89.9 | - | 7.7 | 100.0 |
| Wyoming | 0.5 | 0.7 | 96.7 | 2.2 | - | 100.1 |
| 11 Western States | 2.6 | 4.1 | 77.6 | 3.9 | 11.7 | 99.9 |
| Other States | 2.6 | 24.5 | 40.4 | 1.8 | 30.6 | 99.9 |
| 48 States | 2.6 | 5.8 | 74.5 | 3.7 | 13.3 | 99.9 |

[a] Source: Data supplied to the University of Idaho by the Public Land Law Review Commission.

[b] Totals may be slightly off due to rounding.

[c] Less than .05 percent.

juniper types of vegetation. The salt-desert shrub and the drier portions of the sagebrush-grass types are largely usable in the winter because of the nature of the vegetation (predominance of shrubby species) and often a lack of water except in the form of snow. These areas are best suited for winter grazing by sheep; however, cattle use a substantial portion of these lands. About 23 percent of the BLM administered lands are used in the winter (Table 22). Nevada, Utah, Wyoming and Colorado are states in which these range types are abundant.

The better sagebrush-grass types, found on the deeper soils and under greater annual precipitation than the winter range types, are commonly used as spring and fall ranges in the intermountain states of Idaho, Wyoming, Colorado, Utah and Nevada. Summer use of this type, however, is not uncommon. Most of the public land with sagebrush-grass vegetation is regulated by the Bureau of Land Management and about 24 percent of all Bureau of Land Management land grazed by domestic livestock is used during the spring-fall period. An additional 18 percent is grazed spring and summer.

The yearlong use of the Bureau of Land Management administered lands is largely concentrated in the desert grassland, chaparral, and lower forest zones of the southwest (Arizona and New Mexico). Some yearlong grazing occurs in the southern portions of Utah, Colorado, and Nevada, and the western parts of Oregon and Washington.

About 70 percent of the land grazed by cattle, and 93 percent of the land grazed by sheep on national forests is used during the summer months (Table 23). Forty-three percent of area administered by the Bureau of Land Management for sheep grazing is used in the winter period (Table 24). Cattle use is more evenly spread through the seasons on land administered by the Bureau of Land Management. Summer use, however, is least common and less than 10 percent of the cattle range is grazed in this season.

Table 22. Percent of land allocated for grazing by the Bureau of Land Management that is grazed in the various seasons of the year, 1966. a/

(1000 Acres)

| | All Animals | | | | | |
|---|---|---|---|---|---|---|
| | Spring Fall | Spring Summer | Summer | Winter | Yearlong | Total b/ |
| Arizona | 16.8 | - | 2.2 | 19.5 | 61.5 | 100.0 |
| California | 17.1 | 30.7 | 6.3 | 5.1 | 40.8 | 100.0 |
| Colorado | 35.4 | 18.2 | 14.6 | 28.7 | 3.1 | 100.0 |
| Idaho | 53.3 | 33.2 | 7.7 | 5.3 | 0.5 | 100.0 |
| Montana | 34.5 | 30.5 | 12.7 | 6.7 | 15.7 | 100.1 |
| Nevada | 14.2 | 16.2 | 8.3 | 26.3 | 35.0 | 100.0 |
| New Mexico | 3.9 | 1.5 | - | 4.5 | 90.2 | 100.1 |
| Oregon | 31.4 | 47.4 | 13.3 | 7.9 | c/ | 100.0 |
| Utah | 19.4 | 7.7 | 14.4 | 55.8 | 2.7 | 100.0 |
| Washington | 27.8 | 34.1 | 13.9 | 10.8 | 13.5 | 100.1 |
| Wyoming | 40.3 | 16.8 | 11.4 | 27.0 | 4.4 | 99.9 |
| 11 Western States | 23.7 | 18.2 | 9.1 | 22.7 | 26.3 | 100.0 |
| Other States | 15.2 | 30.4 | 3.3 | 4.3 | 46.7 | 99.9 |
| 48 States | 23.7 | 18.2 | 9.1 | 22.7 | 26.3 | 100.0 |

a/ Source: Data supplied to the University of Idaho by the Public Land Law Review Commission.

b/ Totals may be slightly off due to rounding.

c/ Less than .05 percent.

Table 23. Percent of land allocated for grazing by the U. S. Forest Service that is grazed by kind of animal and season of use, 1966. a/

(1000 Acres)

| | Cattle and Horses | | | | | |
|---|---|---|---|---|---|---|
| | Spring Fall | Spring Summer | Summer | Winter | Yearlong | Total b/ |
| Arizona | 3.7 | 1.1 | 23.9 | 19.8 | 51.5 | 100.0 |
| California | 3.0 | 18.4 | 72.9 | 1.0 | 4.6 | 99.9 |
| Colorado | 3.0 | 0.1 | 94.8 | 0.7 | 1.5 | 100.1 |
| Idaho | 3.5 | 4.2 | 91.6 | 0.7 | - | 100.0 |
| Montana | 0.7 | 1.0 | 98.0 | 0.2 | 0.1 | 100.0 |
| Nevada | 2.8 | 0.9 | 87.3 | 7.6 | 1.4 | 100.0 |
| New Mexico | 5.2 | 7.1 | 30.4 | 6.3 | 51.1 | 100.1 |
| Oregon | 2.2 | 3.9 | 83.8 | 1.2 | 8.9 | 100.0 |
| Utah | 0.3 | 2.1 | 97.1 | 0.6 | - | 100.1 |
| Washington | - | 1.7 | 88.9 | - | 9.4 | 100.0 |
| Wyoming | - | 1.0 | 97.1 | 2.0 | - | 100.1 |
| 11 Western States | 2.6 | 4.7 | 73.4 | 4.4 | 14.9 | 100.0 |
| Other States | 2.6 | 24.7 | 40.0 | 1.8 | 30.9 | 100.0 |
| 48 States | 2.6 | 6.8 | 69.9 | 4.1 | 16.6 | 100.0 |

Table 23. U. S. Forest Service Continued

(1000 Acres)

| | Sheep and Goats | | | | | |
|---|---|---|---|---|---|---|
| | Spring Fall | Spring Summer | Summer | Winter | Yearlong | Total [b] |
| Arizona | 26.2 | - | 73.8 | - | - | 100.0 |
| California | 9.1 | 5.3 | 85.6 | - | - | 100.0 |
| Colorado | 0.9 | - | 99.1 | - | - | 100.0 |
| Idaho | 0.8 | 3.1 | 92.8 | 2.7 | 0.7 | 100.1 |
| Montana | 0.3 | - | 98.4 | 1.2 | - | 99.9 |
| Nevada | 5.4 | 1.6 | 90.9 | 2.0 | - | 99.9 |
| New Mexico | 13.9 | - | 58.0 | 15.4 | 12.6 | 99.9 |
| Oregon | 1.5 | 3.5 | 88.6 | 6.4 | - | 100.0 |
| Utah | 0.4 | 2.2 | 96.9 | 0.4 | - | 99.9 |
| Washington | - | 5.8 | 94.2 | - | - | 100.0 |
| Wyoming | 1.3 | 0.2 | 96.0 | 2.4 | - | 99.9 |
| 11 Western States | 2.7 | 1.9 | 92.8 | 2.1 | 0.4 | 99.9 |
| Other States | - | 11.5 | 83.9 | 1.1 | 3.4 | 99.9 |
| 48 States | 2.7 | 2.0 | 92.8 | 2.1 | 0.4 | 100.0 |

[a] Source: Data supplied to the University of Idaho by the Public Land Law Review Commission.

[b] Totals may be slightly off due to rounding.

Table 24. Percent of land allocated for grazing by the Bureau of Land Management that is grazed by kind of animal and season of use, 1966. a/

(1000 Acres)

| | Cattle and Horses | | | | | |
|---|---|---|---|---|---|---|
| | Spring Fall | Spring Summer | Summer | Winter | Yearlong | Total b/ |
| Arizona | 16.3 | - | 2.2 | 18.8 | 62.6 | 99.9 |
| California | 16.1 | 26.9 | 4.9 | 4.1 | 47.9 | 99.9 |
| Colorado | 35.1 | 24.2 | 15.8 | 21.3 | 3.5 | 99.9 |
| Idaho | 46.9 | 42.3 | 8.8 | 1.2 | 0.8 | 100.0 |
| Montana | 36.6 | 31.7 | 13.2 | 4.3 | 14.1 | 99.9 |
| Nevada | 13.7 | 16.7 | 6.5 | 22.0 | 41.1 | 100.0 |
| New Mexico | 3.1 | 1.2 | - | 3.6 | 92.2 | 100.1 |
| Oregon | 28.8 | 49.6 | 13.9 | 7.7 | c/ | 100.0 |
| Utah | 20.9 | 11.8 | 23.7 | 39.0 | 4.6 | 100.0 |
| Washington | 25.5 | 35.2 | 14.4 | 11.1 | 13.9 | 100.1 |
| Wyoming | 38.6 | 20.0 | 14.8 | 22.3 | 4.3 | 100.0 |
| 11 Western States | 21.7 | 20.4 | 9.5 | 16.7 | 31.8 | 100.1 |
| Other States | 12.8 | 25.6 | 3.8 | 5.1 | 52.6 | 99.9 |
| 48 States | 21.7 | 20.4 | 9.5 | 16.6 | 31.9 | 100.1 |

Table 24. Bureau of Land Management Continued

(1000 Acres)

| | Sheep and Goats | | | | | |
|---|---|---|---|---|---|---|
| | Spring Fall | Spring Summer | Summer | Winter | Yearlong | Total [b] |
| Arizona | 44.4 | - | - | 55.6 | - | 100.0 |
| California | 22.6 | 52.3 | 13.8 | 11.0 | 0.4 | 100.1 |
| Colorado | 35.9 | 4.5 | 11.8 | 45.7 | 2.1 | 100.0 |
| Idaho | 67.6 | 12.8 | 5.2 | 14.4 | - | 100.0 |
| Montana | 21.8 | 23.3 | 9.5 | 20.6 | 24.8 | 100.0 |
| Nevada | 16.9 | 13.7 | 17.1 | 47.9 | 4.4 | 100.0 |
| New Mexico | 8.1 | 3.3 | - | 9.4 | 79.2 | 100.0 |
| Oregon | 82.4 | 3.9 | 2.5 | 11.2 | - | 100.0 |
| Utah | 17.3 | 2.2 | 1.5 | 79.0 | - | 100.0 |
| Washington | 100.0 | - | - | - | - | 100.0 |
| Wyoming | 42.1 | 13.6 | 7.9 | 31.9 | 4.5 | 100.0 |
| 11 Western States | 30.6 | 10.9 | 7.8 | 43.3 | 7.4 | 100.0 |
| Other States | 28.6 | 57.1 | - | - | 14.3 | 100.0 |
| 48 States | 30.7 | 10.9 | 7.8 | 43.2 | 7.4 | 100.0 |

[a] Source: Data supplied to the University of Idaho by the Public Land Law Review Commission.

[b] Totals may be slightly off due to rounding.

[c] Less than .05 percent.

Public land grazing by grazing capacity classes

Grazing capacity of the land varies because of a number of factors. The number of acres required to support an animal unit for a month of grazing (AUM) may be high or low because of inherent characteristics of the land. Deep, well developed soils with ample precipitation and suitable temperatures are capable of producing forage in quantities that will supply animal needs with the minimum of land area. Limited precipitation, poor soil development, steep topography and poor range condition increase the land area required to supply the needs of grazing animals. Even the most productive range types, however, are needed in large quantities for range livestock ranches. A range livestock operation of 200 animal units that depended on rangeland for 8 months of the year would require access to 8,000 acres of 5 acre per AUM, or 16,000 acres of 10 acre per AUM rangeland to operate.

Meadows, open parks, and gentle slopes of the mountain regions are often very productive of livestock forage. Fewer than 5 acres and often less than 1 acre may be required to support an AUM under such circumstances. The semi-desert ranges, consisting of sagebrush grass and salt-desert types, are generally less productive and require 10 to 15 acres or more of land to support an AUM.

Increased brush cover and decreased amounts of perennial herbaceous species lower the productivity of many rangelands for livestock production. The arid southwestern desert-shrub communities are inherently low in the production of livestock forage except when precipitation and other conditions are suitable for the growth of annual plants. Range in poor condition requires many more acres to supply animal needs than the same range in good or excellent condition.

The Forest Service administers proportionately more land with greater grazing capacities than the Bureau of Land Management (Table 25). Nearly 60 percent of the land classified as suitable for grazing by the Forest Service requires 10 acres or less to support an animal unit month. Only 6 percent of land administered by the Bureau of Land Management will carry an animal unit month on 5 acres or less, while 25 percent of the land has a grazing capacity of 5 to 10 acres per animal unit month.

Most of the national grassland areas administered by the U. S. Forest Service, and land utilization project areas administered by the Bureau of Land Management, have greater carrying capacities (less than 10 acres/AUM) than the average of other public lands. About 10 percent of the Forest Service area and 26 percent of the BLM area requires 25 acres or more to support an animal unit month. Experience and experiments show that the net economic productivity of grazing lands in the west falls to zero at some point near a physical productivity of 24 animal units per section, or 27 acres per AUM. 100/

The most productive grazing lands administered by the Bureau of Land Management and the U. S. Forest Service, based on the percentage of land in the lowest grazing capacity class, is found in Montana. The least productive are the lands in Nevada and Oregon. The Bureau of Land Management administers a large part of the southern desert-shrub type in Arizona and this area has a naturally low carrying capacity.

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100/ Kelso, M. M. 1947. Current issues in federal land management in the western United States. Jour. Farm Economics 29( ):1295-1318.

Table 25. Percent of land administered for grazing by the U. S. Forest Service and Bureau of Land Management that is in various grazing capacity classes (Acres/AUM), 1966. a/

| State | U. S. Forest Service | | | | | | Bureau of Land Management | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 or Less | 5.1-10 | 10.1-15 | 15.1-25 | Over 25 | Total | 5 or Less | 5.1-10 | 10.1-15 | 15.1-25 | Over 25 | Total |
| Arizona | 34 | 42 | 15 | 7 | 2 | 100 | 0 | 10 | 22 | 19 | 49 | 100 |
| California | 17 | 26 | 21 | 22 | 14 | 100 | 0 | 22 | 20 | 27 | 31 | 100 |
| Colorado | 17 | 36 | 30 | 12 | 5 | 100 | 6 | 34 | 31 | 15 | 14 | 100 |
| Idaho | 29 | 36 | 20 | 9 | 6 | 100 | 9 | 29 | 29 | 15 | 18 | 100 |
| Montana | 48 | 28 | 10 | 4 | 10 | 100 | 27 | 46 | 20 | 4 | 3 | 100 |
| Nevada | 18 | 15 | 12 | 27 | 28 | 100 | 3 | 10 | 19 | 26 | 42 | 100 |
| New Mexico | 26 | 43 | 18 | 8 | 5 | 100 | 14 | 75 | 7 | 3 | 1 | 100 |
| Oregon | 18 | 23 | 15 | 17 | 27 | 100 | 4 | 10 | 28 | 35 | 23 | 100 |
| Utah | 22 | 28 | 21 | 16 | 13 | 100 | 3 | 14 | 26 | 26 | 31 | 100 |
| Washington | 16 | 39 | 15 | 21 | 9 | 100 | 15 | 53 | 14 | 9 | 9 | 100 |
| Wyoming | 32 | 45 | 13 | 6 | 4 | 100 | 9 | 42 | 30 | 16 | 3 | 100 |
| 11 Western States | 24 | 35 | 18 | 12 | 11 | 100 | 6 | 25 | 22 | 21 | 26 | 100 |
| Other States | 58 | 27 | 6 | 3 | 6 | 100 | 61 | 23 | 9 | 2 | 5 | 100 |
| 48 States | 29 | 34 | 16 | 11 | 10 | 100 | 6 | 25 | 22 | 21 | 26 | 100 |

a/ Percentages are based on the acreage classified suitable for grazing by the U. S. Forest Service and does not include unsuitable range even though some is grazed.

Public land grazing by range condition class

Range condition classification is a rating of the present state of a range site relative to its potential. The potential may be defined in terms of forage production or climax vegetation. Different systems and detail of analyses are used by the different federal agencies. These do not necessarily lead to different results but do indicate that this classification process is largely a subjective estimate of the present state of the range. The range condition rating is useful in planning range livestock management programs and serves as an indication of areas that should receive priority attention in land management programs.

Ranges in excellent and good condition are most productive relative to the potential for the area and generally need only judicious management. A considerable increase in range livestock production could be obtained by improvement of poor or fair condition rangeland. This may be by management alone, through range improvement practices, or a combination of the two.

Although there is some relationship between grazing capacity class and range condition, it cannot be inferred that inherently low producing rangeland is always in poor condition. Much of the western rangeland has a naturally low productive potential because of climate, soils and topography.

Range condition classification by the Forest Service and Bureau of Land Management was not widely practiced until after World War II. Much of the public rangeland was examined and classified during the 1950's and early 1960's. About 80 percent of the rangeland under jurisdiction of the Bureau of Land Management and the Forest Service was rated in fair and poor condition by 1966 (Table 26). Less than 3 percent was in excellent condition and 16-18 percent was in good condition.

Table 26. Percentage of land administered for grazing by the U. S. Forest Service and the Bureau of Land Management in four range condition classes, 1966. a/

| State | USFS b/ | | | | BLM | | | |
|---|---|---|---|---|---|---|---|---|
| | Excellent | Good | Fair | Poor | Excellent | Good | Fair | Poor |
| Arizona | 0.0 | 8.0 | 55.3 | 36.7 | 2.7 | 20.7 | 51.9 | 24.7 |
| California | 1.6 | 4.3 | 26.2 | 67.9 | 0.5 | 15.0 | 56.3 | 28.1 |
| Colorado | 0.4 | 11.5 | 40.0 | 48.1 | 2.4 | 27.7 | 40.4 | 29.6 |
| Idaho | 17.5 | 20.6 | 41.7 | 20.2 | 2.7 | 20.7 | 51.9 | 24.7 |
| Montana | 1.9 | 50.5 | 37.9 | 9.7 | 3.0 | 46.0 | 43.5 | 7.4 |
| Nevada | 2.2 | 21.7 | 45.9 | 30.1 | 2.0 | 14.6 | 56.6 | 26.8 |
| New Mexico | 0.0 | 10.0 | 61.4 | 28.6 | 3.4 | 21.8 | 57.6 | 17.3 |
| Oregon | 1.6 | 16.3 | 30.5 | 51.5 | 3.6 | 12.6 | 41.1 | 42.6 |
| Utah | 5.7 | 20.8 | 43.6 | 29.9 | 1.0 | 3.9 | 49.2 | 45.9 |
| Washington | 7.3 | 26.4 | 43.2 | 23.1 | 4.6 | 22.4 | 41.0 | 31.9 |
| Wyoming | 5.4 | 14.0 | 52.6 | 28.0 | 2.0 | 17.4 | 51.0 | 29.5 |
| 11 Western States | 2.9 | 15.7 | 44.1 | 37.2 | 2.2 | 16.7 | 51.6 | 29.5 |
| Other States | 0.4 | 30.4 | 41.8 | 27.2 | 0.5 | 12.8 | 59.7 | 27.0 |
| 48 States | 2.5 | 17.9 | 43.7 | 35.7 | 2.0 | 16.4 | 52.2 | 29.3 |

a/ Source: Data supplied to the University of Idaho by the Public Land Law Review Commission.

b/ Percentages are based only on land classified as suitable for grazing.

A greater percentage of excellent condition U. S. Forest Service administered rangeland is found in Idaho and Washington than in any of the other western states. Arizona, New Mexico and California have the greatest proportions of fair and poor condition U. S. Forest Service land. The amount of Bureau of Land Management administered rangeland in excellent condition is relatively uniform among the states. Montana has the largest and Utah the least percentage of good condition rangeland administered by this agency. The greatest percentages of poor condition range are in Utah and Oregon.

In view of the large amount of poor and fair condition rangeland administered by the U. S. Forest Service and the Bureau of Land Management, some have charged that grazing land management for 60 years by the U. S. Forest Service and 32 years by the Bureau of Land Management has failed to attain the goals planned. The data presented have limited validity, however, in supporting such a conclusion. Changes in range condition are often slow to occur, and whether or not the desired goals of management are being attained can be judged only by comparisons of changes in range condition over time. Such data are not readily available for U. S. Forest Service administered land, but data of this type were presented at a Senate Hearing in 1963 [101] for lands administered by the Bureau of Land Management. The federal lands encompassed by the Taylor Grazing Act of 1934 had been severely grazed until passage of the Act and the subsequent creation of an agency to administer these lands. Data presented at the Hearing in 1963 are compared with data for 1966 (Table 27 ).

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101/ Senate Hearings before the Subcommittee on Public Lands of the Committee on Interior and Insular Affairs, 1963. United States Senate, Eighty-Eighth Congress. First Session on Review of the Taylor Grazing Act, Part 2. February 7 and 8. 988 pp. p. 771.

These data show small increases in the percentage of excellent and good condition rangeland and a consequent decrease in the fair and poor condition classes. The analysis in 1961 showed that 20 percent of the Bureau of Land Management administered rangeland was improving, 63 percent had no detectable change occurring and 17 percent was declining in condition.

Table 27. Percentage of rangeland administered by the Bureau of Land Management in four condition classes in 1961 and 1966.

| Condition Class | 1961 [a] | 1966 | Increase or Decrease Over 1961 |
|---|---|---|---|
| | (percent) | | |
| Excellent | 1.6 | 2.2 | 0.6 |
| Good | 15.0 | 16.7 | 1.7 |
| Fair | 53.1 | 51.6 | -1.5 |
| Poor (or Bad) [b] | 30.3 | 29.5 | -0.8 |

[a] Source: Senate Hearing before the Subcommittee on Public Lands of the Committee on Interior and Insular Affairs. United States Senate, Eighty-Eighth Congress. First Session on Review of the Taylor Grazing Act, Part 2. February 7 and 8, 1963. p. 771.

[b] A fifth category, bad, was used in the classification of range in 1961.

## Acreage of public grazing land needing and susceptible to range improvement practices

Range improvement practices refer to the artificial seeding, fencing, fertilizing and control of undesirable plants on rangeland. Also included as range improvement practices are the construction of water spreaders, stock water developments and flood control devices.

The Forest Service indicated that 86 percent of the acreage suitable for grazing was in need of some type of range improvement practice (Table 28 ). Seventy percent of the BLM land was judged to need improvement practices.

Ninety percent or more of the public land administered by the U. S. Forest Service in the states of Oregon, New Mexico and Washington and Bureau of Land Management land in New Mexico would benefit from some form of range improvement practice. Less than 50 percent of the Bureau of Land Management land in Arizona, Oregon and Montana requires range improvement practices. Slightly less than one-half of the total land administered by the Bureau of Land Management in Montana consists of land utilization project areas, and considerable investment in range improvements were made after these were purchased by the federal government. Large sums were invested in range seeding, water developments, fencing, sagebrush control and other forms of range improvement practices in the Vale Bureau of Land Management district of Oregon. The southern desert-shrub areas of Arizona, because of low inherent forage productivity, are generally not suitable for investments in range improvement practices.

The Bureau of Land Management, since 1950, has been investing large sums in range seeding in the intermountain states, and this partly explains the lower

Table 28. Acreage of land grazed, acreage suitable for grazing, and the percent of the suitable acreage needing and susceptible to range improvement practices by state for the public land administered by the U. S. Forest Service and the Bureau of Land Management, 1966. a/

| State | U. S. Forest Service | | | Bureau of Land Management | | |
|---|---|---|---|---|---|---|
| | Area Grazed | Acreage Suitable for Grazing | Percent Needing Range Improvement Practices | Area Grazed | Acreage Suitable for Grazing | Percent Needing Range Improvement Practices |
| | (1000 Acres) | | | (1000 Acres) | | |
| Arizona | 11,338 | 7,458 | 95 | 12,500 | 12,500 | 39 |
| California | 11,963 | 3,459 | 80 | 8,410 | 8,830 | 77 |
| Colorado | 12,401 | 5,370 | 80 | 7,800 | 7,780 | 78 |
| Idaho | 11,823 | 4,124 | 68 | 11,600 | 12,100 | 71 |
| Montana | 7,673 | 2,735 | 79 | 7,790 | 7,950 | 49 |
| Nevada | 4,864 | 1,868 | 81 | 43,200 | 44,400 | 82 |
| New Mexico | 8,352 | 4,891 | 92 | 13,500 | 13,600 | 90 |
| Oregon | 9,856 | 6,056 | 94 | 13,900 | 13,900 | 33 |
| Utah | 7,123 | 3,037 | 83 | 21,100 | 21,800 | 64 |
| Washington | 4,435 | 1,160 | 90 | 233 | 285 | 62 |
| Wyoming | 6,830 | 2,724 | 75 | 17,300 | 17,300 | 85 |
| 11 Western States | 96,656 | 42,882 | 85 | 157,211 | 160,408 | 70 |
| Other States | 8,784 | 6,453 | 95 | 92 | 364 | 20 |
| 48 States | 105,439 | 49,335 | 86 | 157,303 | 160,772 | 70 |

a/ Source: Data supplied to the University of Idaho by the Public Land Law Review Commission.

** Totals may not add due to rounding.

percentage of land needing range improvement practices than lands administered by the U. S. Forest Service. These seeded areas largely require only management to maintain productivity.

Specialized grazing programs are presently being implemented extensively on public lands and these are producing significant and surprising improvement in rangeland productivity.

## CONTRIBUTION OF THE PUBLIC LANDS TO THE FORAGE REQUIREMENTS OF LIVESTOCK ENTERPRISES

The public lands, particularly in the western states, supply range forage for a number of livestock enterprises during parts of most of the year. The mountain summer ranges of the U. S. Forest Service, for example, are often critical in the yearlong operation of a livestock ranch. The total forage supplied by mountain summer range may be only a relatively small part of the total forage and feed used by a livestock ranch, but it often determines the extent to which the forage produced on private and other public lands can be used. Public lands which supply spring and fall grazing complement the summer grazing areas and assist in making full and efficient use of all public and private forage lands. Some ranches in the southwestern states are dependent on the public lands for the yearlong grazing program of the ranch enterprises.

During the beginning development of the livestock industry in the western states, there was almost total dependence on the use of public lands for the industry. As settlement pressed westward, a small part of the yearly livestock forage was obtained from private rangelands and cultivated forage crops.

Increased transfer of public lands to private ownership through the various settlement acts and regulation of grazing on the forest reserves about the turn of the century increased the contribution of private lands to total livestock forage requirements. Federal land contributions were further reduced in 1934 when the unreserved and unappropriated public domain came under regulation after passage of the Taylor Grazing Act.

The number of animals grazing national forests in 1905 were reported to be 692 thousand cattle, horses and swine and 1.7 million sheep and goats. [102] Numbers of domestic livestock grazing national forests reached a peak in 1918 and have continually declined since that time. [103] After passage of the Taylor Grazing Act, permitted use of the public domain, covered by the act, was highest in 1944. [104]

Between 1947 and 1970, numbers of permitted animals on national forest system lands decreased by 36 percent in the 11 western states and 32 percent in the United States (Table 29 ). A large part of the reduction is due to the 48 percent decline in permitted number of sheep in the western states. A general increase in cattle number, however, has not offset the sharp decline in sheep numbers, even considering the exchange rate of 5 sheep per animal unit. Part of the increase in cattle numbers is due to the addition of the national grasslands and land utilization project areas to the national forest system.

The decline between 1947 and 1970 in total number of animals permitted on land administered by the Bureau of Land Management is much less than in the case of national forest system lands (Table 30 ). A 37 percent increase in cattle numbers in the 11 western states, however, was more than offset by the 33 percent decline in sheep numbers for a net decline of 16 percent. The Bureau of Land Management administers land that was left over after the homestead era, in which the better lands were selected for entry, and the setting aside of the national forests. The dominant use on much of this land is primarily grazing. Extensive improvement of these lands by investment in seeding, spraying, and water develop-

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102/ Clawson, Marion. 1967. The federal lands since 1956: recent trends in use and management. John Hopkins Press, Baltimore, Md. 113 pp. p. 58.

103/ Ibid. p. 58.

104/ Ibid. p. 67.

Table 29. Permitted number [a] of animals on U. S. Forest Service administered land in 1947 [b] and 1970. [c]

(1000 Head)

| Location | Cattle & Horses | | Sheep & Goats | | Total | | Percent Increase or (Decrease) 1947 to 1970 | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1947 | 1970 | 1947 | 1970 | 1947 | 1970 | Cattle & Horses | Sheep & Goats | Total |
| Arizona | 173 | 155 | 130 | 64 | 303 | 219 | (10) | (51) | (28) |
| California | 209 | 123 | 391 | 82 | 600 | 205 | (41) | (79) | (66) |
| Colorado | 200 | 206 | 725 | 404 | 925 | 610 | 3 | (44) | (34) |
| Idaho | 128 | 138 | 815 | 452 | 943 | 590 | 8 | (44) | (37) |
| Montana | 118 | 134 | 341 | 110 | 459 | 244 | 14 | (68) | (47) |
| Nevada | 68 | 62 | 209 | 105 | 277 | 167 | ( 9) | (50) | (40) |
| New Mexico | 104 | 105 | 140 | 46 | 244 | 151 | 1 | (67) | (38) |
| Oregon | 72 | 119 | 191 | 71 | 263 | 190 | 65 | (63) | (28) |
| Utah | 115 | 120 | 525 | 383 | 640 | 503 | 4 | (27) | (21) |
| Washington | 21 | 53 | 53 | 13 | 74 | 66 | 152 | (76) | (11) |
| Wyoming | 116 | 149 | 534 | 360 | 650 | 509 | 28 | (33) | (22) |
| 11 Western States | 1324 | 1364 | 4054 | 2090 | 5378 | 3454 | 3 | (48) | (36) |
| 17 Western States | 1371 | 1568 | 4072 | 2103 | 5443 | 3671 | 14 | (48) | (33) |
| Other States | 56 | 39 | -- | 2 | 56 | 41 | (30) | -- | (27) |
| 48 States | 1427 | 1607 | 4072 | 2105 | 5499 | 3712 | 13 | (48) | (32) |

[a] Includes permitted numbers under active and non-use.

[b] The national grassland areas were not administered by the U. S. Forest Service in 1947.

[c] Source: Data for 1947 were supplied to the University of Idaho by the Public Land Law Review Commission. Data for 1970 were obtained from: U. S. Dept. of Agriculture, Forest Service. 1971. Annual grazing statistical report, 1970. Processed. 102 pp.

Table 30. Permitted number [a] of animals on Bureau of Land Management administered land in 1947 and 1970. [b]

(1000 Head)

| Location | Cattle & Horses | | Sheep & Goats | | Total | | Percent Increase or (Decrease) 1947 to 1970 | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1947 | 1970 | 1947 | 1970 | 1947 | 1970 | Cattle & Horses | Sheep & Goats | Total |
| Arizona | 103 | 243 | 65 | 27 | 168 | 270 | 136 | (58) | 61 |
| California | 172 | 145 | 374 | 262 | 546 | 407 | (16) | (30) | (26) |
| Colorado | 185[c] | 338 | 718[c] | 701 | 903 | 1039 | 83 | ( 2) | 15 |
| Idaho | 323 | 368 | 1138 | 640 | 1461 | 1008 | 14 | (44) | (31) |
| Montana | 365 | 616 | 438 | 358 | 803 | 974 | 69 | (18) | 21 |
| Nevada | 340 | 422 | 813 | 472 | 1153 | 895 | 24 | (42) | (22) |
| New Mexico | 299 | 288 | 620 | 219 | 919 | 507 | ( 4) | (65) | (45) |
| Oregon | 250[c] | 296 | 204 | 57 | 454 | 353 | 18 | (72) | (22) |
| Utah | 218 | 205 | 1702 | 1077 | 1920 | 1282 | ( 6) | (37) | (33) |
| Washington | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Wyoming | 412 | 741 | 2370 | 1863 | 2782 | 2604 | (80) | (21) | ( 6) |
| 11 Western States | 2667 | 3662 | 8442 | 5677 | 11109 | 9339 | 37 | (33) | (16) |
| 17 Western States | 2669 | 3691 | 8448 | 5706 | 11117 | 9397 | 38 | (32) | (16) |
| Other States | -- | 3 | -- | -- | -- | -- | -- | -- | -- |
| 48 States | 2669 | 3694 | 8448 | 5706 | 11117 | 9397 | 38 | (32) | (16) |

[a] Includes permitted numbers under active and non-use.

[b] Source: Data for 1947 were supplied to the University of Idaho by the Public Land Law Review Commission. Data for 1970 were obtained from: U. S. Dept. of Interior, Bureau of Land Management. 1972. Public land statistics, 1971. U. S. Government Printing Office, Washington, D. C.

[c] Data supplied were found to be incorrect in comparison with data in: Bureau of Land Management. 1947. Report of the Director. Statistical Appendix p. 83. These data were substituted for those reported.

ments has prevented sharper declines in permitted numbers. These improvements along with specialized grazing programs, presently being used, are increasing the permitted numbers at many locations.

Adjustments in grazing pressure can be obtained by reducing numbers, length of grazing season, or both. The animal unit month of grazing (AUM) [105] is an index to forage consumption that combines number of animals and time.

The average length of the grazing season on all national forest lands was 5.36 months in 1923, 4.92 months in 1933, 4.64 months and 4.22 months in 1960. [106] Using the calculated numbers of animal units and animal unit months of grazing on national forest lands shown in Table 29 and Table 30 , the average grazing season in 1970 was 4.12 months. Although cattle numbers in the 11 western states increased 3 percent between 1947 and 1970 (Table 29), the animal unit months decreased 18 percent (Table 31) on U. S. Forest Service administered land. A greater decline between 1947 and 1970 in sheep animal unit months than numbers of animals permitted also occurred.

Animal unit months of sheep use on Bureau of Land Management land decreased more than sheep numbers, but the reverse occurred with cattle numbers between 1947 and 1970 (Table 32).

The decline in permitted numbers and animal unit months of sheep use on public lands between 1947 and 1970 has been accompanied by a general decline of stock sheep and lambs in the United States (Table 33). The introduction of synthetic fibers, high labor costs and imports of wool and lamb have all had a detrimental impact on the sheep business in the United States.

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105/ Defined as the amount of feed or forage required by an animal unit for one month. An animal unit is defined as a mature cow with calf or their equivalent. Five sheep with lambs are normally considered as the equivalent of a mature cow with calf or an animal unit.

106/ Roberts, N. Keith and B. Delworth Gardner. 1964. Livestock and the public lands. Utah Historical Quarterly 285-300. p. 290.

Table 31. Animal unit months of permitted use and non-use on U. S. Forest Service administered land by kind of animal in 1947 and 1970. a/

(1000 AUM's)

| Location | Cattle & Horses | | Sheep & Goats | | Total | | Percent Increase or (Decrease) 1947 to 1970 | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1947 | 1970 | 1947 | 1970 | 1947 | 1970 | Cattle & Horses | Sheep & Goats | Total |
| Arizona | 1636 | 1333 | 98 | 53 | 1734 | 1386 | (18) | (46) | (20) |
| California | 945 | 371 | 284 | 49 | 1229 | 420 | (61) | (83) | (66) |
| Colorado | 819 | 749 | 391 | 188 | 1210 | 937 | ( 8) | (52) | (23) |
| Idaho | 575 | 483 | 489 | 242 | 1064 | 725 | (16) | (50) | (32) |
| Montana | 522 | 496 | 149 | 43 | 671 | 539 | ( 5) | (71) | (20) |
| Nevada | 302 | 230 | 141 | 70 | 443 | 300 | (24) | (50) | (32) |
| New Mexico | 919 | 804 | 138 | 38 | 1057 | 842 | (12) | (72) | (20) |
| Oregon | 350 | 378 | 138 | 56 | 488 | 434 | 8 | (59) | (11) |
| Utah | 562 | 398 | 356 | 208 | 918 | 606 | (29) | (42) | (34) |
| Washington | 96 | 88 | 38 | 6 | 134 | 94 | ( 8) | (84) | (30) |
| Wyoming | 445 | 512 | 236 | 176 | 681 | 688 | 15 | (25) | 1 |
| 11 Western States | 7171 | 5842 | 2458 | 1129 | 9629 | 6971 | (18) | (54) | (28) |
| 17 Western States | 7410 | 6866 | 2471 | 1141 | 9881 | 8007 | ( 7) | (54) | (19) |
| Other States | 507 | 337 | b/ | 2 | 507 | 339 | (34) | -- | (33) |
| 48 States | 7917 | 7203 | 2471 | 1143 | 10388 | 8346 | ( 9) | (54) | (20) |

a/ Source: Data for 1947 were supplied to the University of Idaho by the Public Land Law Review Commission. Data for 1970 were obtained from: U. S. Dept. of Agriculture, Forest Service. 1971. Annual grazing statistical report, 1970. Processed. 102 pp.

b/ Less than 1,000 AUM's.

Table 32. Animal unit months of permitted use and non-use on Bureau of Land Management administered land by kind of animal in 1947 and 1970. [a]

(1000 AUM's)

| Location | Cattle & Horses | | Sheep & Goats | | Total | | Percent Increase or (Decrease) 1947 to 1970 | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1947 | 1970 | 1947 | 1970 | 1947 | 1970[c] | Cattle & Horses | Sheep & Goats | Total |
| Arizona | 606 | 705 | 62 | 17 | 668 | 993 | 16 | (73) | 49 |
| California | 718 | 223 | 205 | 45 | 923 | 434 | (69) | (78) | (53) |
| Colorado | 484[b] | 483 | 466[b] | 227 | 950 | 1371 | (d) | (51) | 44 |
| Idaho | 876 | 1035 | 695 | 387 | 1571 | 1478 | 18 | (44) | ( 6) |
| Montana | 1005 | 1127 | 232 | 120 | 1237 | 1452 | 12 | (48) | 17 |
| Nevada | 1633 | 2227 | 771 | 565 | 2404 | 2828 | 36 | (27) | 18 |
| New Mexico | 1620 | 1572 | 735 | 264 | 2355 | 2078 | ( 3) | (64) | 12 |
| Oregon | 982[b] | 954 | 110[b] | 15 | 1092 | 1112 | ( 3) | (86) | 2 |
| Utah | 1086 | 792 | 1549 | 680 | 2635 | 1751 | (27) | (56) | (34) |
| Washington | 1 | -- | -- | -- | 1 | -- | -- | -- | -- |
| Wyoming | 1045 | 884 | 1525 | 834 | 2570 | 2231 | (15) | (45) | 13 |
| 11 Western States | 10056 | 10002 | 6350 | 3154 | 16406 | 15728 | ( 1) | (50) | ( 4) |
| 17 Western States | 10082 | 10002[c] | 6376 | 3154[c] | 16458 | 15815 | ( 1) | (50) | ( 4) |
| Other States | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 48 States | 10082 | 10002 | 6376 | 3154 | 16458 | 15815 | ( 1) | (50) | ( 4) |

[a] Source: Data for 1947 were supplied to the University of Idaho by the Public Land Law Review Commission. Data for 1970 were obtained from: U. S. Dept. of Interior, Bureau of Land Management. 1972. Public land statistics, 1971. U. S. Government Printing Office, Washington, D. C.

[b] Data supplied were found to be incorrect in comparison with data in: Bureau of Land Management. 1947. Report of the Director. Statistical Appendix. p. 83. These data were substituted for those reported.

[c] AUM's on lands outside of grazing districts were not reported separately by kind of animal in 1970, but total estimates were made and are included in the total values.

[d] Less than 0.5 percent.

Table 33. Number of cattle, sheep and lambs by state. a/

(1000 Animals)

| Location | Cattle a/ | | | | Stock Sheep and Lambs | | | |
|---|---|---|---|---|---|---|---|---|
| | 1947 | 1950 | 1960 | 1970 | 1947 | 1950 | 1960 | 1970 |
| Arizona | 756 | 649 | 684 | 812 | 459 | 413 | 454 | 424 |
| California | 1459 | 1272 | 2063 | 2576 | 1907 | 1589 | 1712 | 1185 |
| Colorado | 1306 | 1226 | 1544 | 2374 | 1275 | 1237 | 1434 | 823 |
| Idaho | 508 | 482 | 778 | 1080 | 1097 | 990 | 1071 | 632 |
| Montana | 1376 | 1350 | 1744 | 2474 | 1971 | 1464 | 1767 | 1051 |
| Nevada | 427 | 433 | 426 | 512 | 477 | 440 | 335 | 213 |
| New Mexico | 936 | 952 | 950 | 1073 | 1445 | 1343 | 1127 | 791 |
| Oregon | 600 | 610 | 940 | 1155 | 758 | 671 | 863 | 449 |
| Utah | 343 | 360 | 444 | 576 | 1422 | 1269 | 1249 | 939 |
| Washington | 356 | 344 | 569 | 764 | 348 | 271 | 295 | 125 |
| Wyoming | 810 | 782 | 909 | 1182 | 2344 | 1841 | 2248 | 1784 |
| 11 Western States | 8877 | 8460 | 11048 | 14578 | 13503 | 11528 | 12555 | 8416 |
| % 11 Western States is of 48 States | 23.3 | 22.2 | 21.0 | 20.1 | 42.5 | 44.0 | 43.5 | 48.0 |
| 17 Western States | 23414 | 22385 | 30193 | 41944 | 23846 | 19715 | 21497 | 13882 |
| % 17 Western States is of 48 States | 61.5 | 58.8 | 57.4 | 57.7 | 75.0 | 75.3 | 74.5 | 79.0 |
| Other States except Alaska and Hawaii | 14653 | 15675 | 22390 | 30716 | 7959 | 6467 | 7352 | 3669 |
| 48 States | 38067 | 38060 | 52583 | 72660 | 31805 | 26182 | 28849 | 17551 |

a/ Source:

U. S. Dept. of Agriculture. Agriculture Marketing Service. Crop Reporting Board. 1956. Livestock and poultry inventory, January 1. 1940-54. Statistical Bulletin No. 177. 688 pp.

U. S. Dept. of Agriculture. Agriculture Marketing Service. Crop Reporting Board. 1961. Livestock and poultry inventory, January 1. 1955-60. Statistical Bulletin No. 278. pp. 14-15, 29-30.

U. S. Dept. of Agriculture. Statistical Reporting Service, Crop Reporting Board. 1970. Livestock and poultry inventory, January 1. 1968-70. LvGn 1 (70). p. 15.

U. S. Dept. of Agriculture. 1971. Agricultural statistics 1971. U. S. Government Printing Office, Washington, D. C. 639 pp. p. 308.

c/ The average of (1) other cattle on farms January 1 minus cattle on feed and (2) other cattle on farms December 31 minus calves ("other cattle" means other than k[illegible] for milk purposes)

In the United States as a whole, there were approximately 8.6 million less stock sheep in 1970 than in 1947, representing a 45 percent decline in numbers. In contrast, cattle numbers in 1970 have increased by 34.6 million or almost double (1.9 times) the number found in 1947. During this same period, total AUM's obtained from public land administered by the U. S. Forest Service and the Bureau of Land Management decreased only 10 percent in the 48 states and 13 percent in the 11 western states. The lower percentage of contribution to the total livestock AUM's by public lands in 1970 compared to 1947 largely results from increased numbers of animals in the United States, and only slightly by the decreased use on public lands.

The importance of federal rangeland to the production of livestock, livestock products and the economy of the western states and the nation is grossly underestimated by the comparison of AUM's derived from these lands to the total AUM's needed. This comparison is analogous to saying that the 3 to 5 percent of the total population engaged in farming are unimportant from the standpoint of food production.

Data are sketchy as to the total physical output from the western grazing grounds, but some estimates and comparisons have been attempted. Clawson, et al [107] indicated that western grazing lands normally produce at least 50 million and perhaps 80 million or more tons of hay-equivalent. On the basis that range forage was valued at the same price per ton as hay, in 1949 its gross value would have been $1.1 to $1.5 billion. All crops harvested in the United States in 1949 had a value of $16.3 billion, of which hay was $1.88 billion. These values would be quite different today, but the relationship would likely be the same.

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[107] Clawson, Held and Stoddard, 1960. Op. Cit. pp. 391-392.

Table 34. Total animal unit months of forage supplied in 1947 and 1970 and the portion obtained from land administered by the U. S. Forest Service and the Bureau of Land Management. a/

| Location | 1947 | | | 1970 | | |
|---|---|---|---|---|---|---|
| | Total AUM's | USFS & BLM AUM's | Percent Federal | Total AUM's | USFS & BLM AUM's | Percent Federal |
| Arizona | 10,174 | 2,402 | 24 | 10,762 | 2,379 | 22 |
| California | 22,085 | 2,152 | 10 | 33,756 | 854 | 2 |
| Colorado | 18,732 | 2,160 | 12 | 30,463 | 2,308 | 8 |
| Idaho | 8,728 | 2,635 | 30 | 14,477 | 2,203 | 15 |
| Montana | 21,242 | 1,908 | 9 | 32,210 | 1,991 | 6 |
| Nevada | 6,269 | 2,847 | 45 | 6,655 | 3,128 | 47 |
| New Mexico | 14,700 | 3,412 | 23 | 14,774 | 2,920 | 20 |
| Oregon | 9,019 | 1,580 | 18 | 14,938 | 1,546 | 10 |
| Utah | 7,529 | 3,553 | 47 | 9,166 | 2,357 | 26 |
| Washington | 5,107 | 135 | 3 | 9,468 | 94 | 1 |
| Wyoming | 15,346 | 3,251 | 21 | 18,466 | 2,919 | 16 |
| 11 Western States | 138,931 | 26,035 | 19 | 195,134 | 22,699 | 12 |
| 17 Western States | 338,198 | 26,339 | 8 | 536,645 | 23,822 | 4 |
| 48 States | 533,163 | 26,846 | 5 | 914,042 | 24,161 | 3 |

a/ Source: Calculated from data in Tables

Cow-calf and ewe-lamb livestock operations are the basic units for the production of beef and lamb. These operations are the source of the stocker and feeder animals that are used to convert forage and feed concentrates to marketable meat products. Livestock operations that use the public lands are predominantly cow-calf and/or ewe-lamb enterprises. As such, they perform the important first phase in the production of meat.

> "For the most part, ranchers who use federal lands run cow-calf operations and supply calves to the feedyards of the Midwest and Pacific Coast. About 22 percent of the stocker-feeder cattle in the entire United States were produced in the 11 western states." 108/

Based on estimates of the energy produced per acre, the amount of public range and the energy required to produce one pound of beef, Cook 109/ indicated that the public rangelands have the potential of producing 55 percent of the total beef production in the United States. In other words, if the livestock feeders produced the weaner calves from cow-calf herds in total confinement and the public land range forage were used only to fatten steers during spring and summer, this forage resource could produce more than one half of the total finished beef normally consumed.

Estimates of the potential of public grazing lands to contribute to future demands for livestock products

Animal units in the United States calculated 110/ from data in Table increased from 44.4 million to 76.2 million or 71 percent between 1947 and 1970. This has resulted primarily from improvements on private rangelands.

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108/ Gardner, B. Delworth and Darwin Nielsen. 1967. Can recreation save ranching communities? The National Woolgrower 57(12):8-11. p. 10.

109/ Cook, C. Wayne. 1971. Wyy not say it the way it is! Journalof Range Management 24(4):320-321.

110/ The number of sheep reported in 1947 and 1970 were divided by 5 to obtain animal units for this kind of livestock.

In 1954, Renner estimated that the public rangelands could be improved in productive capacity from 200 to 300 percent. [111/] Estimates supplied by the federal agencies to the Public Land Law Review Commission indicate that the animal unit months of forage could be increased by 55 percent over 1970 values by investment in improvement practices (Table 35).

Table 35. Grazing potential of the public lands for domestic livestock with intensive improvement practices.

| Agency | AUM's Supplied in 1970 | AUM's Possible with Improvement[a/] | Difference | Percent Increase |
|---|---|---|---|---|
| U. S. Forest Service | 8,346 | 14,598 | 6,252 | 75 |
| Bureau of Land Management | 15,815 | 22,918 | 7,103 | 45 |

a/ Data are for 1966 and were supplied to the University of Idaho by the Public Land Law Review Commission.

This 55 percent increase would amount to about 13.3 million AUM's or a little over half again as much as was supplied in 1970.

Most of the estimated additional improvement indicated in 1966 would be obtained from investments in range seeding, water developments for better distribution, undesirable plant control, fences and other physical structures. Since 1966, some surprising increases in livestock carrying capacities have been achieved by application of intensive grazing management programs on federal and private rangelands. The application of rest-rotation, deferred and/or rotation grazing programs are increasingly being applied to more acres of public land.

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111/ Renner, F. G. 1954. The future of our range resources. Journal of Range Management 7(2):55-56. p. 56.

These programs along with seeding, fencing, undesirable plant control, water developments, etc, will probably increase the potential of public lands above that previously estimated. Since 1966, the permitted AUM's on U. S. Forest Service and Bureau of Land Management areas has increased from 22.9 [112] million to 24.2 million in 1970.

Relationship of grazing to other public land resources and use

The public lands of the United States provide a variety of resources including timber, water, range forage, wildlife, recreation and minerals. It is not uncommon to find two or more of these resources or resource values on the same tract of public land. As a consequence, the federal agencies administering the public lands manage for multiple use objectives. Some uses are largely compatible with other uses while some are incompatible.

In 1905, when the forest reserves were transferred to the Department of Agriculture, grazing was one of the most important uses of the federal lands. Grazing receipts made up 68 percent of the total receipts on national forest lands in 1906, [113] and grazing was considered the most important surface use of the unreserved public domain in 1934 when the Taylor Grazing Act was passed.

As the population of the country has increased, desires and demands for use of the public land for other purposes have also increased. Accompanying the increase in population has been an increase in the amount of leisure time and the money that can be expended by individuals and groups for leisure time activities. Among these activities are hunting, fishing, rock-hounding, jeep-touring, camping, hiking, or sight-seeing on public lands. Mineral, gas, and oil explorations have

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[112] University of Idaho with Pacific Consultants, Inc., 1970. Op. Cit. p. III-15, Table III A-7.

[113] Clawson, 1967. Op. Cit. p. 61. Appendix Table 5.

expanded in recent years and the ever-growing concern over water supplies make the public lands increasingly important in these aspects. Some of these land use activities have an impact on grazing while others have none or only a slight impact.

Grazing and watershed protection on public lands

The public lands, particularly in the western states, are extremely important from the standpoint of water production and conservation. The mountainous areas, largely administered by the U. S. Forest Service, receive moisture which is channeled into the streams and rivers of the nation. The amount and manner in which water flows from the watersheds is influenced by the kind and amount of vegetation cover.

Grazing is generally not incompatible with water production and conservation if it is properly regulated. There are, however, areas with limited soil development or soils so erosive, because of steepness and texture, that grazing is not advisable. Grazing has also been excluded from some range-watershed areas because of a deteriorated plant cover. When the vegetation cover is restored to a level adequate for watershed protection, these areas may be returned to grazing use.

The potentially detrimental effect of improper livestock grazing on watershed values has resulted in protective directives by both the U. S. Forest Service and the Bureau of Land Management. 114/ The U. S. Forest Service provides specifically that:

(1) Watershed areas may be closed to livestock grazing when necessary to prevent accelerated erosion, floods or the diminution of usable-yield or pollution of the water supply;

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114/ Forest Service Manual §§ 2205.13. Bureau of Land Management Manual §§ 4112.11A2.

(2) Areas suitable to grazing will not be used if it requires moving livestock over watersheds which will be damaged by livestock use;

(3) Grazing use will be planned to prevent trampling damage on water-courses, alpine meadows, and snowbank areas;

(4) Water pollution resulting from livestock grazing will be prevented;

(5) Watershed protection and improvement will be considered in all range improvement projects.

The Bureau of Land Management recognizes that good range management usually results in good watershed management. The regulations of this agency also state that a watershed may be closed to the grazing of livestock when necessary to reduce accelerated erosion, increase water yield, or prevent water pollution.

Between 1947 and 1966 grazing was excluded from about 3.9 million acres (Table 30). About 97 percent of this land is administered by the U. S. Forest Service and 99 percent of the watershed land, on which grazing has been excluded, occurs in the 11 western states.

The largest areas on which grazing has been excluded for watershed protection are found in those states with large amounts of mountainous area. Almost three fourths (73 percent) of the range-watershed land on which grazing has been excluded is found in the states of Colorado, Idaho, New Mexico and Utah.

Table 36. Net acres of public land from which grazing has been excluded for watershed protection between 1947 and 1966. a/

(1000 Acres)

| State | USFS Total | BLM Total | Total |
|---|---|---|---|
| Arizona | 31 | 5 | 36 |
| California | 134 | -- | 134 |
| Colorado | 1,038 | 6 | 1,044 |
| Idaho | 912 | 10 | 922 |
| Montana | 143 | -- | 143 |
| Nevada | 73 | -- | 73 |
| New Mexico | 461 | -- | 461 |
| Oregon | 261 | 3 | 264 |
| Utah | 409 | 24 | 433 |
| Washington | 123 | -- | 123 |
| Wyoming | 223 | 10 | 233 |
| 11 Western States | 3,808 | 58 | 3,866 |
| Other States | 36 | 1 | 36 b/ |
| 48 States | 3,844 | 59 | 3,902 b/ |
| Percent 11 Western States is of United States | 99 | 98 | 99 |

a/ Source: Data supplied to the University of Idaho by the Public Land Law Review Commission.

b/ Totals vary slightly because of rounding figures to whole numbers.

Grazing and recreational use of the public lands

Providing for recreational use of the public lands is one of the multiple use objectives of the federal agencies. Outdoor recreation involves more people than any other public land use activity and the recreational visits to the public lands are growing at an astounding rate. Data compiled by Clawson [115] showed that total recreational visits to national forests more than doubled between 1956 and 1964. There were 52.5 million recreational visits in 1956 and 133.7 million in 1964. Based on projections to the future, the U. S. Forest Service estimates that there will be 230 million visits in 1976.

In 1962, the Bureau of Land Management began a continuing inventory and evaluation of outdoor recreation resources on all Bureau of Land Management lands. There were an estimated 14.5 million visitor days in 1964,[116] and 38.7 million in 1970 [117] on land under jurisdiction of the Bureau. Recreational activities are expected to increase on these lands but probably at a lesser rate than on national forest areas.

Grazing and some forms of recreational activity are incompatible. The U. S. Forest Service and Bureau of Land Management have withdrawn about 1.3 million acres from grazing for organizational campsites, camping and picnicking areas, recreation residences, resorts, historical and archeological sites, natural and wilderness areas and other types of recreation areas (Table 37). Natural and wilderness areas

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115/ Clawson, 1967. Op. Cit. p. 60 Appendix Table 4.

116/ U. S. Dept. of Interior, Bureau of Land Management. 1965. Public land statistics, 1964. U. S. Government Printing Office, Washington, D. C. 203 pp. p. 73.

117/ U. S. Dept. of Interior, Bureau of Land Management. 1971. Public land statistics, 1970. U. S. Government Printing Office, Washington, D. C. 182 pp. p. 80.

Table 37. Acreages of public land withdrawn from grazing for recreational use by agency, class of land and recreational activity as of 1966. a/

(1000 Acres)

| Agency | Organization Camps | Camping and Picnicking | Recreation Residences | Resorts | Historical and Archeological | Natural and Wilderness | Recreation Areas | Total |
|---|---|---|---|---|---|---|---|---|
| USFS | | | | | | | | |
| National Forest | 3.74 | 77.83 | 6.51 | 11.57 | 9.52 | 39.77 | 961.03 | 1,109.97 |
| National Grassland | 0.02 | 0.13 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.17 |
| LU Project | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 |
| Wilderness and Primitive Areas | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 234.47 | 234.49 |
| Total | 3.87 | 77.98 | 6.51 | 11.58 | 9.52 | 39.77 | 1,195.51 | 1,344.74 |
| BLM | | | | | | | | |
| Grazing District | 0.00 | 5.35 | 2.00 | 0.00 | 0.01 | 5.00 | 0.00 | 12.36 |
| Outside Grazing District | 0.00 | 1.10 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 | 1.40 |
| LU Lands | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 2.00 |
| Total | 0.00 | 7.45 | 2.00 | 0.00 | 0.01 | 5.30 | 1.00 | 15.76 |
| TOTAL | 3.87 | 85.43 | 8.51 | 11.58 | 9.53 | 45.07 | 1,197.51 | 1,360.50 |
| Percent of Total | 0.3 | 6.3 | 0.6 | 0.8 | 0.7 | 3.3 | 87.9 | 99.9 |

a/ Source: Data supplied to the University of Idaho by the Public Land Law Review Commission.

comprise about 3 percent of the land withdrawn from grazing for recreational use whereas campsites, residences and resorts make up 8 percent of the area withdrawn.

The U. S. Forest Service, in 1966, administered about 99 percent of the public land withdrawn from grazing by the two agencies. National forest lands have a much greater appeal for recreational activities than public lands administered by the Bureau of Land Management. The increasing use of off-road vehicles, however, is creating a high recreational demand for these public lands.

Approximately 6.3 million acres of public land designated primarily for recreational use by the U. S. Forest Service and Bureau of Land Management is also grazed by livestock (Table 38). About 89 percent of this area is administered by the U. S. Forest Service. Wilderness and primitive areas constitute the greatest amount of recreational land that is grazed.

The total acreage of land designated for recreational use by the two agencies is about 7.7 million acres. Grazing is permitted on 82 percent of this land area.

Recreational use of the public lands, in addition to the land withdrawn from livestock grazing, places additional demands on the forage resource. Pack and riding stock, used in some forms of outdoor recreational activities, harvest forage from the public lands.

The amount of forage used incident to recreational activities increased from 71.3 thousand AUM's in 1962 to 85.5 thousand AUM's in 1966, a 20 percent increase over 1962 (Table 39). This kind of grazing use occurs principally on national forests in wilderness and primitive areas administered by the U. S. Forest Service. There was an 18 percent increase of grazing use (AUM's) incident to recreational activities on national forests and 22 percent on wilderness and primitive areas between 1962 and 1966. Forage allocations for animals used incidental to recreational use is of minor importance on Bureau of Land Management administered land.

Table 38. Acreages of land designated for recreational use by the U. S. Forest Service and Bureau of Land Management which are grazed by livestock as of 1966. a/

(1000 Acres)

| Agency and Class Of Land | Acreage Grazed |
|---|---|
| U. S. Forest Service | |
| Wilderness | 3,252 |
| Primitive | 2,297 |
| National Monuments b/ | 63 |
| National Recreation Area | 6 |
| Total | 5,618 |
| Bureau of Land Management | |
| Natural and Historical Areas | 34 |
| Other | 690 |
| Total | 724 |
| Total | |
| Wilderness | 3,252 |
| Primitive | 2,297 |
| National Monuments | 63 |
| National Recreation Areas | 6 |
| Natural and Historical Areas | 34 |
| Other | 690 |
| Total | 6,342 |

a/ Source: Information supplied to the University of Idaho by the Public Land Law Review Commission.

b/ Administered by the U. S. Forest Service for the National Park Service.

Table 39. Forage allocations in AUM's for animals used incident to recreation use (pack and riding stock primarily), 1962-1966. a/

| Agency | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|
| U. S. Forest Service | | | | | |
| National Forests | 58,790 | 59,949 | 61,610 | 65,627 | 69,901 |
| National Grasslands | 46 | 46 | 46 | 51 | 51 |
| Land Utilization Project | 68 | 100 | 299 | 239 | 136 |
| Wilderness and Primitive Areas | 12,344 | 12,353 | 13,814 | 14,414 | 15,129 |
| Non-forest Federal | 44 | 49 | 44 | 44 | 44 |
| Total | 71,292 | 72,497 | 75,813 | 80,375 | 85,261 |
| Bureau of Land Management | | | | | |
| Grazing Districts | 0 | 0 | 215 | 0 | 265 |
| TOTAL | 71,292 | 72,497 | 76,028 | 80,375 | 85,526 |

a/ Source: Information supplied to the University of Idaho by the Public Land Law Review Commission.

Grazing and wildlife use of the public lands

The use of the forage resources of the public lands by wildlife species has increased sharply over the years. Big game population estimates on national forests in 1923 indicated 1.2 million AUM's of use, and this increased to 7.3 million AUM's in 1964. 118/ About 4.5 million big game animals are presently estimated to occur on national forest and national grasslands in the 50 states, compared to an estimated number of 0.9 million in 1928. 119/ Game use of the national forests surpassed the use made by domestic animals in 1961. 120/ Estimates of game animal use on public land administered by the Bureau of Land Management rose from 1.2 million animals in 1947 121/ to 2.6 million in 1967. 122/

Both the Bureau of Land Management and the U. S. Forest Service have long recognized the rights of the general public for hunting, fishing and other recreational pursuits. In the case of the Bureau of Land Management, the district manager is instructed to reserve in each grazing district, sufficient federal range forage and habitat to accommodate the needs of a reasonable number of wildlife animals. 123/

The U. S. Forest Service endeavors to arrive at an equitable balance of use between livestock and big game when there is direct competition for forage. In the wildlife management program of the U. S. Forest Service, reservations of equitable forage and cover for wildlife, particularly on big-game winter range,

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118/ Clawson, 1967. Op. Cit. p. 58.

119/ Wolfe, Donald F. 1972. Wildlife for tomorrow. U. S. Forest Service. Program Aid No. 989. U. S. Government Printing Office, Washington, D. C. 28 pp. p. 4.

120/ Clawson, 1967. Op. Cit. p. 7.

121/ U. S. Dept. of Interior, Bureau of Land Management. 1947. Report of the Director of the Bureau of Land Management. Washington, D. C. p. 84.

122/ U. S. Dept. of Interior, Bureau of Land Management. 1968. Public land statistics, 1967. Superintendent of Documents, Washington, D. C. p. 76.

123/ 43 CFR 4111.3-1(b).

are made; livestock management plans and range improvement programs are coordinated with wildlife management plans; food and cover for upland game birds, waterfowl and small game are reserved; and livestock and big game grazing are coordinated to protect fishery values. 124/

The acreage of public land withdrawn from livestock grazing by the U. S. Forest Service and the Bureau of Land Management amounts to about 2 million acres (Table 41). About 73 percent of the total withdrawn is national forest system land and 27 percent Bureau of Land Management land.

The land withdrawn from livestock grazing for wildlife use is 1.4 percent of that permitted to be grazed by the U. S. Forest Service and less than 1 percent of that administered by the Bureau of Land Management.

Approximately 2.3 million AUM's of big game use were allocated by the U. S. Forest Service and the Bureau of Land Management in 1966 (Table 42). Forty-five percent of the total AUM's allocated is to provide winter range for game animals.

The amount of use allowed big game animals on land administered by the Bureau of Land Management is in sharp contrast to the estimated amount of use made by these animals. About 2.58 million AUM's 125/ of grazing by big game animals were reported in 1967. Although a similar comparison is not possible on U. S. Forest Service administered land, the trend is probably somewhat the same. Clawson 126/ shows 7.29 million AUM's of big game use on all national forest lands in 1964. The 432 thousand AUM's allocated to big game use in 1966 was only in the 36 states with U. S. Forest Service rangelands or range environments.

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124/ Forest Service Manual §§ 2205.14.

125/ U. S. Dept of the Interior, Bureau of Land Management, 1968. Op. Cit. p. 76.

126/ Clawson, 1967. Op. Cit. p. 58.

Table 41. Animal unit months of forage allocated for big game use by the U. S. Forest Service and the Bureau of Land Management, 1966. a/

(1000 AUM's)

| Agency | Total All Seasons | Allotment on Winter Range |
|---|---|---|
| USFS | | |
| National Forests | 420 | 134 |
| Wilderness and Primitive Areas | 11 | c/ |
| Non-Forest Service Federal | b/ | d/ |
| Total | 432 | 134 |
| BLM | | |
| Inside Grazing Districts | 1,459 | 725 |
| Outside Grazing Districts | 229 | 93 |
| Land Utilization Projects | 28 | 6 |
| Acquired and Revested Lands | 25 | 13 |
| Other Agency Withdrawals | 93 | 43 |
| Total | 1,834 | 880 |
| TOTAL | 2,266 | 1,014 |

a/ Source: Tables supplied to the University of Idaho by the Public Land Law Review Commission.

b/ 260 AUM's.

c/ 180 AUM's.

d/ 50 AUM's.

Table 42. Acreage of public land withdrawn from livestock use for wildlife use between 1947 and 1966. a/

(1000 Acres)

| Agency | Acreage Withdrawn | | Total |
|---|---|---|---|
| | For Winter Use Only | Other or All Seasons | |
| U. S. Forest Service | | | |
| National Forests | 480 | 913 | 1,393 |
| Wilderness and Primitive Areas | 4 | 123 | 127 |
| Total | 484 | 1,036 | 1,520 |
| Bureau of Land Management | | | |
| Inside Grazing Districts | 69 | 362 | 431 |
| Outside Grazing Districts | 2 | 71 | 73 |
| Land Utilization Projects | 0 | 2 | 2 |
| Other Agency Withdrawals | 3 | 54 | 57 |
| Total | 74 | 489 | 563 |
| TOTAL | 558 | 1,525 | 2,083 |

a/ Source: Data supplied to the University of Idaho by the Public Land Law Review Commission.

It cannot be inferred from these data that the reduction in livestock use on the public lands has been caused mainly by the increase in big game numbers and use. There are indications [127] that balanced use of the range by both domestic and wild animals are most productive for both kinds of animals. With big game use along, herbaceous species increase at the expense of the browse species and the converse is true with heavy livestock grazing. Recent evidence, accumulating from specialized grazing programs implemented in the last 5 to 6 years, indicate that wildlife habitat is improving along with an increase in livestock carrying capacity. [128]

In the 11 western states 82 percent of the total land area is used by big game animals (Table 43). Of the area used by big game, federal lands comprise 48 percent with the remaining 52 percent being in state and private ownership. These data indicate the stake that the private land owner, principally livestock ranchers, have in providing habitat for game animals in the western range areas.

Total land area lost to livestock grazing

Livestock grazing has been excluded on about 7.3 million acres of U. S. Forest Service and Bureau of Land Management administered land for watershed protection, recreational and wildlife use (Table 44). The total land withdrawn from grazing for these purposes represents about 2.8 percent of the approximately 263 million acres allocated for grazing by the two agencies.

In addition to the acreages lost to grazing because of watershed protection, recreation and wildlife use, about 300 thousand acres were lost between 1957 and

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127/ Smith, Arthur D. and Dean D. Doell. 1968. Guides to allocating forage between cattle and big game on big game winter range. Utah State Division of Fish and Game Publication No. 68-11. 32 pp.

128/ U. S. Dept. of Interior, Bureau of Land Management. 1971. Range Management Workshop Proceedings, Bozeman, Montana. March 1-5. Processed. 203 pp.

Table 43. Acreage of public land withdrawn from livestock grazing for watershed protection, recreational and wildlife use to 1966. [a]

(1000 Acres)

| Agency | Watershed Protection | Recreational Use | Wildlife Use | Total |
|---|---|---|---|---|
| U. S. Forest Service | 3844 | 1345 | 1520 | 6709 |
| Bureau of Land Management | 59 | 16 | 563 | 638 |
| Total | 3903 | 1361 | 2083 | 7347 |

[a] Source: Information supplied to the University of Idaho by the Public Land Law Review Commission.

Table 44. Area of 11 western states used by big game animals and the portion of this area in federal and state and private ownership. a/

| State | Area Used by Big Game | Portion of Total State Area That is Used by Big Game | Portion of Area Used by Big Game Animals in: | |
|---|---|---|---|---|
| | | | Federal Ownership | State and Private Ownership |
| | (1000 Acres) | (Percent) | (Percent) | (Percent) |
| Arizona | 69,054 | 95 | 43 | 57 |
| California | 50,103 | 50 | 49 | 51 |
| Colorado | 63,826 | 96 | 36 | 64 |
| Idaho | 44,993 | 85 | 67 | 33 |
| Montana | 86,742 | 93 | 29 | 71 |
| Nevada | 52,698 | 75 | 89 | 11 |
| New Mexico | 74,656 | 96 | 33 | 67 |
| Oregon | 49,279 | 80 | 61 | 39 |
| Utah | 39,523 | 75 | 69 | 31 |
| Washington | 34,155 | 80 | 34 | 66 |
| Wyoming | 56,000 | 90 | 40 | 60 |
| TOTAL | 621,029 | 82 | 48 | 52 |

a/ Source: Colorado State University. 1969. Fish and wildlife resources on the public lands. Prepared for the Public Land Law Review Commission. 326 pp. plus Appendices and Summary. Adapted from Appendix Table 36, page a-84.

1966 under the land disposal acts, Recreation and Public Purposes Act, Public Sales Act and transfers to other agencies. 129/

It is not anticipated that major changes in the amount of land used for grazing will occur through the next 30 years. A summary of projected land use changes between 1950 and 2000 predicted a decrease of about 20 million acres or a decline of 3 percent in the land used for grazing. 130/ These same projections indicate an increase of 49 million acres will be used for recreational purposes and that an additional 6 million acres will be used primarily for wildlife.

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129/ Information contained in data supplied to the University of Idaho by the Public Land Law Review Commission.

130/ Clawson, Held, and Stoddard, 1960. Op. Cit. p. 454.

## GRAZING FEES

Grazing fees on the national forests, established by administrative regulation, are related to a base fee structure. The base fee was established in 1931 following studies conducted in the 1920's. Base fees were established by forest and area within forest because of differences in location of allotments, grazing capacity, forage quality and other factors. 131/ In the western forest regions--1 through 6--there are 24 different base rates for cattle ranging from 6 to 56.4 cents per animal month and 17 different base rates for sheep ranging from 1.5 to 6 cents per sheep month of use (Table 45). A total of 25 different base rates exist on national forests in the United States.

Base fees established in 1931 vary yearly in accordance with the relationship of the previous year's livestock price to livestock prices for the base period. The percentage change in base fees by years on national forests is shown in Table 46.

Average fees for grazing on national forests reached a low value for cattle and sheep in 1934 and peaked in 1952 when they were 4.4 times as great as the base fee for cattle and 3.4 times as great for sheep. Fees for sheep grazing have been lower, proportionately, than cattle fees in all but 2 years since 1933. Fees in 1968, on national forests, ranged from 21 cents to $1.97 per animal month for cattle, and sheep fees varied from about 3.75 to 14.5 cents per animal month.

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131/ U. S. Dept. of Agriculture, U. S. Dept. of Defense, and U. S. Dept. of the Interior. 1967. Review of federal land administration for livestock grazing. Report of the Interdepartmental Grazing Fee Committee. Processed. 42 pp. p. A-7.

Table 45. Base fee rates for cattle and horses, and sheep and goats on national forests by Forest Service Region. a/

| Forest Service Region | Cattle and Horses b/ | | | Sheep and Goats | | |
|---|---|---|---|---|---|---|
| | Number of Different Base Rates | Average Base Rate (cents) | Range of Base Rates (cents) | Number of Different Base Rates | Average Base Rate (cents) | Range of Base Rates (cents) |
| 1 | 13 | 17.3 | 10-24 | 12 | 4.4 | 2-6 |
| 2 | 10 | 19.0 | 13-26 | 4 | 5.7 | 3.25-6 |
| 3 | 10 | 11.5 | 10-13 | 7 | 3.1 | 2.50-4 |
| 4 | 13 | 15.5 | 6-20 | 11 | 4.2 | 1.50-6 |
| 5 | 5 | 19.5 | 15-56.4 c/ | 4 | 5.5 | 4.50-6 |
| 6 | 11 | 16.7 | 10-22 | 9 | 4.2 | 2.50-5 |
| Sub-total | 24 | 16.7 | 6-56.4 | 17 | 4.47 | 1.50-6 |
| 8 | 1 | 15.0 | 15 | 1 | 4.50 | 4.50 |
| 9 | 5 | 21.2 | 11-30 | 1 | 4.50 | 4.50 |
| Sub-total | 5 | 20.0 | 11-30 | 1 | 4.50 | 4.50 |
| Total | 25 | 16.9 | 6-56.4 | 17 | 4.47 | 1.50-6 |

a/ Information adapted from mimeographed sheets supplied by the PLLRC. These data show grazing fee base rates by regions and forests for the years 1956, 1957, 1959, and 1960. National grasslands are excluded.

b/ Fees for horses are 1.5 times the fee for cattle.

c/ The 56.4 cent base fee in Region 5 is on land that was acquired by a land exchange with the U. S. Army. The Forest Service acquired approximately 25,000 acres that was under grazing lease to 3 lessees. The Army was charging $2.00 per animal month and the Forest Service prorated this value back to the 1931 base fee period. Without this value the range in Forest Service base fee rates would be 6 to 30 cents for cattle.

Table 46. Percent grazing fee is of base fee on national forests because of varying livestock prices, 1932-1968. a/

| Year | Percent of Base Fee b/ Cattle | Sheep | Year | Percent of Base Fee Cattle | Sheep |
|---|---|---|---|---|---|
| 1932 | 100 | 100 | 1951 | 349 | 271 |
| 1933 | 62 | 46 | 1952 | 440 | 340 |
| 1934 | 52 | 53 | 1953 | 370 | 262 |
| 1935 | 55 | 60 | 1954 | 241 | 200 |
| 1936 | 90 | 75 | 1955 | 255 | 200 |
| 1937 | 87 | 81 | 1956 | 241 | 194 |
| 1938 | 103 | 94 | 1957 | 234 | 200 |
| 1939 | 92 | 73 | 1958 | 269 | 217 |
| 1940 | 103 | 82 | 1959 | 345 | 228 |
| 1941 | 110 | 86 | 1960 | 352 | 206 |
| 1942 | 130 | 102 | 1961 | 317 | 192 |
| 1943 | 159 | 123 | 1962 | 319 | 172 |
| 1944 | 177 | 138 | 1963 | 337 | 200 |
| 1945 | 171 | 134 | 1964 | 317 | 200 |
| 1946 | 183 | 141 | 1965 | 290 | 215 |
| 1947 | 214 | 167 | 1966 | 319 | 250 |
| 1948 | 278 | 221 | 1967 | 350 | 258 |
| 1949 | 335 | 245 | 1968 | 350 | 243 |
| 1950 | 293 | 241 | | | |

a/ Source: 1932-1953 rates from: Dutton, W. L. 1953. History of Forest Service grazing fees. Journal Range Management 6(6):392-398; 1954-1960 rates calculated from data presented by: Clawson, Marion. 1967. The federal lands since 1956; recent trends in use and management. John Hopkins Press, Baltimore, Md. Appendix Table 2; and 1961-1968 rates were obtained from Salmon National Forest, Salmon, Idaho.

b/ Percentage values may be in error by 1-3 percent from actual because of rounding in data used.

The national grasslands have fees established in a similar manner to those on national forests. The base fee was established after studies in the late 1940's. The base livestock price was the average price received by producers in 15 western states during the period 1937-1946.

Uniform fees are normally charged for use of all grazing district lands administered by the Bureau of Land Management. Annual rental charges per area for lands outside of grazing districts are based on the AUM's authorized by the grazing lease. This charge per AUM has been the same as the charge for an AUM of use on grazing districts.

Various fee schedules apply to the land utilization project areas administered by the Bureau of Land Management. Land utilization project areas transferred from the Department of Agriculture to the Department of the Interior by Executive Order 10046 of March 24, 1949, retained the fee schedule then in effect. 132/ Executive Order 10234, April 23, 1951, transferred 78.6 thousand acres of land utilization land in Idaho to the Bureau of Land Management, and fee schedules are the same as on grazing district lands. The land utilization lands in Montana and New Mexico which were transferred from the U. S. Forest Service to the Bureau of Land Management under Executive Order 10787, November 6, 1958, retained the previous fee formula similar to that on national grasslands.

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132/ U. S. Congress, Senate Hearings before the Subcommittee on Public Lands on the Committee on Interior and Insular Affairs. 1963. Review of the Taylor Grazing Act, pt. 2. 88th Congress, 1st session February 7 and 8. p. 588.

Fee rates were 5 cents per AUM between 1936 and 1946 on grazing district lands (Table 47 ). Following studies initiated by the Grazing Service in 1941 [133/] rates were increased to 8 cents in 1946. Additional studies between 1946 and 1950 caused an additional increase to 12 cents in 1950 and 15 cents in 1954. [134/] Beginning in 1958, fees were varied on the basis of the average of the previous year's livestock price per pound. Continued criticism of the fee rate caused the Secretary of Interior in 1963 to change the base for calculating annual fees to 1.5 times the former base fee established in 1958.

On November 15, 1968, the Secretary of Agriculture and the Secretary of Interior jointly announced a change in current methods of charging grazing fees on public lands under their jurisdiction. A common base of $1.23 per animal unit month (AUM) adjusted by an animal forage value index would be used to calculate grazing fees. The new base value would be reached by adjusting current fee levels to the $1.23 base level in even increments over a 10-year period. Adjustments began with the 1969 fee levels. Fees in 1970, however, were not increased over the 1969 level because of requests to await the report of the Public Land Law Review Commission to the President and Congress of the United States. This report was submitted in June of that year.

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133/ Clawson, Marion. 1950. The western range livestock industry. McGraw Hill Book Company, New York. 401 pp.

134/ U. S. Congress, 1963. Op. Cit.

Table 47. Fee rates of the Bureau of Land Management per animal unit month within grazing districts (1935-1968). a/

| Year | Charge per AUM of Grazing b/ |
|---|---|
| 1936-1946 | 5 |
| 1947-1950 | 8 |
| 1951-1954 | 12 |
| 1955-1957 | 15 |
| 1958 | 19 |
| 1959-1960 | 22 |
| 1961-1962 | 19 |
| 1963-1965 | 30 |
| 1966-1968 | 33 |

a/ Source: Clawson, Marion. 1967. The federal lands since 1956; recent trends in use and management. Resources for the Future, Inc. Baltimore: John Hopkins Press. Appendix Table 12, p. 67.

b/ Rate for horses is the same as for cattle; sheep are charged at one-fifth the rate for cattle.

# GOALS OF RANGELAND POLICY

## Need for a clear statement of the goals of rangeland policy

The purpose of the evaluation or performance of public agencies in their operations is to devise laws and administrative procedures which will improve the attainment of their assigned goals or objectives. Before such an evaluation can be made, therefore, it is necessary first to determine what the goals are; second, the extent to which the agencies have attained or fallen short in the attainment of the goals; third, to determine whether or not the goals themselves are the most appropriate ones; and finally to suggest more appropriate goals together with means of attaining them.

Probably no question is more frequently asked of a public agency than: What are your goals and objectives? And probably none is more difficult to answer. There are several reasons for this difficulty. First, goals or ends and means have a tendency to become mixed up. Public ownership and administration of land is not an end or goal but, rather, a means to attain one or more goals. Since national policy over the years has been oriented to attainment of welfare goals through private ownership of property, especially that of land, the burden of proof must lie with the agency to demonstrate not only that it has accomplished certain policy objectives, but also that these objectives either could not be attained or could not be attained as well under private ownership as they could under public ownership. Consequently, such policies as efficient management of the public lands or cooperation with local cattlemen in management are not goals but means of attaining certain goals. Since agency administrators and employees are engaged in management of public lands they are likely to

assume that public ownership is an established fact and efficient management is the goal.

A second difficulty in stating policy goals is that the goals themselves are difficult to agree upon and, when accepted, they may not be attainable by the administering agencies. Kenneth Boulding has listed four principles as the main criteria of economic policy. They are economic progress, economic stability, economic justice, and economic freedom. 135/ Boulding believes that all other policy goals can be fitted into this classification. Although several economists are willing to accept progress, freedom, and justice as policy goals, they would substitute security for stability on the grounds that stability would automatically exist if progress and security were both attained. 136/ Security, however, can be treated as a sub-objective under stability. The fact that stability and progress cannot be easily attained at the same time, does not warrant its exclusion as a separate goal. In fact, one of the principle objectives of growth theory is to discover the conditions of "steady state" growth. 137/ This implies that stability and growth need not be mutually exclusive. Even if differences in goals can be reconciled, which is not too hard to imagine, there still remains the difficulty in getting general agreement on the meaning of the terms such as freedom and justice, and upon the priority to be given to these concepts. Would the farmers

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135/ Boulding, Kenneth E. 1958. Principles of economic policy. N. Y. Printers Hall.

136/ Tweeten, Luther. 1970. Foundations of farm policy. Univ. of Nebraska Press., Lincoln, Nebraska. p. 2.

137/ Hahn, F. H. and R. C. O. Mathews. 1964. The theory of economic growth: a survey. The Economic Journal VLXXIV:781-782.

prefer more freedom from government restraints at the expense of justice (equality of income with non-farm groups)? This seems to be the main point at issue between the Republican and Democratic administrations over their respective farm programs. The issue can be stated as a difference in the concept of freedom. The Republican concept of freedom being one of absence of government restraints placed upon the farmer in the operation of his farm and his decision making concerning the use of his land and the crops he will grow on it. The Democratic concept of freedom would place restraints upon production decisions as secondary to a greater freedom that the farmer would experience if he had a larger income to spend as he desires.

In setting forth objectives there is always the belief or hope that they are complementary in the sense that the more we attain of one objective, the more we can secure of the other objective at the same time. But social objectives are, by their nature, competitive. Agencies are, therefore, being constantly confronted with difficult decisions of assessing priorities among the objectives. In doing so, one objective must be restrained in order to attain more of another objective. Such actions and such decisions create misunderstandings and conflicts among beneficiaries of the programs. Most beneficiaries or users are likely to have different priorities, or to think in terms of single objectives. The compromises at which the agencies arrive to resolve the conflicts usually leave interested groups dissatisfied. Multiple use, as a principle of optimizing public land benefits, must assume that certain uses will be competitive and that all uses cannot be attained to their fullest extent without encroaching on other uses. It is doubtful that any large group will recognize that its particular interest should be restrained to protect other uses for which it has no great interest.

There is also the question as to the extent to which agencies can attain certain objectives. To what extent, for example, can stability of the livestock industry be attained through public range management? Can stability of the local community be secured through policies adopted by public land agencies? To what extent can the agencies provide for a just and fair allocation of rangeland to users and at the same time secure proper maintenance and development of the range resource? It may be that the objectives set forth by the Congress or the agencies are not operational and, thus, the agencies are defeated at the outset.

Finally, we must recognize that objectives change over time. The issues foremost in the minds of legislators and the public today will not be those of greatest importance in 1905 when the Forest Service assumed administration of the forest reserves or in 1934 during the depression years when the Taylor Grazing Act was passed. It becomes necessary, therefore, at intervals to re-analyze the objectives of agency policy and to re-evaluate the policy goals in the light of emerging needs and issues.

## Objectives of public rangeland management

Because of the difficulties listed above, it is difficult to discover a set of objectives of public rangeland policy which will receive general acceptance by the agencies themselves. The Forest Service--first public agency to manage public lands in a sense distinct from the disposal objectives of the General Land Office--was the first agency to set forth specific objectives of management.

Secretary of Agriculture James Wilson in an oft-quoted letter of February 1, 1905, to the Chief of the Forest Service set forth the statement of objectives as follows: (1) that the resources (water, wood, and forage) be conserved and wisely used "for the benefit of the home builder first of all, upon whom depends the best permanent use of land and resources alike"; (2) all land to be put to its most productive use "for the permanent good of the whole people"; (3) all resources to be used with only such restrictions "as will insure the permanence of these resources"; (4) the permanence of the resources are essential to the continued prosperity of the lumbering, mining, and livestock industries; and (5) decisions were to be made on local grounds, "the dominant industry" to be considered first, but minor industries are to be restricted as little as possible. 138/

As a statement of goals of public policy, the above statement leaves much to be desired. There is confusion between means and ends, but it became the guide to rangeland policy not only for the Forest Service but also for the Grazing Service and later for the Bureau of Land Management. The accepted goals of administration for the Forest Service were stated in 1936 as the following:

1. Conservation and use -- protection and perpetuation of all resources through wise use, protection and development,

2. Multiple use -- correlation in management and use of the different resources in order to obtain the highest net benefits from the combined resources of the land,

3. Equal opportunity -- protection of the settler and home builder against monopoly and unfair competition in the use of resources,

4. Integration with agriculture -- relating to the use of range and other resources on the national forests to farm grown forage crops, range, and other agricultural resources, in a manner to obtain the highest benefit from the several classes of land,

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138/ U. S. Dept. of Agriculture, Forest Service, 1936. Op. Cit. p. 254.

5. Stability of use -- safeguarding the livestock industry by affording maximum stability of use of the range resources . . . ,

6. Cooperation with users, and

7. Local administration. [139/]

The Taylor Grazing Act set forth the following objectives:

1. To stop injury to public grazing lands by preventing overgrazing,

2. To provide for their orderly use, improvement, and development, and

3. To stabilize the livestock industry dependent upon the public domain. [140/]

These statements of objectives can be summarized into four general goals or aims of rangeland policy: (1) the maintenance and development of rangeland, or rangeland conservation; (2) justice and fairness in the allocation of the grazing privileges on public grazing lands, (3) stability of the range livestock industry, the local community, and the regions, and (4) optimum use or multiple use. The other stated aims or objectives are of the nature of means, rather than ends of policy. Integration with agriculture is a means of stabilization and a criterion for allocation rather than an objective of public policy. In a similar manner, cooperation with users and local administration can be considered as methods of attaining the end of stability for the livestock industry and of fairness in treatment of local livestock interests. They are not, strictly speaking, objectives of rangeland policy.

The four objectives of policy listed above can be related to the general principles of economic policy as stated by Boulding; that of economic progress, economic stability, economic justice, and economic freedom. Maintenance and development of rangeland

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[139/] C 865, 48 Stat. 1269.

[140/] Ibid. p. II-2.

is certainly an important element in both the stability of the livestock industry and of the local communities depending upon it. Allocative justice and fairness would fit nicely under the classification of economic justice. Stability of the range livestock industry and of the local community and regions would contribute to over-all economic stability, and optimum use would be a significant contribution to economic progress, as would also resource maintenance and development.

Having identified the objectives of public rangeland policy, we shall now turn our attention to the means of evaluating the effectiveness of the public land agencies in accomplishing these objectives.

## The free market and economic objectives

Economists in the past have preferred to depend upon the free market to evaluate performance. Those firms that succeed in remaining in business and continue to make profits are deemed successful ones. Those that are forced out of production are considered unsuccessful. Public agencies cannot be so easily classified. The services they perform are not always sold on the market. The agencies themselves are performing the services because the market could not be trusted to perform the task adequately. There are also many types of externalities, which stem from their operations, which cannot easily be internalized and credited to the operations of the agencies themselves.

Because the activities of government agencies do not easily conform to the standards of private competitive businesses, does not mean that there should be no economic assessment made of the costs and benefits derived from their services.

This is particularly true of agencies, such as the public land services, that do produce products for the market and that do compete with private enterprises in performing these services. Tests of performance of such firms should be demonstrated against two standards: (1) that the services they perform could not be adequately performed by the private business sector of the economy, and (2) that the agency itself is performing the services at the least possible cost. Since the public lands, for the most part, have never been in private hands, the issue still remains as to whether or not the best interests of the public would be secured through disposal or retention of these lands.

Economic analysis of production and consumption activities stems from the marginal utility concepts developed during the last quarter of the 19th century. This analysis was later applied to welfare problems during the first quarter of the 20th century. The general conclusions derived from welfare economics is that the free market, if permitted or induced to work effectively, will lead to the production of goods and services that society wants, in the quantity wanted, at the lowest possible costs. These goods and services will then be distributed to the income holders in such a manner that each unit of commodity or service will yield the greatest utility to the consumer; this is known as the principle of equi-marginal utility. To justify government economic activity, it would be necessary to demonstrate market imperfections or the existence of a higher order of value than those placed upon goods and services by the market.

The latter criterion for government action was evaded by the economist on the grounds that values, other than those generated by the market, involved inter-personal

comparisons -- this was the domain of the philosopher or the psychologist, not that of the economist. In fact, the reasoning of the economists at this point takes on a circular nature. The market determines the best allocation of the factors of production and of the goods and services produced by them, because the only basis for deciding what is "best" is what the impersonal market forces determine. According to Professor J. M. Clark, Charles H. Cooley "performed the great service of showing that the mechanism of the market, which dominates the values that purport to be economic, is not a mere mechanism for neutral recording of peoples' preferences but is a social institution with biases of its own different from the biases of the institutions that it purports to record, for example, aesthetic or ethical valuation." 141/

Later generations of economists have recognized that the free market does not always optimize welfare. If we consider the general objectives of economic policy mentioned above, it can be readily seen that none of these will be attained in full through the market mechanisms alone. A certain degree of economic progress will be secured through competition and through the efficient allocation of resources which the market will provide, but progress at the rate that most societies would like to achieve would not be secured through market action alone. 142/ The essence of economic progress is that the current generation restricts its consumption of goods and services so that future generations may live more abundantly. This is the essence also of

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141/ Clark, J. M. 1953. Aims of economic life as seen by economists. In: Goals of Economic Life. Ed. by A. Dudley Ward. Harper Brothers, New York. p. 38.

142/ Tobin, James. 1967. Economic growth as an objective of government policy. American Economic Review. May Proceedings.

resource conservation. The free market is especially weak in its provision for the future. Even large corporations find it difficult to justify investments which will not yield returns over costs for a period much longer than 25 to 30 years. Even if they should choose to do so, any positive interest rate would make the present value of future returns too low to justify such investments for many years beyond that period. On the other hand, our concern for environment, it is urged, is one largely of anticipation of needs of generations as yet unborn. We cannot allow the market to limit the time horizon in which our concern over these matters can extend.

In a similar manner stability of employment, prices, and income have not been successfully attained by the free market. Disastrous depressions and equally disastrous periods of hyperinflation have, on numerous occasions, wrought havoc on the economies of the Western World. Economists for years sought the cause of these ills in malfunctioning of the market; the existence of monopolies or oligopolies, improper expansion of credit, or irresponsible expansion of purchasing power by improvident governments. It was the great contribution of J. M. Keynes that he demonstrated that, even under conditions of perfect competition and neutral government and banking credit policies, the market system would not necessarily bring about full employment equilibrium. 143/ Whereas the existence of oligopolies and administered prices in important sectors of the economy may impede stability, agriculture as an industry suffers from instability caused by too much competition. The adjustments which the market is expected to bring about do not seem to operate quickly and effectively in this industry. Reasons for the failure of agriculture to adjust to adverse market conditions have been variously explored. The low opportunity costs of agricultural

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143/ Keynes, J. M. 1936. The general theory of employment interest and money. Maxmillan, London.

land, labor, and capital; [144/] the agricultural treadmill which forces farmers to be quick in adopting production-increasing technologies which result in severe farm declines when a considerable number of farmers follow suit; [145/] and the vastness of the differences between acquisition costs and salvage value which lock productive factors in agriculture once they have been invested. [146/] These considerations have called for government programs which attempt to stabilize agricultural prices at higher levels than the free market would provide, and to induce farmers to keep land out of production of surplus commodities.

Considerations of stability have also led the public land agencies to attempt to eliminate the "haystack" ranchers and the migrant sheep operators. They have also led to the requirement of commensurate private property to assure enough feed supply for year around feeding of livestock, and the integration of livestock ranching with cropland agriculture. Stability of the livestock industry was also an important consideration in the steps taken to prevent overgrazing and the consequent deterioration of the rangelands.

Economic justice, for the most part, concerns itself with the just and fair distribution of income. It is generally recognized that the free market, if left to itself, may lead to a high concentration of wealth and income in the hands of the few. To prevent this, society has enacted such legislation as progressive income taxation

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144/ Johnson, D. Gale. 1950. The nature of the supply function for agricultural products. An Economic Review. pp. 539-564.

145/ Cochrane, Willard W. 1958. Farm prices, myths and reality. University of Minnesota Press. St. Paul.

146/ Johnson, Glen I. 1958. Supply function -- some facts and notions. In: Agriculture Adjustment Problems in a Growing Economy. Iowa State University Press.

and progressive taxation on estates and inheritances. The various land laws culminating with the Homestead Act of 1862 were designed to establish and maintain the family farm, and to prevent the rise in this country of an aristocracy based upon a concentration of land ownership.

In the allocation of grazing privileges on public lands, the express objective of the U. S. Forest Service and the Bureau of Land Management was to prevent a monopoly of grazing privileges in the hands of a few large cattle and sheep operators. At the same time, however, the agencies expressed the goal of establishing ranch units of large enough size to enable the operator and his family to earn an adequate living.[147/]

Economic freedom has generally been concerned with the presence or absence of government interference in economic life, following the famous dictum "that government governs best which governs least." For this reason, departures from the free enterprise system have to be justified on strong economic and social grounds. It is a mistake to believe that individuals want no restrictions on decision making in their own economic activity. J. M. Clark has stated "It is no service to the principle of freedom and individual responsibility to overload the individual with more decisions than he can give proper attention to, or decisions of a character with which he cannot hope to cope successfully." [148/] Even apart from the wishes and desires of the individual, as society becomes more complex, there develops more need for restrictions on personal freedom for the protection and benefits of the many. The existence of near monopoly, the dangers to health, the pollution of air, water, and sound, the loss of privacy, the

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147/ U. S. Dept. of Agriculture, Forest Service, 1936. Op. Cit. p. 398.

148/ Clark, 1953. Op. Cit. p. 48.

increase in crime all require government intervention and controls to make life in the industrial age tolerable or even bearable.

A discussion of all the philosophical concepts of freedom would lead us far beyond objectives of this study. There are, however, three aspects of freedom that concern us with public rangeland. It has long been recognized that unrestrained freedom leads to conflicts. One means of preventing conflict is to draw a barrier around the area of conflict and, thus, to restrict the parties to the conflict to their sides of the barrier. This is accomplished in a wide area of conflicts by the existence of property and property rights. "Property involves the right to exclude." This has been interpreted at times as a restriction on freedom -- many social theorists have taken this position -- but by the avoidance of conflict and the possibility of exclusive use for one's own purposes, it has generally resulted in more rather than less freedom. The justification for property "in terms of broadening of freedom for any particular form or institution of property, must be urged in terms of whether the losses caused by the restrictions imposed are greater or less than the gains derived from the elimination of costly conflict." 149/

The free use of public grazing lands has been characterized by conflicts. Cattle wars and lesser fights over the use of the land have become the theme of western stories and movie "thrillers". The exercise of the right of exclusion of certain classes of users and the apportioning of grazing privileges to other users did resolve most of these conflicts and extend the general principle of freedom in the grazing industry.

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149/ Boulding, 1958. Op. Cit. p. 119.

The principle of freedom was further considered and extended by the practice of allowing the permit holders to transfer or sell their privileges with their livestock or with their private land. In addition, the policy of placing a considerable burden of decision making on the local officers assures local user participation in the decisions relating to local user problems. 150/ For this reason, advisory boards composed of citizens and users have been used at the local and national levels to advise the agencies in policy matters. 151/

These three policies relating to freedom, exclusion of non-permit holders, right to transfer, and participation in decisions, have gone far in the direction of giving permit holders a property right on the land they use. We shall consider this point in more detail later.

## Collective consumption goods

In addition to the failure of the market to supply the general objectives of economic policies, in as much abundance as the public may desire, there is another class of goods and services known as "collective consumption goods" or just "collective goods" for which the market either tends to undervalue or merely fails to supply in the quantity or variety wanted by society.

Examples of collective goods are national defenses, public health, pure air, and preservation of species of wildlife. The characteristic of these goods is that they

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150/ Clawson, Marion and Burnell Held. 1957. The federal lands: their use and management. Resources for the Future Inc. John Hopkins University Press, Baltimore. pp. 167-176.

151/ Proceedings of the Western Resources Conference. 1968. Ed. by Phillip O. Foss. Ft. Collins, Colorado.

Stoddard, Charles H. Public Participation in Public Land Decisions.

cannot be supplied by private enterprise, and when they are provided by the public their marginal cost to the individual in society is zero. Public health, in the sense of sanitation and the various controls over communicable diseases through spraying of swamps, etc., cannot be supplied in any one form to individuals who may be willing to pay for it. If it is supplied at all, it must be available to everyone. Since the marginal cost to any one individual is zero, once adequate health provisions are provided, it can be supplied free of charge. It is well recognized by all economists that goods which fall into this category should be provided by the public and paid for out of taxes. 152/ The problems arise out of such issues as how much of the collective good should be provided. There are no known ways of determining this. Nor, in fact, does the public know how much is being provided. In a like manner, national defense and national security are collective goods provided in bundles in such a manner that the public neither knows how much it needs nor how much is being supplied. Issues of this type will not concern us very much in public land policies related to the range livestock industry.

We are very much concerned, however, with mixed public collective goods and with limited public goods. 153/ Mixed collective goods are goods that are private in one use and collective in another, and limited public goods exist whose use once provided does not have a marginal cost of zero but as use increases the marginal cost of providing for more of it rises precipitously. 154/

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152/ Hirschleifer, Jack, Dr. James C. Haven and J. W. Milliman. 1960. Water supply, economics, technology, and policy. Published by the Rand Corp., University of Chicago. p. 80.

153/ Barkley, Paul and David W. Seclar. 1972. Economic growth and environmental decay. Harcourt Brace Jovanovich Inc., New York. pp. 130 and 134.

154/ Ibid. p. 134.

The rangelands provided us with numerous examples of both types of collective goods. Grazing of range livestock is a private use; wildlife, recreation, scenic beauty, and watershed protection are collective goods. To a certain level of use, all uses are complementary. Good stands of grass provide watershed protection as well as forage for livestock. Grass also provides cover and forage for wildlife. But as both domestic livestock and wildlife expand in numbers, they become competitive in their uses of the range. It is relatively easy to compute the marginal costs and returns to grazing of livestock, but there is no easy way of computing the marginal value product of wildlife, watershed protection, or scenic values. One of the difficulties is that we do not usually think in terms of marginal values at all with respect to public goods and services. We know that we want wildlife and watershed protection. We seldom ask ourselves or attempt to determine the value to the public or to recreationists of one more elk, deer or sagehen, or one more acre of watershed protection. As a result, we either tend to over value the private goods use or the collective goods uses depending upon personal biases. Hirschleifer et. al. would put the emphasis upon market values. "The position of the authors, and on such a fundamental matter all positions must be recognized as to contain an element of sheer faith, is that the system of market values -- as regulated and modified by the existing legal institutions -- can be considered to be a generally satisfactory guide to resource allocation decisions." 155/ The authors not only favor the market as a guide to resource allocation but they seem to imply that collective consumption wants are used frequently as a justification for the support of public goods which could not be justified on the basis of economic efficiency.156/

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155/ Hirschleifer, Haven and Milliman, 1960. Op. Cit. p. 82.

156/ Ibid. p. 82.

In contrast to this view, Barkely and Seclar state "it is quite possible that killing whales, cutting forests, and damming streams may create far more total costs (social costs) than total benefits. Yet such acts will continue because the collective losses are divided among so many people that the cost to any one person is rather small. The benefits of destroying collective goods, however, most often accrue to only a few people, making the rewards to each quite high. Economic and political power increases as it is concentrated and weakens when it is dispersed." 157/ These authors seem to imply that when collective goods can be used both as private goods and as public goods, the private users will win over the public users because the benefits accruing to them are more concentrated.

The two positions described above are both subject to criticism. The first approach if carried to its logical conclusion would lead to a bias in favor of market values to the exclusion of social values, to a point where collective goods no matter how socially important would be denied in favor of private goods no matter how trivial.158/ The second point of view also has its dangers. It is true that, in the case of a conflict of interests between private goods and collective goods, the benefits accruing to the private sector are more concentrated and, therefore, more subject to intensive

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157/ Barkley and Seclar, 1972. Op. Cit. p. 136.

158/ Galbraath's discussion in his book "The Affluent Society" is pertinent to this point. He points out that the conventional wisdom is so biased towards the production of goods by the private sector that the trade-offs may be more built in obsolescence or tail fins on cars as against pure air or investment in human intellectual development. He closes his book with this statement, "To have failed to solve the problem of producing goods would have been to continue man in his oldest and most grievous misfortune. But to fail to see that we have solved it and to fail to proceed thence to the next task, would be fully as tragic."
Galbreath, John Kenneth. 1958. The affluent society. Houghton Mifflin Co., Boston. p. 356.

effort to secure them by that group. On the other hand, the demand for the public goods are likely to be more diversified and the path to their attainment requires little more than an emotional response or a vote. They may be provided in quantity far in excess of their benefits and at the expense of intensively designed private goods. Methods of improving judgments on these matters and thus avoiding either extreme will be considered below.

## Collective goals and externalities

Both private and collective goals are likely to have external effects which, in many cases, requires governmental intervention either to enhance the external benefits or to prevent the external disutilities. External economics were first given wide recognition by Alfred Marshall. Marshall distinguished between external and internal economics accruing to a business or firm resulting from increases in the scale of production: "firstly, those dependent upon the general development of the industry; and secondly, those dependent on the resources of the individual houses of business engaged in it; on their organization and the efficiency of their management. We may call the former external economics and the latter internal economics." [159/] This concept later became a crucial issue in the field of welfare economics and the literature on it has expanded to a point where it comprises a separate division of the welfare economics field. [160/] The reason for the emphasis placed upon externalities is that

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159/ Marshall, Alfred. 1920. Principles of economics. 8th Ed. p. 266.

160/ Misham, E. J. 1971. The post war literature on externalities -- an interpretative essay. Journal of Economic Literature IX(1):1

much of the justification for government entrance into economic activities rests upon the proof or disproof of the thesis that the free competitive economy does not, in itself, provide for an optimum of external economics nor does it reduce external diseconomics to a minimum.

It is not our purpose to review the literature on externalities, but rather to consider externalities as special problems arising in public rangeland policy. Examples of such externalities are situations when a feedlot may be located near a river or stream in order that the stream may carry off the waste matter created by the feedlot, with little or no cost to the feedlot operators. Recreationists downstream who wish to use the stream for fishing or swimming will find the water too contaminated for such uses. The benefits of the stream as a means of sewage disposal for the feedlot operator accrue to him at no cost. The diseconomy of loss of recreational benefits or even loss of property value if the recreationists own homes or commercial buildings associated with the recreation area, will be borne by them as a result of the pollution of the stream. External economics may arise when permittees on the public range, through investments in range improvements, increase the carrying capacity of the range for domestic livestock, but in addition provide forage for wildlife; or again, when cattle ranchers build cattle watering facilities which are used also by wildlife. In the latter cases, recreationists and hunters receive benefits from those investments without costs; the costs being borne by the ranchers. Because the costs and benefits are difficult to pinpoint and even more difficult to assess, the allocation of costs and benefits between users gives rise to conflicts over policies in investments in public rangelands.

The use of public and private investments in rangelands of the type cited above are not, strictly speaking, collective goods externalities. Such externalities exist only

when the marginal cost to an additional user is zero. [161] If more cattle or wildlife use the range or the water holes, the cost of providing more water holes will be positive, or the opportunity cost of restricting the number of cattle or wildlife population will also be positive. The building of a road into the forest or rangeland can be used by recreationists, lumbermen, or cattlemen within the broad limits set by congestion without additional costs.

Externalities arising from both private and collective goods give rise to difficult policy decisions in public rangeland administration. How much investment should a permittee on the public rangeland be expected to make, if the benefits accrue to others besides himself? If the government makes the investments, how should the costs or payments be allocated among users? Should recreationists be made to pay for the range improvements which benefit them? If all investments are made by the government, do the agencies have enough funds to provide all the improvements that can be economically justified? If not, is public management of rangelands really protecting and developing the range resources as effectively as they would be protected under private ownership? These questions will be considered in a subsequent chapter.

Before we leave the issue of externalities, we must consider another type of external effect. These are what Schitovsky calls pecuniary external economics which are significant in economic development as contrasted with the types of interaction dealt with in equilibrium analysis. [162] Externalities of this type accrue to society,

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161/ Misham, 1971. Op. Cit. p. 9.

162/ Bator, Francis M. 1938. The anatomy of market failure. Quarterly Journal of Economics. 72:373.

generally in the form of economic development. Schitovsky described external pecuniary economics in the following manner: "Investment in an industry leads to an expansion of its capacity and may, thus, lower the price of its products and raise the price of the factors used by it. The lowering of product prices benefits the users of these products; the raising of factor prices benefits the suppliers of the factors . . . . according to the theory of industrialization, these benefits being genuine benefits should be explicitly taken into account when investment decisions are made." 163/ This concept was presented in somewhat different form by Rosenstein-Rodan in his famous example of the shoe factory employing 200 unemployed workers who produced shoes for which no market existed because the workers would not want to spend all their wages on shoes. "If instead one million unemployed workers were taken from the land and put into not one industry but into a whole series of industries which produce the bulk of the goods on which workers would spend their wages, what was not true in the case of one shoe factory would become true in the case of the whole system of industries." 164/ In this context, Rodan emphasized the importance of indivisibilities to economic development. Equilibrium economics depends upon infinitesimal changes in one sector of the economy having no external impacts on other sectors of the economy. If, however, changes occur in large batches, the "big push", external economics of large proportions will accrue to society.

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163/ Schitovsky, Thor. 1958. Two concepts of external economics. In: The Economics of Development. Ed. by Agarwala and Singh. Oxford University Press. p. 301.

164/ Rosenstein-Rodan, P. N. 1953. The problem of industrialization of eastern and southeastern Europe. Economic Journal.

Akin to these concepts of externalities, there is extensive literature relating to the process of transformation from a predominantly agricultural economy to an industrial society in underdeveloped countries. In these situations the external economics generated by an increase in productivity in agriculture lead to the shifting of labor from agriculture to manufacturing and trade. 165/ In most of these studies, the development of agriculture results in the generation of external economics which induce growth in dependent and service industries. A variant on this type of analysis is suggested by Albert O. Hirschman in his concept of backward and forward linkages. Hirschman argues that an industry once established will set in motion two inducement mechanisms: "(1) In input-provision derived demand, or backward linkage effect, i.e., every non-primary economic activity, will induce attempts to supply through domestic production the inputs needed in that activity, and (2) in output utilization or forward linkage effects, i.e., every activity that does not by its nature cater exclusively to final demands, will induce attempts to utilize its inputs as inputs in some new activities." 166/

With these extensions of the concept of external economics, we encounter justifications for a wide variety of government investment activities, not so much for the direct benefit stemming from the investments but for the external benefits they generate. It must not be presumed from the above discussion that all these extensions of the concept of externalities into the arena of economic development have been accepted by the equilibrium-oriented economists as true externalities. Misham rejects

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165/ Johnson, Bruce F. 1970. Agricultural and structural transformation in developing countries: a survey of research. Journal of Economic Literature.

166/ Hirschman, Albert O. 1958. The strategy of economic development. Yale University Press. New Haven. p. 100.

the validity of the concept of external pecuniary economics as used by Viner as well as the extensions of Rosenstein-Rodan thus: "the original clarity of the externality concept has become blurred in consequence of the term being used over the years as a convenient peg on which to hang a variety of economic phenomena which might be used to justify intervention in the private enterprise sector of the economy." 167/ Regardless of their use, the concepts do have validity. Since federal land agencies have on numerous occasions stated as an objective of public land management the stabilization of the livestock industry and of the local community and, more recently, the development of the western states, 168/ as much as we would like to dismiss the concept as irrelevant, and also dismiss with it many difficult problems in measurement and analysis, we cannot do so. Consequently, we will consider the external effects on community and regional stability of rangeland policies as they relate to the livestock industry and other components of the multiple use principle.

## The political process and economic objectives

When government intervention is required, either to correct or to supplement market behavior in optimizing economic objectives, recourse is usually made in a democracy to the political process.

If the public generally believes that it is not receiving enough of the collective goods or externalities it deserves, it has the opportunity to vote for individuals who

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167/ Misham, 1971. Op. Cit. p. 6.

168/ U. S. Dept. of Agriculture, Forest Service, 1936. Op. Cit. pp. 34 and 254.

will enforce the cause of expanding the supply of these goods. The political process has the advantage over the market process in allocating resources in that the political process adhered to the "one man one vote" principle over the "one dollar one vote" of the market.

Probably the weakest aspect of the political process in the allocation of resources is its lack of specificity. In the market if an individual desires a certain good he purchases it and in doing so he records his approval of that good and that one good alone. In the political arena, seldom does an individual have the opportunity to vote for one issue. Instead he is usually confronted with a choice between two persons representing two parties, each with a bundle of issues. Such an issue as a desirable allocation of range resources between domestic livestock and wildlife, watershed protection, etc. is likely to be a minor one. The voter's preferences are likely to be improperly registered amid the confusion over the package deal he must select. 169/

The best that can be hoped for in the political process is that interested parties will organize pressure groups which will force political parties to give attention to the issues involved. Such an approach, however, becomes a two edged sword. Pressure groups, once they have attained power, cannot be counted upon to use that power with

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169/ Buchanan, J. M. 1954. Individual choice in voting and the market. Journal of Political Economy LXII.

In an unpublished doctoral dissertation by Don McAbe. After examining voter responses to public issues in some 900 precincts in Idaho over the years, 1960-1966, no discernible response was detected to public issues. This would indicate that minor political issues would have little effect upon voter response.

McAbe, Don. 1972. Voting in Idaho 1960-1966: A precinct analysis of social and economic characteristics. (Unpublished).

restraint. There is also the possibility that such sources of political power will induce countervailing power on the part of other pressure groups.

We find ourselves thus confronted with a paradox. We recognize that the market cannot be counted upon to give us an optimum allocation of resources. The political pressure group approach is too unwieldy and dangerous to make fine decisions approximating an optimum. What then is the solution? The only alternative available in our present state of knowledge seems to be the use of competitive models based upon free market assumptions as standards of comparison for agency performance and then to work in the non-market factors as elements of improvement over the free market performance. In the final analysis the real improvement in performance, in the provision for collective goods, will depend upon the will and desire of the public agencies themselves to provide society with the goals and services it wants, in the combinations it wants, at the lowest possible cost.

## MEASURING PUBLIC AGENCY PERFORMANCE

### The cost benefit analysis

As a means of evaluating the individual projects as they were submitted to Congress for authorization by the Bureau of Reclamation and the Corps of Engineers, cost-benefit analysis was developed. The purpose of this analysis was to assure a uniform procedure for estimating costs and benefits for proposals submitted by these agencies. Congress could use such an analysis as a guide in selecting the most promising projects and thus allocate its limited funds to their best uses. The experience with cost-benefit analysis can be used as a basis for evaluating the performance of public land agencies as well as that of agencies concerned with water development.

It may be objected that public land agencies are primarily management agencies and are only incidentally concerned with investments. Any criterion used for evaluating investments are not applicable to them. This argument can be countered by pointing out that all agencies whether administrative, management, or construction oriented represent investments of public funds. They should, therefore, be evaluated on the basis of their performance records. Costs and benefits should apply to them as to any other investment activity. Every activity of a governmental agency either would have been performed in some manner without government intervention, or if it would not have been performed there would have been costs, economic or social, which were averted. If some analysis or model can be devised to evaluate the accomplishments without government action, or to measure the loss incurred by failure of the government agency to act, an approximation can be made of the accomplishments of the government action. To do this is the purpose of cost-benefit

analysis. In the broader measure, this is also the purpose of program planning and budgeting.

In 1946, an interagency committee was appointed to develop standard procedures for evaluating river basin projects. The committee, the Interagency Committee on Water Resources; Subcommittee on Evaluation Standards, published a report shortly thereafter. The publication is usually referred to as the "Green Book". 170/ The "Green Book", besides setting forth the procedures for evaluating the proposals for funding of projects, also defined the terms used in such proposals. The procedures for determining primary benefits, "the values of the immediate products or services resulting from the measures for which project costs and associated costs are incurred", were to be evaluated along conventional lines. These procedures present no particular interest for this study. Our concern is with the manner in which benefits arising from non-market values were handled.

The first edition of the "Green Book" can be characterized as conservative in its recognition of externalities, collective goods, and social values. Secondary benefits, which consist of the growth in an area induced or stemming from the projects, were recognized only partially as contributing to the value of the project. These benefits were restricted to estimates of values added on a with and without basis. Only such activities which would not have occurred without the project could be added, and only the value added of these projects would be included. The report did not recognize, as a benefit, regional economic growth attributable to the project. Even in the 1958 revision, growth factors were not included. The

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170/ Interagency Committee on Water Resources: Subcommittee on Evaluation Standards. 1958. Report proposed procedures for economic analysis of river basin projects. U. S. Government Printing Office, Washington, D. C.

"Green Book" states [171]

> ". . . although secondary benefits may be significant in the economic justification of projects from a local or regional point of view or in reinvestment and assessment considerations. . . .from a national point of view such benefits usually have little significance in project formulation, economic justification and array."

A second class of values which was considered, was intangibles. These benefits were defined as goods or services not measurable in monetary terms. They include such services as recreation, wildlife protection, conservation, etc; benefits which we have termed collective goods. The "Green Book" stipulated that these benefits should be described with care but no monetary value should be attributed to them. Unlike the benefits relating to regional economic growth, these services would be taken into account for project evaluation and array purposes. [172]

A third type of benefit which is akin to the objective of economic stability relates to contributions of projects towards full employment. During periods of full employment of labor and capital resources, public investment projects will tend to compete for labor and capital which would otherwise be employed. During periods of slack construction activity or low economic activity, generally these projects can employ labor and capital which otherwise would not be used. Even if the projects do not have favorable cost-benefit ratios, they may be justified on the basis of high social benefits and low social costs. The "Green Book" took cognizance of this situation by allowing an adjustment in either costs or benefits by the amount of unemployment benefits and relief payments that would be saved by employment on the project. [173]

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[171] Interagency Committee on Water Resources: Subcommittee on Evaluation Standards, 1958. Op. Cit.

[172] Gardner, B. Delworth and Allen LeBaron. 1966. Lectures on water resources development and conservation. In: The economics of water resources development and conservation. Proceedings of a Summer Institute in Water Resources Vol. II. Logan, Utah. p. 75.

[173] Ibid. pp. 75-76.

One other factor of significance relating to provisions for social wants is the rate of interest to be applied to arrive at the present value of future benefits. As it was pointed out above, the interest rate becomes a limiting factor for provision for the future. An interest rate of zero would mean that any positive benefits, no matter how small, could be used to justify projects as long as these benefits would occur within the lifetime of the project and would also cover the cost of maintenance. If interest rates are very large, say equal to the current commercial rates, most conservation projects would be uneconomical. This becomes a very important consideration because, in the case of government projects, the interest rates could be moved upward or downward to justify or to exclude any project regardless of its cost-benefit relationship. 174/ Reclamation projects by law require the homesteaders to repay only the construction costs over a period of 40 to 60 years without interest, whereas other construction agencies must count interest rates in computing their cost-benefit ratios. The "Green Book", in its first edition, suggested that the interest rate to be applied was that of long term government bonds. The 1958 edition of the "Green Book", however, suggested that the commercial rate rather than the government rate be used. 175/

In 1952, Budget Circular A-47 was issued by President Trumen which had the effect of putting many recommendations contained in the "Green Book" into operation. 176/ If anything, the Budget Circular was more conservative than the "Green

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174/ The authors were told by a former official in the German government that Germany had wanted to increase its forest reserves, since the commercial value of lumber was low and the period of time required for the increased growth was long, they would have difficulty in justifying the projects economically. What they did, therefore, was to determine first the expected benefits and costs and then to discover what rate of interest would be required to make the benefits exceed the costs. They therefore came up with an interest rate slightly less than 1% and thus were able to fund the projects.

175/ Gardner and LeBaron, 1966. Op. Cit. p. 74.

176/ Budget Circular A-47. p. 29.

Book". Secondary benefits were to be calculated along with the primary benefits but they were to be shown separately. But until standards and procedures were approved by the Bureau of the Budget, evaluation of projects were to be based upon primary benefits only. The length of repayment period for projects was reduced from a maximum of 150 years to 50 years. Recreational benefits were to be given full consideration, but they were to be treated as nonreimbursable federal expenses.

The impact of the "Green Book", its revision and Budget Circular 47 was to make public water and land projects difficult to justify economically. The criteria they need, for the most part, were criteria that private firms would use to justify investments. Viewed in this manner, if a project could meet the tests of cost-benefit analysis it could be profitable for a private firm to undertake it without government assistance. 177/

In an attempt to broaden the objectives of resource policies and to make them uniform throughout the government, President Kennedy in 1961 sent a memorandum to the Secretaries of the Army, Interior, Agriculture, and Health, Education and Welfare asking them to set standards for federal project evaluation. The recommendations were published as Senate Document 97. 178/ The recommendations broadened the scope of benefits which were to be included in project evaluations significantly. Regional development was considered as essential to national security and to the attainment of desirable levels of living. The Document stressed the need for entire river basin planning and for the various project plans to fit within the framework of the basin plans. Consideration was to be taken of less than full employment and of chronic unemployment and underemployment in specific areas. In

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177/ Folz, William E. 1963. Public and private investment in resource development. In: Land and Water Use. American Association for the Advancement of Science.

178/ U. S. Congress. 19 . Policies, standards and procedures in the formation, evaluation and review of plans for use and development of water and related land resources. Senate Document 97. 87th Congress 2d session.

taking these situations into account, benefits should be adjusted upward by the amount that the labor and other resources, used as a result of the project, exceeded that which would have been used without the project. 179/

The Document distinguished between secondary benefits accruing to the national economy and those accruing to regional, state, or local areas. The former category of benefits would be counted along with primary benefits in evaluating the projects. The latter type of benefits would also be evaluated, but they would be considered separately and an additional cost-benefit ratio would be computed to take these benefits into account.

Supplement No. 1 to Senate Document 97 dealt with the evaluation of outdoor recreation benefits. It recommends the use of a standard unit such as a visit of one individual to a recreation area for any part or all of a 24-hour period. It differentiates between general activities and specialized recreational activities, the former consisting of such activities as warm water fishing, swimming, picnicking, hiking, sight-seeing, etc. For general category types of recreation, values would be from 50¢ to $1.50 a day. For specialized recreational activities, benefits will vary from $2.00 to $8.00 a day. These are the estimated amounts a user would be willing to pay if charges were made. It provided that the lower end rates should be used in areas where recreation facilities are limited and where the area would provide only light use. In areas where the recreation would be pack-ins and big game, the middle and upper values should be applied.

Where intangible recreation facilities are found on a project such as scenic beauty, the evaluation report should include a narrative description of the

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179/ Senate Document 97, 19 . Op. Cit.

intangible asset, an estimate of the increase in project cost to provide such benefits, and an estimate in the reduction of benefits accruing to other project benefits to provide for the intangible. 180/

The passage of the Water Resources Planning Act of 1965 provided for comprehensive regional or river basin plans under the direction of the Water Resources Council. This Act was only one of several acts passed at about that time dealing with water and land resources, and environmental planning and development. In 1968, the Council revised the formula for interest rates then in effect for federal projects. Because of the wide response it received relating to the revision both from the public and from Congress, it decided to re-evaluate the entire procedure for project analysis. A task force was appointed consisting of representatives from the Departments of Army, Agriculture, and Interior, and from the Water Resources Council. After a series of public hearings and a study of the issues, the Task Force published its report in June, 1969. 181/

The Task Force report reviewed the objectives of planning as set forth by the Water Resources Planning Act as development, preservation, and welfare of people. It considered that these objectives would be best treated under national income, regional development, environmental enhancement and the well-being of the people. It recommended that these objectives be evaluated in four accounts under the same heading.

The position taken by the Task Force with reference to the externalities and collective wants were the same as those embodied in Senate Document 97, which in turn were provided for in the objectives of the Water Resources Planning Act of 1965.

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180/ Gardner and LeBaron, 1966. Op. Cit. pp. 86-94.

181/ Report of the Water Resources Council by the Special Task Force. 1969. Procedures for evaluation of water and related land resources projects. Water Resources Council, Washington, D. C.

The direct benefits contributing to the national income objectives were about the same as those included in the "Green Book" and in Budget Circular 42A-47, except that recreation benefits and intangibles were included as direct benefits. Recreational benefits were to be computed along the same lines as that provided in Supplement 1 of Senate Document 97. The Task Force stated that "it had no satisfactory basis for adjusting unit values but urges that the research on value of recreation that was recommended in Supplement 1 be vigorously pursued." 182/ Intangible benefits of "pursuing areas of natural beauty and scenic, historical and scientific interest" should be included as benefits. But the report gave no statement of a value to place on them. It pointed out, however, that "many improvements in the environment are not measured by 'willingness to pay' visitor-day approach".

Primary benefits also include fish and wildlife preservation and development. These values were to be computed in the same manner as recreation, but these benefits also include the intangible benefits of improvement of habitat and environment of wildlife and the preservation of rare species. Benefits also result from the increase in market value of commercial fish and wildlife less the associated costs. 183/

Secondary national income benefits consist of economies of scale in certain industries, such that projects may increase the inputs necessary for such economies to prevail. There also exists resource immobilities causing unemployed or underemployed production factors to exist in the region. If these immobilities or unemployed resources were the result of persistent economic factors, the removal

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182/ Report of the Water Resources Council by the Special Task Force, 1969. Op. Cit. p. 98.

183/ Ibid. p. 99.

of them would be considered a national income benefit as well as a regional one. If the unemployment was of a short term duration, it would provide no national income benefits. On the other hand, 184/

> ". . .if the. . . .analysis indicates the presence of an employment problem of significant dimensions, in terms of extent and duration, and further indicates that the project may enhance the locational or competitive factors likely to prevail within the region, a necessary condition for accrual of secondary national benefits will be considered to be met."

The treatment of national income benefits amounted to any situation in which the projection of the Office of Business Economics showed employment of the production factors to be below the national average, with a tendency to remain in this state over time. Any improvement of that condition would be counted as a national benefit.

The regional development objectives consisted of increased "regional income, improved geographical distribution of economic activity, enhancement of the regional economic base, or improved income distribution within the region itself." These objectives were to be measured on a strict "with or without" basis. The Task Force suggested that for differentiating the regional objectives from the national income objectives, that the region be treated as a closed economy and the income effects be treated on that basis. 185/

Environmental objectives consists of "conservation, preservation, enhancement, nondegradation, esthetics and environmental quality in general." No attempt was made to measure quantitatively nor economically these benefits. They were to be described in detail so that decision makers could get a full accounting of them.

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184/ Report of the Water Resources Council by the Special Task Force, 1969. Op. Cit. p. 105.

185/ Ibid. p. 113.

They appeared in the environmental account only as costs. 186/

> "The physical changes involved may be visibly evident and quantitative descriptions may be easily established by appropriate land classification terms or other measures. . . .No pretense should be made, however, that the cause and diffusion of all or even most environmental changes can be well measured or established, let alone evaluated."

Finally, the welfare objectives consist of effects of the project on life, health, income distribution, national defense, concentration of population, etc. These objectives were also to be measured and described although no monetary benefits could be ascribed to them.

Measuring performance -- the program planning and budgeting system

While the cost-benefit analysis was being developed to provide a basis for decision making in the federal water resources projects, the general theme behind this concept was being developed to measure performance of federal agencies in general. It will be beyond the scope of this study to make an analysis of the PPB system. Our only concern is its application to the federal rangelands.

PPB was first undertaken in the Department of Defense to devise a systematic basis for public decision making. The methods used were an extension of the cost-benefit analysis developed for water resources projects. This, together with the systems analysis techniques developed by the Rand Corporation, were used to allocate Defense Department expenditures among the various competing end uses of the funds. Where the objectives could be so defined as to give rise to economic and social benefits that could be measured, cost benefit calculations were made. If the ratio was greater than 1, there was a presumption that the project could be

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186/ Report of the Water Resources Council by the Special Task Force, 1969. Op. Cit. p. 115.

justified. On the other hand, [187]

> "In those cases in which the program output was difficult to define or measure, or when the output could not be valued, analysis undertook what is called cost-effectiveness analysis. In this form of analysis, the task becomes one of searching for the most effective or lowest cost means of attaining an explicit public sector objective, rather than an evaluation and comparison of the social value of benefits and the social value of costs."

Program planning and budgeting has five distinguishing features: (1) program accounting; (2) multi-year costing; (3) detailed description of activities; (4) zero base budgeting; and (5) quantitative evaluation of alternatives. [188]

Program accounting attempts to classify government activities by programs and then attempts to determine the expenditures by programs regardless of the agency in which the activities are undertaken. The program is a collection of activities that have the same function or objective and provide the same output. The purpose is to assemble all similar activities throughout the government and to place a price tag on them.

Multi-year costing requires that a program should consider not only the year for which the budget is cast, but the anticipated cost of the program over the years. In this manner, it is expected that if total costs are viewed relative to the program, a better judgment can be made of the costs in relation to the benefits. It also requires the agency to think through the entire program, and it prevents the practice of selling a program through low entrance costs and raising the ante later.

The detailed description of the activities involved is not only an elaborate statement of what is necessary to achieve the objectives of the program, but also

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187/ Haveman, Robert H. 1969. The analysis and evaluation of public expenditures: the PPB system. A Compendium of Papers Submitted to the Subcommittee on Economy in Government of the Going Economic Committee. 91st Congress 1st session. Vol. 1. U. S. Government Printing Office, Washington, D. C. pp. 6-7.

188/ Sosnick, Stephen H. 1966. The budgets' new clothes: A review of the costs and benefits of cost benefit analysis and other points of PPB. (Unpublished). p. 1.

a justification of each activity in the program. The purpose is to give the decision maker a better basis for discovering duplication of activities or to uncover excessive costs of activities representing inefficient or ineffective effort.

Zero-based budgeting requires, for each budget period, that the entire cost of the program for that period be presented and justified in place of a justification of the increases only. The purpose being to have the decision makers constantly aware of the entire cost of the program, and not to consider just the incremental increases each year that the agency may request. Incremental increases may be easy to justify, but if the entire budget is reviewed, the benefits in relation to the cost may be more easily ascertained.

Finally, the quantitative evaluation of alternatives brings into the analysis the cost-benefit analysis and the cost-effectiveness analysis for projects such as defense, for whose benefits no monetary value can be placed. 189/ Since our concern in this study is the analysis of the performance of federal land agencies, we are concerned mostly with this last feature of the PPB system.

Evaluation of cost-benefit and PPB procedures

The early attempts at cost-benefit methods of evaluation of government projects adhered closely to the welfare functions based upon neo-classical equilibrium analysis. 190/ As a result, most of the analysis leaned heavily upon the market mechanisms as the determinate of resource allocation. Departures from the market were frowned upon as aberations.

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189/ The above short review was taken from Sosnick, 1966. Op. Cit. It merely provided a brief description and omitted the analysis provided in Sosnick's manuscript. In general, Sosnick is quite critical of the PPB and is very skeptical of its usefulness considering the very great cost of applying it.

190/ Eckstein, Otto. 1961. Water resources development: The economics of project evaluation. Harvard University Press, Cambridge, Mass. Chapter II. pp. 14-46.

In a similar manner, most of the economists writing on government investments in water resources took positions closely related to those of the "Green Book". The economy was on safe ground only where the market mechanisms were applicable. The interest rate, as stated above, limits the period in which provision can be made for the future. As Jan Timbergen pointed out: 191/

> "The length of the period is the most difficult aspect of dispensing welfare; elements involved here are that longer term interests of one individual should not be forgotten vis-a-vis short term interests, but also that the distribution between generations should be observed."

This important welfare consideration the economists were willing to leave to the impersonal decision of the bond market for government securities or to the market for private investments. 192/

The expansion of public investment, as a means of alleviating unemployment, was also generally accepted with coolness. Most of the economists recognized the logic of accelerating public investment in times of unemployment, but they were fearful that if the investments were large enough to make a dent in unemployment, they would not meet the assumptions of marginal analysis. 193/ The difficulty is that when the marginal analysis concept is abandoned, products will be forthcoming in large enough quantities to have an impact on the market. There will, therefore,

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191/ Timberge, Jan. 1970. From economic to socio-economic development. The Environment and Society in Transition. Annals of the New York Academy of Sciences. New York. Vol. 184. p. 412.

192/ Hirschleifer, Haven and Milliman, 1960. Hirschleifer and his colleagues would apply a rate of about 10 percent to include the risk element on government projects. Such a rate would of course practically prevent all government projects from being constructed.

193/ Krutilla and Eckstein state "Implicit in the decision of the production functions and marginal adjustments in the competitive model was the assumption that the factors could be varied by small amounts. In some instances, however, there are technical reasons why factors can be employed only in large indivisible ."

Krutilla, I. and O. Eckstein. 1958. Multiple purpose river development. John Hopkins Press, Baltimore, Md.

be a price effect and an income redistribution effect which equilibrium analysis attempts to avoid. [194]

The treatment of external effects leading to economic development were also avoided in the economic analysis. These effects were usually treated under the term of secondary benefits. McKean recognized the economic nature of regional economic growth, but recommended against placing a value on it for project evaluation purposes. [195] Krutilla and Eckstein also back away from the consideration of regional development as a benefit to investments in water resources, stating [196]

> ". . .while the ultimate effect of a federally developed hydroelectric site in the Northwest results in some income transfer, a host of additional redistribution consequences among members of society also attends the federal development of hydroelectric projects."

The essence of the argument being that growth induced by government investment results in merely a redistribution of income and a measurement of the entire effect would not be possible. This is one of the essential weaknesses of the equilibrium approach. It does not and, by its nature, cannot emcompass growth. It can record only redistribution of income. This is testament to the treatment of growth as a zero sum game, i.e., the gain to one region must be compensated by a corresponding loss to the economy as a whole. Intangibles also found little support from the economists as well as from the "Green Book". In reviewing the books by Eckstein, Eckstein and Krutilla, and McKean, Margolis stated [197]

> ". . .most of the intangible benefits are concerned with social evaluation of such matters as conservation, the family sized farm,

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[194] Folz, W. E., 1963. Op. Cit. p. 326.

[195] McKean, R. N. 1958. Efficiency in government through systems analysis with emphasis on water resources development. A Rand Corporation Research Study. Wiley, New York.

[196] Krutilla and Eckstein, 1958. Op. Cit.

[197] Margolis, J. 1959. The economic evaluation of federal water resources development. American Economic Review 49:96-111.

> mobility of resources, effect upon the degree and type of competition, implications for public health, income redistribution or balanced regional development. . . .A danger in this procedure is evident in all three volumes, the intangibles are recognized but barely analyzed. Therefore, the significance of the tangible benefits will be weighed at the expense of the intangibles."

Viewed from the standpoint of objectives of economic policy, the early cost-benefit analysis recognized as benefits for the most part those objectives which were attainable by the mechanisms of the market. In taking this position, the authors of the "Green Book" and Budget Circular A-47 were in accord with the economic thinking of the time. If this position were accepted as valid, there is a danger that too much power would be conceded to the market. If decision making at the governmental policy level is limited to economic values, and these values in turn are limited to what can be evaluated in the market, it is apparent that the market determines not only the best choices among alternative programs of government, but it also determines what the objectives of government policies themselves should be. We shall examine this statement in more detail below. 198/

The extensive liberalizing of benefits contained in Senate Document 97 and in the report of the Council of Economic Advisors Task Force described below stimulated a second round of controversy by economists, this time of a generally critical nature.

The discount rate came in for additional discussion and revision. The rate used by the "Green Book", the long term government bond rate was $2\frac{1}{2}$ percent. This was considered too low for a full employment economy. The going private rate of interest was also rejected because it did not reflect all the costs borne by private business.

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198/ For a corroborative viewpoint, see Gramm, Warren S. 1963. Water resources analysis vs. private investment criterion and social priorities. Journal of Farm Economics 45(4):705-712.

The actual interest rate was, therefore, replaced by the concept of the social rate of interest. The private corporation, for example, may pay corporate taxes to the extent of 50 percent of its profits. If the rate on government bonds is 5 percent, the corporation will have to expect to receive 10 percent on its investments if it were to receive the opportunity cost rate on tax from bonds. Since taxes are a form of public investment, any other government investment which would return to society what the alternative employment of the investment would be if privately used would have to be 10 percent.

Interest rates in many private investments also reflect a risk factor. The greater the risk, the higher the interest rate. It was pointed out, however, by several economists that what is a risk to a private investor may not be a social risk at all. If the company fails, the investors lose, but the plant may still operate under different ownership arrangements. Therefore, the risk factor should also be taken into account in computing the social discount rate.

To arrive at the social discount rate, therefore, one must take into account: (1) the opportunity cost of private rates; (2) the taxes paid by the private corporation on corporate income; and (3) the risk factor on private investments. If the government were to approve an investment under conditions of full employment of resources, the discount rate on anticipated benefits would be the weighted average of these elements in private investments. 199/ That this type of computation would increase the interest rate significantly over the "Green Book" recommendation can be ascertained from the following quotation from a paper by one who

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199/ Baumal states: "We conclude that the correct discount rate is a weighted average, over all tax and risk circumstances, of the rate of returns that would otherwise be earned by the resources to be used in a government project." Baumal, W. J. 19 . The discount rate for public projects. In: The Analysis and Evaluation of Public Expenditures. Joint Economic Committee. p. 498

has attempted to compute the appropriate discount rates for government projects. 200/

> "The equalizer approach suggests that the rate of return in the non-corporate sector, before property taxes, is slightly over 10 percent. If we weigh the 15 percent corporate return and 10 percent non-corporate return, a 40 and 60 respectively, we derive at an overall estimate of 12 percent as the rate of returns before corporate and property taxes on investment in the entire private sector."

Since discount rates of this magnitude would tend to limit public investment in resource and environmental areas, it may be well to explore more deeply the justification for such constraints. Environmentalists and others who would like to emphasize the need to protect resources and to develop them for the use of future generations would protest that many projects of this nature would have negative present values if discounted at that rate. These individuals feel that there is not enough consideration given to needs of future generations as it is. 201/ Imposing such large discount requirements would decrease such investments below the optimal social needs.

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200/ Stockfisch, J. A. 1968. Measuring opportunity costs of private investment. The Discount Rate in Public Investment Evaluation. Proceedings of the Committee on Water Resources Development of the Western Agricultural Economics Research Council Report No. 17. p. 29.

201/ This is the position taken by Tobin as a justification for greater emphasis on current economic development (See Tobin, 1967. Op. Cit. p. ), and by Harrod in "Are Monetary and Fiscal Policies Enough." Harrod argues that stability of the economy using fiscal policy tends to encourage consumption at the expense of economic growth; consequently, the government should use indicative planning and even direct government investment measures to secure stability and more growth simultaneously. (See Harrod, R. F. 1964. Economic Journal Vol. 74)

Marglin argues that provision for the future in a good or collective which is not reflected in individuals' preference maps, private investments do not reflect these non-appropriable wants and, therefore, the provision for the future is less than optimum.

Marglin, Stephen A. 1963. The social rate of discount and the optimum rate of investment. Quarterly Journal of Economics. pp. 95-112.

To this argument the exponents of the opportunity cost approach retort: (1) that it is not certain that government projects will secure the best provision for the future, the government could encourage some investments in that direction by selective subsidies; (2) that taking funds from areas of high returns and placing in projects of low returns is no way to provide for future generations, private investments which are excluded may do it better; (3) that while they recognize the point that unrestorable scenic, mineral, and water resources when used up and cannot be replaced, this does not validate the conclusion that [202] "each generation is constrained to engage in overall efforts to support its posterity beyond the level that is indicated by the free market." Baumal goes on to say that the use of the opportunity cost formula for the discount rate is providing for future generations; is it necessary to provide more?

> "Per capita income has risen persistently throughout our history and there is every reason to expect the rise to continue. We are, therefore, wealthier than our predecessors and it can quite safely be predicted that our successors will be richer than we. In effect then, the substitution of a program of added investment amounts to an inducement for transfer of additional resources from the poor to the rich. It would take inputs whose product would be available for consumption today and make them available tomorrow when the supply of consumers' goods is likely to be much more abundant than it is at present."

Again the environmentalists may counter that Baumal and his colleagues have merely set forth the issue, they have not provided a solution. The issue to which the environmentalists are addressing themselves is whether or not we can maintain our rapid rate of growth and the quality of life acceptable to us with the rapid rate of disappearance of our resources. If the social rate of discount continues to rise, investments will be diverted more and more into private activities which place drains upon our resource base. Whether or not our technological

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[202] Baumal, 19 . Op. Cit. pp. 500-501.

advances are providing substitutes for natural resources, or devising methods for consuming these resources through more efficient use, is not a problem that can be solved by the economist with his theoretical models. Nor is there anything in the rate of discount, as constructed by methods described above, that will correct the interest rate in favor of the future generations if the fears of the environmentalists are realized. The issue is still wide open for negotiation between the "forebodings of doom" predictions of the environmentalists and the "live it up" optimism of the economists.

It should be pointed out further, however, that neither the economists nor the physical scientist has a monopoly on errors in projections especially when they are made into the distant future. A projection of a growth rate of 3 to 4 percent per year for the next 100 years would lead to heavy pressures upon our natural resources, provided the growth continues to require physical goods of the same type or product mix we have at present. The environmentalists are justified in being concerned or even alarmed.

But the economists' position cannot and should not be so easily discredited. With all the criticism leveled at the market mechanisms and market price, prices have always been good barometers of existing or impending scarcities. If any one or if all resources show any indication of becoming in short supply this fact will be registered in rising prices. Joseph L. Fisher states: 203/

> "If resource commodities were becoming scarcer in the economic sense, one would expect their costs and prices relative to costs and prices generally to have increased. Raw material price data over the past century, at least as they may be priced together, do not exhibit any market tendency to rise or fall except for the upward movement of forest products. . .Thus for this most obvious and direct indicator of resource availability, the movement of relative costs and prices, the overall picture does not indicate increasing scarcity certainly on any general or alarming scale."

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203/ Fisher, Joseph L. 1971. Impact of population on resources and the environment. The American Economic Review Proceedings. p. 393.

In fact the great concern for the future of developing countries has been the long term tendency for the terms of trade to turn against exports of primary products (products of the mines, forests and land). 204/

There are also indications that such factors as population growth, especially in the United States, tends to adapt itself to environmental requirements. 205/ If population can adjust to the constraints placed upon income growth by the limitations of available resources, it is not fair to ask -- will not human wants and desires also make the necessary adjustment? Will not economic growth in the future, in advanced countries at least, place more emphasis on services such as more learning, the arts and culture, and better quality in life than upon goods that place a drain upon resources?

Furthermore, the assumptions made by the environmentalists are that technology will remain constant or at least fail to compensate for the great increase in demand upon resources. There is ample evidence, however, that technology does respond to the requirements of environment. 206/ This is particularly true if prices of the resources are rising. Research and development in private firms have always been directed towards the search for cheaper substitutes for costly natural resources in the production process. Should raw material prices rise, more emphasis would be directed into this type of research. It has even been suggested that experiment stations of the type of the Agricultural Experiment Station be established to study environmental situations on which human welfare depends and, where possible, assist

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204/ Nurkse, Ragnar. 1961. Contrasting trends in nineteenth and twentieth century world trade. In: Nurkse, Ragnar. Equilibrium and growth in the world economy. Harvard University Press, Cambridge, Mass. pp. 282-336.

205/ Easterlin, Richard A. 1971. Does human fertility adjust to the environment. American Economic Review Proceedings. pp. 339-407.

206/ Kindleberger, Charles P. 1965. Economic development. 2d Ed., New York. Chapter 8. pp. 137-139.

in pointing out directions of social change that would be imposed by environmental requirements. 207/

The greatest objections to the economists' position, with respect to the interest rate, is the rigidity it imposes on goals of public policy. It is valid to make assumptions about the nature of the economy and to analyze the structure of the economy under these assumptions. If public policy is to be guided by this structure, however, there must be strong evidence that the assumptions are valid. Marglin has listed these assumptions as: (1) absence of increasing returns (which tend to create oligopolies); (2) absence of uncertainty; and (3) absence of constraints on methods of distributing income.

Under these assumptions, market gains associated with competitive equilibrium would represent social as well as private value, providing 208/

> "(1) that individual utility functions are a 'primitive' of the system, and (2) that social welfare increases whenever at least one individual's utility (as he measures it) increases while no one else's decreases."

Departure from these assumptions create distortions that will result in decreased rates of interest if computed in the manner described above. As a consequence, this does not reflect the optimum social intertemporal preference.

Since some of these distortions are of importance in our study, we shall review them. The idea that the economy reflects an absence of monopoly or oligopoly is significant. When oligopoly prevails, returns to these industries are higher per unit of input than in competitive business. In commenting on this point, Earl Heady stated:

> "The monopolist would produce a smaller quantity (of goods) and charge a higher price. The average product per unit of resource would be higher accordingly. In contrast, producers of a purely competitive

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207/ Rutlan, Vernon W. 1971. Technology and environment. American Journal of Agricultural Economics 53(5):707-715.

208/ Marglin, 1963. Op. Cit. p. 71.

> industry would have a lower price and produce a larger output. They would have a lower average product per unit of resource. Because of the lower resource returns do we claim that the competitive industry is inefficient and needs the greatest adjustment?" 209/

This point was also made by Tobin, who argues that the existence of monopoly enables such firms to secure rates of returns that are not available to either private investors or competitive industries. 210/

Investments in such activities as range improvement and rehabilitation, if undertaken by ranchers on private lands, usually do not reflect a very high rate of return. It is a common saying that a farmer receives an adequate return either on his labor or on his capital, but seldom on both. Range improvement usually absorbs a large amount of the ranchers own labor along with investments in materials and equipment. It is doubtful if any such investments earn the opportunity cost rate of interest if the full value of all inputs are calculated in the costs. Furthermore, the farmer and rancher usually have rising expectation of increases in capital value of their land. They are willing to sacrifice current income gains for long term capital gains. This accounts for the old saying that "farmers live poor and die rich."

A requirement of an opportunity cost discount rate on government investment in rangeland preservation and development would not only restrict conservation practices greatly, but it would also raise the question of the capability of the government to carry out conservation practices as efficiently as they could be accomplished under private ownership. If the lands were in private hands, range

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209/ Heady, Earl. 1959. Feasible criteria and programs: problems and policies of American agriculture. Iowa State University Center for Agricultural Adjustment. Ames, Iowa. p. 214.

210/ Tobin, 1967. Op. Cit.

improvements would be expected to be carried out to a lower marginal efficiency of capital rate than under government ownership. 211/

When so much by way of provision for the future and governmental policy hinges upon the discount rate, what rates should be applicable to government investment projects? Marglin offers some help. He suggests that projects be evaluated using shadow prices for costs and benefits and alternative interest rates; that Congress be presented with the alternative ratios together with the rate at which the present value of costs and benefits cross, i.e., equal one another. If Congress and its committees over the years select projects for funding, they as representatives of the people will decide upon the rate that reflects social intertemporal preference. 212/ Being neither Congressmen nor corporation we will use the interest rates for government investment as the rates at which the government borrows, and for private investment the rates at which the cattlemen borrow.

Aside from the discount rate issue and the intertemporal issues incident to it, the economists encountered much with which to concern themselves in the broadened criteria for computing benefits in Senate Document 97 and the report of the Special Task Force.

Shortly after the publication of Senate Document 97, a review of its evaluation procedures was published in the Journal of Farm Economics under the authorship of Castle, Kelso and Gardner. 213/ These authors questioned the national benefits

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211/ It should be pointed out that the opportunity cost rate of discount of 12 percent estimated by Stockfisch is not agreed to by all exponents of this approach. Haverman, using a somewhat different approach, estimated the social discount rate to be 7.3 percent.

Haverman, R.H. 19 . The opportunity cost of displaced private spending and the social discount rate. Proceedings of the Committee on Western Resources Development #17. p. 69.

212/ Marglin, 1963. Op. Cit. p. 82.

213/ Castle, Emery, Maurice Kelso and Delworth Gardner. 1963. Water resource development: A review of the new federal evaluation procedures. Journal of Farm Economics 45(4):693-704.

accruing from the stability criteria of providing for regional unemployment through project construction. In particular, they were concerned over the effect of providing employment on labor mobility when only the one region was experiencing unemployment. The authors also criticized the Document for including secondary benefits, which they considered synonymous with regional development, on the basis that regional development created no national benefits, and that if such benefits did exist they would be difficult to measure. If only regional benefits can be accounted for, there is a question as to whether or not the region rather than the nation should share in the reimbursement of costs. The authors also criticized the laxity in requiring only that benefits exceed costs. This, the authors ascerted, would encourage the project to be expanded beyond the point where marginal cost equals marginal benefit, a criterion stressed in the "Green Book" and also one very dear to the hearts of the neo-classists.

The method suggested for handling intangibles in Senate Document 97 also raised questions from the authors. The use of cost of supplying the service for an intangible benefit such as water quality, was tantamount to saying that we want this quality and the cost of getting it is the benefit. This approach affords no economic constraint on such a service. Recreational benefits were to be included at simulated market prices, the authors questioned the availability of approved methods of doing this.

After this rather crisp criticism of the evaluation criteria of Senate Document 97, the authors surprisingly take the position that nothing has changed. This is as much as saying that the new criteria were disastrous but not serious. The political process would continue to allocate funds and economists would continue to "look over the shoulders" of those responsible for decision making, but presumably they would not materially affect the outcome.

After the Task Force report, another group of economists tried their hand at evaluation. Drs. Knetsch, Haveman, Howe, Krutilla, and Brewer collaborated on a statement which was published by the Natural Resources Policy Center of George Washington University. 214/ The authors of this statement took the position that if federal funds were to be used to finance a project, there should be clear evidence of national benefits derived from the project. Under the conditions of full employment and of reasonably competitive conditions, the primary or direct benefits of the project and the market costs will measure adequately the total national economic cost and benefits. Under these conditions also secondary benefits will tend to have offsetting effects in other parts of the economy, and since their benefits are local or regional in nature, they should not be treated or counted in the national account as benefits.

The statement recognized that conditions do exist where the assumption of a reasonably effective working market system does not apply. These conditions occur: (1) during periods of unemployment in labor and capital; (2) where there is a lack of labor mobility from a depressed region or industry to one of full employment; (3) where there are economies of scale in the pertinent commodities produced by the project; and (4) where there is a lack of generally competitive conditions. Under these situations the undertaking of projects may give rise to secondary benefits of a national character and these should be evaluated and included in the cost-benefit calculations.

The statement issues the following warnings, however: (1) that unemployment must be of a fairly long duration or else the project cannot be activated in time

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214/ Knetsch, Jack L., Robert H. Haveman, Charles W. Howe, John V. Krutilla and Michael F. Brewer. 1969. Federal natural resources development: basis issues in benefit and cost measurement. Natural Resources Policy Center, George Washington University, Washington, D. C.

to do any good; (2) in calculating the benefits, labor and capital immobility should not be considered as lasting for the entire period of the project, the benefit derived from employing labor and capital that would otherwise not be employed should be credited to the project for only the appropriate period of time; and (3) that in cases where new industries are induced to locate in the area only the net comparative advantage should be counted as benefits, since a part of the additional activity would be acquired at the expense of loss of business in other areas; also, attention should be given to costs induced by such secondary benefits, i.e., the costs, to the cotton growing sector of the south, of cotton grown on irrigated land in the west.

The authors emphasize again that the national benefits should constitute the primary basis for project selection. Among the primary consequences of national resources projects are scenic beauty, recreational opportunities, and wildlife preservation. The authors believe that the measurement of the benefits of these "intangibles" would be better justified than pursuing secondary benefits.

A second evaluation of the Task Force criteria appeared several months later under the authorship of a larger number of equally impressive names. The statement by Robert J. Kalter et al entitled "Criteria for Federal Evaluation of Resource Investments" was published under the auspices of the Water Resources and Marine Science Center of Cornell University. 215/

The authors of this statement approach the problem within the framework of the institutional decision making processes of the Bureau of the Budget and the Congress. Before the project is acted upon by Congress it must be reviewed by the Budget

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215/ Kalter, Robert J., William B. Lord, David J. Aller, Emery N. Castle, Maurice M. Kelso, Daniel W. Bromley, Stephen C. Smith, S. V. Ciriacy-Wantrup, and Burton A. Weisbrood. 1969. Criteria for federal evaluation of resources investments. Water Resources and Marine Sciences Center, Cornell University.

Bureau where the conflicting interests of the various departments of government, which are conscious of the constraints of public spending, are brought to the attention of the Congressional Committee. Before the Committee acts upon the project, hearings are held in which groups favorable and unfavorable to the project have an opportunity to be heard. Economic efficiency matters which the cost-benefit analysis is designed to measure are only one of the features on which decision making is determined. Where multidimensional social objectives are being considered, efficiency is one characteristic, but only one, that is and should be taken into account. The function of the economic analysis should be to "show who is affected by a particular proposal, i.e., who receives what benefits and pays what costs, both market and non-market." Such an analysis goes beyond the efficiency concept and the constraints placed upon policy makers by such a formulation.

Since efficiency is only one of the considerations that should be taken into account, the field is now open for other objectives which in the past have been shunted into the background, such as regional economic growth, income redistribution issues, and environmental quality. 216/

The statement points out that economic analysis is most effective when the system operates under budget constraints, therefore, project analysis should explore a wider variety of alternatives than is usually provided to determine the cheapest means of attaining the desired objectives. This brings up the question of competitive relationships among objectives or trade-offs. The political process has usually functioned to decide on this matter, but more research is needed to determine the nature of the welfare factors involved, even though the weight given these factors in the final analysis will be provided by the political process. To

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216/ Kalter, et al, 1969. Op. Cit. p. 6.

accomplish this, analysis of past projects should be made so that better guides can be given planners and decision makers as to what was done in the past and the impact those activities had on the various social objectives which the projects set out to accomplish.

The authors of the statement were critical of the procedure outlined by the Task Force in separating costs and benefits among the several accounts. It was recommended that costs and benefits attributable to a given objective be allocated to that objective. They also objected to the concept of primary and secondary benefits and to tangible and intangible benefits. They recognized that such benefits as employment of unemployed resources, recognition of immobile factors and resources, and imperfect competition do exist and they should be accounted for as specific objectives. Such non-market benefits as quality of environment, recreation, and preservation of wildlife should be quantified as much as possible.

The authors' position of regional benefits was not clear. They warned that regional benefits and costs may be influenced by the description or identification of the region. They also warned that the implied assumption that if a region grows the income distribution resulting therefrom will be the proper one, is a questionable assumption; and that care should be taken in counting regional benefits as national ones. On the other hand, the authors stated that an accounting of regional benefits arising from the growth of the region is very important to record and that more effort should be placed in the future on doing so.

The authors further recommend that all considerations of equity be placed on a present value basis; some groups interested in equity considerations are indifferent to the time element of the program. They also stress that problems of risk and uncertainty be considered and the probability of the various outcomes occurring be estimated.

## The PPB System

The PPB System has floundered upon the same reefs and sands as the cost-benefit analysis, except that it has a few special hazards of its own. Robert Haveman in summarizing the issues facing PPBS has the following to say: [217]

> "From the outset, the PPB System has encountered serious obstacles which impeded improvements in the public decision process. Among the primary impediments which have been cited by observers of the System are the following:
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> The failure of many agency heads to demand program analysis or to use it in decision making when it was available;
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> The lack of interest in (and sometimes opposition to) the System by important congressional committees and congressmen;
>
> The failure of much legislation to clearly stipulate program goals and objectives and to provide funds for the collection of followup data and other program appraisal information;
>
> The existence of private interest groups which anticipate that hard and quantitative program evaluation will endanger the size or existence of expenditures which benefit them;
>
> The constraints on substantive and time-consuming policy analysis imposed by the annual budget cycle and process to which the PPB System is tied;
>
> A serious scarcity of analytical personnel in the PPB offices of civilian agencies;
>
> A basic resistance by many Federal employees to economic analysis and the difficult job of program evaluation;
>
> The lack of professional agreement on certain basic analytical issues, such as the appropriate public interest rate for discounting long-lived public investments, the development of shadow prices when outputs are not marketed, the evaluation of expenditures with multiple objectives, and the evaluation of public expenditures in regions or periods of less than full employment;
>
> The lack of adequate data from which to develop measures of the social benefits of outputs and social costs of inputs."

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[217] Haveman, 1969. Op. Cit. pp. 6-7.

In a more recent evaluation of the PPB System, Sosnick concluded that the procedure has so many limitations and involves so many additional costs that the value of the entire approach can be questioned.

1. Program accounting would involve a third set of accounts in addition to accounting by the object of expenditure and by agency. The problems of defining programs, of allocating joint costs between programs, and of compiling such records, would be very costly. Probably an alternative approach which would be less costly would be reorganizing the agencies according to function.
2. Multi-year costing would have the same disadvantage in that it would be very costly and the objective which would be to discourage the undertaking of certain types of activities, if the entire costs would be known, would not be accomplished in most cases. Only in the special cases where a given expenditure would lead to the requirements of additional large expenditures in the future once the program was undertaken, would this approach prove of value.
3. A detailed description of activities involves " statement of purpose, objectives, choices made, alternatives considered, outputs, and effectiveness." The statement of purpose is likely to encourage inflexibility in the agency, and the other purposes of the statement of activities may induce high level officials to reject certain programs because of their costliness but it is questionable whether or not the effect is worth the cost.
4. Zero base budgeting as a means of encouraging reallocation of expenditures has several weaknesses. It does not produce the kind of information that would lead to better decision making because most

such judgments are subjective in nature, it omits the previous year's budget which is an important piece of information, and it is costly.

5. Quantitative evaluation of alternatives involves either cost-effectiveness analysis or cost-benefit analysis. We have already considered the problems inherent in cost-benefit analysis. Cost effectiveness also has its limitations. It attempts to determine the most efficient means of attaining a certain objective. It does not consider the alternative of zero allocation. The decision is already made that the objective is desirable. The cost of evaluating all possible alternatives is very great. In addition, the issue of the scale of the operation requiring marginal cost be equal to marginal benefits, which cannot readily be quantified, the value of the cost-effectiveness approach rests entirely upon the cost-benefit analysis; 218/ and as we have seen above the cost-benefit analysis flounders on the issues in which public programs are most vitally concerned.

In spite of the difficulties that can be leveled at the PPB System, the essential purpose of the System should not be lost sight of, i.e., principles of economy in performance in the attainment of objectives. Even at considerable effort and cost, agency performance should be evaluated. It may be that the PPB is not the last word in procedure for such evaluation, but if it injects into government programs a sense of responsibility in keeping objectives before the decision makers and a feeling of obligation to show progress toward the attainment of objectives, a great step forward will have been made in efficiency in government.

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218/ Sosnick, 1966. Op. Cit. pp. 163-169.

## CONSERVATION OF RANGELANDS

### Maintenance and development

The objectives of public grazing land management, as set forth by the Taylor Grazing Act, are to: (1) stop injury to the public grazing lands by preventing overgrazing; and (2) to provide for their orderly use, improvement and development. The description of this objective which appeared in an appropriations act for the Department of Interior read: "For the administration of the public lands and their resources . . . . including their protection, use, maintenance, improvement, development, and disposal." 219/ The provisions for land protection and development as encompassed in this objective are usually encompassed by the generic term conservation. Because conservation has such an important role to play in public land policy, and because the term is so often misunderstood and misinterpreted, it may be well to consider its meaning for public grazing land management.

In an economic sense, conservation means the "redistribution of the rates of use of resources in the direction of the future." 220/ This definition makes conservation synonymous with economic growth. In both conservation and economic growth, the essential economic act is to forego immediate use or consumption for the benefit of future use or consumption. 221/ In economic growth, the current generation refrains from consuming all that it produces so that capital can be accumulated which will result in an increased production and ultimate consumption in the future. In conservation, the resources are either used on a sustained

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219/ 61 Stat 463.

220/ Hooper, Jack. 1970. Economics, the ecosystem, and conservation. Journal of Range Management 23(2):148.

221/ Tobin, 1967. Op. Cit.

yield basis, or they are improved in such a manner that they will yield more in the future. In either case, the process of conservation or economic growth involves restraints, either voluntary or imposed, on current use or consumption.

But if the act of saving makes goods available in the future, by the very definition there must be some idea or concept of future need and use. Conservation in the sense of locking up the resources for an indefinite period of time, with no plan for their ultimate use, makes no sense either from an economic or a social viewpoint.

In order that conservation can be accomplished, it is necessary to determine the nature of the resource to be conserved, the purposes or end uses to which the conserved resource is to be put, and the actions necessary to bring about such conservation. The first step in such a conservation program should be a classification of the resource into its various use capabilities. In the case of land considered primarily for livestock grazing, the classification should center around the capabilities of the land for producing forage for livestock grazing. With this in mind, the following classification is proposed.

1. The irreversible steep mountain slopes. These lands may be critical for watershed protection, but the soil is so thin and the vegetative cover so poor that any grazing will cause deterioration and endanger the watershed. Once the vegetation is removed below the critical stage, it cannot be reversed. The only method available to prevent further deterioration is to remove the animals from those areas, i.e., to prohibit grazing entirely. These forms of restraint upon current use are the only practical means of assuring a cover for the protection of water supply, both for the present and for future generations.

2. The areas which are reversible, but which have little rainfall or too poor soil to justify investments economically in improvements. The only means of protecting these lands from further deterioration is through limitation of grazing, or other types of management, or both. The provision for the future of this quality of land takes the form of restricted use to put the land on a sustained yield basis. If this class of land has no other use besides grazing, it may be well to consider seriously their prospects for yielding significant values for the future. In fact, there may be a question as to the extent to which government expenditures, even in management, are worthwhile. 222/

3. A third classification of rangelands are those that do respond to investments in improvements, such as reseeding, brush removal, spraying, fencing, impounding of water, etc., and to management. These lands which are not capable of justifying returns on intensive investment are, nevertheless, productive enough with moderate investments to provide adequate returns. Conservation on these lands provides for economic growth in the usual meaning of the term.

4. Finally, there are those lands which are marginal to crop production, but superior to class 3 lands. They are capable of greatly expanding carrying capacity at high investment intensity. These lands are

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222/ Kelso maintains that conservation is not a sufficient justification for government ownership (and management) on these lands, because the social cost of misuse is much less than in superior privately owned lands, mostly located east of the 100th meridian, because the productivity of the latter class of lands is much higher.

Kelso, M. M. 1952. Economic analysis of land use on the western range. In: The Future of Our Natural Resources, the Annals of the American Academy of Political and Social Sciences. Philadelphia, Penn. p. 142.

comparable to many of the LU lands which were submarginal for crop production in small acreages but capable of yielding good returns to grazing in ranches of large sizes. Like class 3 lands, these lands are capable of yielding adequate returns on investments.

These classifications can be illustrated by Chart I. The horizontal axis represents increased investments with variable capital input mixes. These investments are in dollar values and they represent varying combinations of management costs (reduction in number of animals or in period grazed, management plans, etc.); investments (reseeding, spraying, etc.); and labor inputs. Class 1 lands have only small response to management, and no economic response to other types of investments. Class 2 types respond to reduction in grazing intensity but only slightly to other investments. Class 3 lands require only temporary reduction in number but respond economically to other investments such that the carrying capacity increases significantly. Class 4 lands require no reduction in cattle numbers or intensity of grazing, but respond readily to both investments and management practices. These lands are capable of being not only restored to their native grazing capabilities but even to produce more forage than in their natural state.

The difficulty with land classifications in the past has been that they were based upon their soil capabilities only. Lands that are submarginal for crops can be highly productive for forage. Lands that are submarginal in small units, say 160 or 320 acres, may be highly productive in 10,000 to 20,000 acre spreads. This concept of marginal lands is probably responsible for some of the difficulties encountered by homesteaders in the western rangelands in the past. Once this concept of land quality is understood, land classification can be of assistance in directing management and investment policies.

Land classification under the Taylor Grazing Act

Land classification has been proposed for the public lands for many years, but the Department of Interior has been hampered by lack of funds for such an undertaking. A report in 1909 by George Otis Smith, Director of the Geological Survey, revealed that the Survey had classified land that was non-irrigable and, therefore, open to entry under the Enlarged Homestead Act. Smith urged in the report that land classification was an essential tool of conservation, in that it would enable the land resources to be put to their most important use. The Geological Survey was not in a position to give consideration to any other aspect of land classification except rainfall and availability of water for irrigation. 223/ The effect of the classification was to determine which lands could be entered under the various Homestead Acts. Gates points out that the difficulty of getting a useful classification of public lands was that the agencies responsible for their administration before 1900 did not possess trained scientists and economists for undertaking such a task. The removal of the U. S. Forest Service to the Department of Agriculture did remedy the situation somewhat for the lands under that agency's jurisdiction. 224/ Considerable progress was made to prune frontier deterioration of lands and even to reverse the process through management by the U. S. Forest Service, but the remainder of the public lands were given little attention from the conservation standpoint until the passage of the Taylor Grazing Act. 225/

Section 7 of the Taylor Grazing Act authorized the Secretary of the Interior to classify the lands within the grazing districts which were more valuable or

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223/ Gates, 1968. Op. Cit. p. 510.
224/ Ibid. p. 5.
225/ Ibid. p. 511.

suitable for production of agricultural crops than for production of forage. Such lands were to be subject to entry under the various land laws in units not to exceed 320 acres.

This power to classify gave an element of permanence to the public ownership of the lands, because the Secretary of Interior himself could determine whether or not the land could be put to a higher use. He could so classify or not classify land for disposal as he saw fit. 226/ The power to classify to dispose also provided the power to refuse to classify and dispose. This power was considered by Clawson to be an important means of preventing misguided homesteaders from getting into financial trouble, by attempting to put land incapable of growing crops permanently into crop cultivation. This also prevented large landowners from setting up dummy entrymen to secure for them the land they wanted. 227/

The procedure followed, under this provision of the Act, usually required the interested entryman to apply for the land he wished to homestead. If he could demonstrate, to the satisfaction of the agency, that the land could be put to a higher use economically, it may classify it for disposal. The fact that the land to be homesteaded could not be entered in units of more than 320 acres, assured the agency that land primarily for grazing would not be disposed of.

This limited use of the power to classify did not meet the needs for good land management for conservation purposes. It did not distinguish between grades of grazing lands which could be improved through investment and those that could be protected only through restricted use. The restrictions on sizes of units that

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226/ The authors of Senate Document 199 were quick to see this power as one that could be used to maintain public ownership of the lands.

U. S. Dept. of Agriculture, Forest Service, 1936. Op. Cit. p. 193.

227/ Clawson, Marion. 1971. The Bureau of Land Management. Praeger Publishers, New York. p. 77.

could be disposed of, precluded any of the land being disposed of that could be economically managed and conserved as private grazing lands.

The Classification and Multiple Use Act of 1960

A second dimension was given to the retention and/or disposal issue by the Classification and Multiple Use Act of 1960. Under the provisions of this Act, no longer would lands be subject to disposal merely by demonstrating that they could be irrigated for crop production, they must now be demonstrated to have no public value of significance for multiple use purposes. The Act listed ten activities which require multiple use management: 228/

> "domestic livestock grazing, fish and wildlife development and utilization, industrial development, mineral production, occupancy, outdoor recreation, timber preservation, watershed protection, wilderness preservation, and preservation of public values that would be lost if the lands passed from Federal ownership."

In implementing this Act, the Bureau of Land Management classified the land under its jurisdiction into three types. Type I consisted of land areas where public land comprised a large sector of the total and where the public land lay in large blocks, and where the land appeared likely to be retained in federal ownership and managed for multiple use. Type II land was land which was scattered among private users and which existed in small tracts and could not be managed without cooperation of private owners. Finally, Type III lands consisted of only small and scattered tracts of public land surrounded by large areas of private land. 229/

The Bureau is making long range plans for improvement, management and use of Type I lands. Type II lands may either be retained or disposed of, according to

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228/ 43 USC 141 (a) 1964.

229/ Clawson, 1971. Op. Cit. pp. 50-51.

the degree of multiple use involved, or exchanged for Type I lands. Type III lands would probably be disposed of. Clawson states that by the end of 1968, of the 153 million acres classified, 97 million acres were in the Type I category. 230/

By January 31, 1969 around 138,000,000 acres, of which 28,000,000 were in Alaska, were classified for retention for multiple use purposes and about 2,500,000 were classified or identified for disposal. At that time, the Bureau of Land Management expected to classify about 10,000,000 acres of land, outside of Alaska, for disposal purposes. It seemed that the Bureau was moving for a time towards the identification of land for disposal purposes. 231/ As public hearings were conducted on the retention or disposal of public lands, however, it became apparent that the public wanted retention for multiple use rather than disposal, and attempts to classify for disposal were opposed by the various interested groups. 232/

Classification of public lands appears to have been undertaken, for the most part, with disposal or retention in mind. Classification to provide a maximum of conservation, as the Taylor Grazing Act was enacted to obtain, was never undertaken on a large scale. If multiple use could be justified, public ownership was to be maintained. But public ownership, in itself, is no guarantee of good conservation practices. In cases where land requires intensive management or where investments in range rehabilitation and reseeding is desirable, there is no assurance that the public land agencies will have either funds necessary to make such investments, or will they be willing to give the private operator enough security in the tenure of his permits to induce him to provide such investments himself. A review of the

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230/ Clawson, 1971. Op. Cit. p. 50.

231/ Harvey, D. Michael. 1969. Public land management under the Classification and Multiple Use Act. Natural Resources Journal 2(1):246.

232/ Ibid. p. 247.

federal land policies, with respect to investments in rangeland, indicates that such practices were circumscribed by the issues involved in public ownership and retention and the problems surrounding the distributions of further privileges created by private vs. public investments in the grazing lands. No systematic or scientific method of determining the best means of carrying out a sound procedure for investments in land improvements was ever undertaken. Instead, the practices that were undertaken came about largely through the attainment of other objectives than land protection and development.

In the absence of a meaningful classification of land, with a view of determining an effective conservation program under public management, it would be surprising if effective conservation could ever be accomplished. Let us now review the efforts towards conservation that were undertaken by the agencies.

## INVESTMENTS IN RANGELAND IMPROVEMENT AND DEVELOPMENT

Illegal fencing and various water impoundments constituted the principal investment in rangeland developments prior to the setting aside of the forest reserves. The expenditures for such items were essentially all from private capital.

Attitudes about and expenditures for range development and improvement may be divided into two periods. After regulation of grazing use on the public lands was initiated, activities and investments for range improvements were directed to maintaining or improving the resource through regulation of animal numbers, season of use, distribution and implementing grazing systems. During the second period, a number of events caused an acceleration in range improvement programs. Substantial investments were made during this period for water developments and fences to improve use and distribution of animals over the range; and range rehabilitation through seeding, brush control, weed and poisonous plant control, rodent and predator control, and erosion control measures.

### Period of maintenance and low investment

No scientific body of knowledge existed as a basis for rangeland management in 1890. Cattlemen and sheepmen, 233/ through experience, gained some understanding of the effects of grazing practices on rangeland productivity but were ineffectual in applying this knowledge widely because of existing land use policies and attitudes.

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233/ Bentley, H. L. 1898. Grasses and forage plants of central Texas. U. S. Dept. of Agriculture, Division of Agrostology. Bulletin No. 10. p. 10.

Following transfer of the forest reserves from the Department of Interior to the Department of Agriculture in 1905, much effort was expended in working out grazing regulations and assigning grazing permits for the use of the reserves. Great hope existed that range management would cure most ills of the range. 234/ Livestock damage to ranges was attributed by Potter in 1905 to overstocking, grazing too early in the season or the manner in which stock were handled. 235/ Most of these effects were considered to be due to a lack of any system of management rather than to number of sheep and cattle. Studies by the Divisions of Agrostology and Botany 236/ in 1899 demonstrated that through alternate grazing and resting, carrying capacity of the range could be substantially improved. 237/

The idea that improvement of the range resource could be accomplished by improved management of animals was advanced by a number of workers in the Department of Agriculture and the State Experiment Stations early in the development of range science. 238/

Although grazing management was the principal focus in the beginning of public land management, artificial seeding was also considered. Grass planting experiments were first undertaken by the Department of Agriculture in the period from 1895 to 1900. 239/ Results were generally disappointing except those conducted in mountain meadow areas. 240/ Of the 499 seeding experiments begun in 1907 by the U. S. Forest

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234/ Roberts, 1963. Op. Cit. p. 98.

235/ Ibid. p. 98.

236/ The Division of Agrostology and Botany were absorbed in the newly formed Bureau of Plant Industry in 1901.

237/ Bentley, H. L. 1902. Experiments in range improvements in central Texas. U. S. Dept. of Agriculture, Bureau of Plant Industry. Bulletin No. 13.

238/ For reference and listing of such studies see: Talbot and Cronemiller, 1961. Op. Cit. pp. 95-102. U. S. Dept. of Agriculture, Forest Service, 1944. Op. Cit. pp. 127-143.

239/ Stoddart and Smith, 1955. Op. Cit. p. 353.

240/ Cotton, J. S. 1908. The improvement of mountain meadows. U. S. Dept. of Agriculture, Bureau of Plant Industry Bulletin No. 127. 29 pp. p. 23.

Service, in cooperation with the Bureau of Plant Industry, only about 16 percent were considered fully successful by 1911. 241/

Thus, management of national forests during the period from 1905 to about 1936 stressed regulating and controlling use so as to provide for a sustained yield from the forage resources. Investments in range improvements were largely for this purpose. Fencing to prevent drift of animals, development of stock water to provide for better distribution of animals, control of predators, control of range pests such as ground squirrels, prairie dogs and poisonous plants and construction of roads and trails for movement of livestock were the principal items of range improvement investments. Investment in artificial revegetation was limited during the early period largely because of the disappointing results obtained during the early studies.

Total capital investments for improvements installed on national forest ranges was estimated to be about 5.8 million dollars, or about $0.07 per acre by 1936. 242/

Livestock permittees cooperated significantly in range improvements investments such as fences and stock water developments during the early period of range management on the national forests. 243/ Secretary of Agriculture Wilson, however, pointed out that development of the range to its fullest usefulness would require the investment of public money in range improvements. 244/

No authority or mechanism for investment in range development existed for the unreserved and unappropriated public domain until passage of the Taylor Grazing Act in 1934.

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241/ Sampson, Arthur W. 1913. The reseeding of depleted grazing lands to cultivated forage plants. U. S. Dept. of Agriculture Bulletin No. 4. 34 pp. p. 7.

242/ Forsling, C. L. et al. 1936. The administration of public rangelands. In: U. S. Dept. of Agriculture, Forest Service, 1936. Op. Cit. p. 463.

243/ Wilson, James. 1911. Report of the Secretary. In: Yearbook of Agriculture 1910. U. S. Government Printing Office, Washington, D. C. 711 pp. pp. 95-96.

244/ Ibid. pp. 95-96.

Period of accelerated investment in range improvements

A number of events in the late 1920's and early 1930's stimulated investments in range resource development. Overproduction of farm commodities, drought, former land settlement policies and other factors combined to produce extremely unfavorable economic conditions throughout the country. 245/ Rangelands became overstocked, erosion accelerated, and unsound farming practices and land tenure arrangements became apparent. Unemployment was widespread and many farm and ranch families became stranded on production units of uneconomic size.

Problems connected with land use were considered at a National Conference on Land Utilization called by the Secretary of Agriculture in 1931. 246/ Recommendations from the Committee were incorporated in the "New Deal" programs of the Franklin Roosevelt administration. Many of these programs provided funds and incentives for range improvement and development. Such investments, however, were often secondary to a primary purpose of providing employment to unemployed people. 247/

The Emergency Conservation Act of 1933 and creation of the Civilian Conservation Corps provided a means of investing in range development and improvement on public lands. Substantial progress was made during the 1930's and early 1940's in seeding depleted rangelands, providing fencing, water developments and controlling noxious plants. 248/ Corps activities were allocated to various land agencies involved with range development and improvement needs.

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245/ Gray, L. C. 1939. Federal purchase and administration of submarginal land in the great plains. Journal of Farm Economics 21(1):123-131.

246/ Dana, 1956. Op. Cit. p. 243.

247/ Clawson, Marion. 1951. Uncle Sam's acres. Dodd, Mead and Co., New York. 415 pp. p. 336.

248/ Dana, 1956. Op. Cit. p. 248.

The "National Plan for American Forestry" [249] printed in 1933 indicated an urgent need for capital investment for range improvements. Proposed annual expenditures for a ten-year period were:

1. $150,000 for capital investments in water development and fences, and $30,000 for maintenance.
2. $50,000 in the first year and up to $500,000 in the tenth year for eradication of poisonous plants on 100,000 acres.
3. $50,000 in the first year and up to $68,000 in the tenth year for rodent control on 5 million acres.
4. $2,500,000 in a 20-year program for revegetation of 810,000 acres of depleted range.

The above suggestion would have advanced capital investment charges from 0.2 cents to 0.443 cents per acre.

Recommendations for federal purchase of submarginal land used for farming was recommended by the National Resources Board in 1934. About 11 million acres of land were acquired by purchase from private, state and county sources, and by transfers from other federal agencies. Of the total acreage acquired, the primary use on about 7 million acres was grazing. [250]

The land purchase and land use program was designed to restore submarginal farm lands to a use for which these lands were best suited. In the case of those lands which were primarily suited for grazing, extensive rehabilitation programs were needed. Range improvement projects, completed by 1954, on 6.9 million acres

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[249] U. S. Forest Service. 1933. A national plan for American forestry. Senate Document 12. 73d Congress 1st session. U. S. Government Printing Office, Washington, D. C. 1677 pp. p. 1312. (This document is sometimes referred to as the Copeland Report).

[250] Wooton, H. H. 1965. The land utilization program 1934 to 1964: origin, development and present status. U. S. Dept. of Agriculture, Economic Research Service. Agricultural Economic Report No. 85. p. 20.

in 68 projects showed 909,606 acres seeded to adapted species, seedbed preparation on 226,865 acres, brush control on 31,749 acres, 13,563 miles of fence, 5,306 stock water developments and the construction of 1,527 miles of roads and trails. Much of the development and improvement work was done under the C.C.C. and other relief programs such as the W.P.A. [251]

The seeding of nearly 1 million acres of abandoned cropland and deteriorated rangeland in land utilization project areas was of particular significance in range improvement programs that followed. Seeding techniques had evolved substantially over the early range seeding programs of the U. S. Forest Service. Machinery for clearing the land and planting the grass species was adapted from farm machinery used in cropland agriculture. The introduction of crested wheatgrass in 1898 and again in 1906 from Russia [252] had a profound influence on range development through artificial seeding. After introduction of this grass species, studies at agricultural experiment stations and by the U. S. Department of Agriculture showed it to be well adapted to the semi-arid lands of the west. During the 1930's and early 1940's, crested wheatgrass was planted on abandoned farmland throughout the plains region and the intermountain country with outstanding success.

Following passage of the Taylor Grazing Act in 1934, the small staff of 36 employees in the Division of Grazing in 1936 [253] was fully occupied establishing grazing districts, allocating permits, establishing grazing advisory boards and other similar duties. Range developments such as fences, seeding, water developments, etc., were largely accomplished through action of the Civilian Conservation Corps and emergency funds appropriated by Congress in the 1930's.

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[251] Lands under the Bankhead-Jones Farm Tenant Act. 1955. Hearings before the Subcommittee on Conservation and Credit of the Committee of Agriculture, House of Representatives. 84th Congress, 1st session. p. 10.

[252] Dillman, A. C. 1946. The beginnings of crested wheatgrass in North America. Journal of the American Society of Agronomy 38(2):237-250. p. 238.

[253] Gates, 1968. Op. Cit. p. 599.

In the 5-year period from 1934 to 1939 investments in 358 spring developments, 143 wells and storage facilities, 780 earth reservoirs, 1950 miles of range fences, 225 corrals, 1750 miles of stock trails, 4950 miles of truck trails, 185 bridges, 245 cattle guards, treatment of 7,300,000 acres for rodent control, and eradication of poisonous plants on 330,000 acres had been made on public domain administered by the Division of Grazing. 254/

The "Green Book", published in 1936, did much to stimulate interest and investment in the federal rangelands of the western states. This report indicated that forage producing capabilities for the entire range area had declined to a point where forage production was less than one-half pristine conditions and that action of the greatest immediate urgency and importance was needed to restore these lands to their former productivity. 255/

As indicated earlier, total capital investments for improvements installed on national forest ranges was estimated to be about 5.8 million dollars, or about $0.07 per acre by 1936. 256/ These investments included range fences, corrals, stock driveways, water developments, buildings, range surveys, and management plans. An estimate of investments, needed for additional improvements, developments and other programs, required annually on 82.5 million acres of national forest range were: 257/

1. $102,000 annually for range surveys and management plans over 5 years or a total cost of $512,000 on 56,800,000 acres.

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254/ Taylor, Edward T. 1939. The building of the Federal range. Reprinted from the Congressional Record. June 29, 1939. 3 pp. p. 3.

255/ The "Green Book" was a term applied by ranchers to: U. S. Dept. of Agriculture, Forest Service, 1936. Op. Cit.

256/ Forsling, et al., 1936. Op. Cit. p. 463.

257/ Ibid. p. 464.

2. $136,000 annually for revegetation of 780,000 acres over a 20-year period for a total cost of $2,730,000.
3. $128,000 annually for rodent control on 8 million acres over a 5-year period for a total cost of $640,000.
4. $438,000 annually for 13,300 miles of fence over 10 years for a total cost of $4,376,000.
5. $336,000 annually for 8,205 water developments over a 10-year period for a total cost of $3,362,000.

Additional investments in existing improvements were estimated at a total cost of $5,768,000. These proposed additional investments would bring the total investment in rangeland grazed to $0.2107 per acre.

Estimates were also made by the U. S. Forest Service in 1936 for capital investments required for the 149.4 million acres of range in grazing districts, unreserved public domain and other unregulated areas. These amounted to $3,536,000 annually for the first 5-year period. 258/ The total estimated investment would amount to $0.39 per acre. Suggested investments included money for range surveys and management plans on 149,390,428 acres, artificial revegetation on 18 million acres, rodent control on 40 million acres, construction of 16.9 thousand miles of fence and 6,050 water developments.

Investment in range improvements during the late 1930's and early 1940's increased because of the indicated need and other programs of the federal government previously mentioned. A temporary slowdown in range improvement investment, however, occurred during the World War II years.

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258/ Forsling, et al., 1936. Op. Cit. p. 465.

In 1945, the Chief of the Forest Service reported 85,400 acres of rangeland in western national forests had been seeded between 1933 and 1945 but that there were 4.2 million acres that needed seeding. 259/ Over 14,000 range water developments had been constructed on the national forests by 1945 but many more were needed. 260/

During the late 1940's and early 1950's range improvement and development programs accelerated rapidly. Pearse 261/ had pointed out that on 80 million acres of rangeland the better forage plants had been largely eliminated and that artificial seeding was the only hope of restoring these lands in the span of a lifetime. With improved machinery and a well adapted grass species (crested wheatgrass), the planting of thousands of acres of depleted rangeland followed.

Halogeton, a poisonous introduced annual weed, added stimulus to the rehabilitation of several million acres of rangeland in the intermountain states of Nevada, Utah, Idaho, Wyoming and Oregon. Halogeton and beet leaf hopper control funds appropriated by Congress were used to seed approximately 633 thousand acres of depleted rangeland from 1950 through 1964. 262/ Thousands of acres were seeded with other funds.

Once an established stand of grass was obtained, fences and water development investments were made to protect the seeding and regulate its use by domestic livestock. The use of herbicides to control brush and other undesirable plants became a common range improvement practice on western rangelands after World War II.

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259/ U. S. Dept. of Agriculture. 1956. Report of the Chief of the Forest Service. U. S. Government Printing Office, Washington, D. C. p. 23.

260/ Ibid. p. 23.

261/ Pearse, C. Kenneth. 1947. Regrassing of the range. In: The yearbook of Agriculture, 1943-1947. U. S. Government Printing Office, Washington, D. C. 944 pp. p. 897.

262/ Source: Data supplied by the Bureau of Land Management.

Range improvement and development activities on land administered by the Bureau of Land Management are shown in the following table:

Table 48. Selected range improvement and development accomplishments on public domain lands, 1935-1970.

| Activity | Units | Period | | Total |
|---|---|---|---|---|
| | | 1935-1962 a/ | 1963-1970 b/ | |
| Brush Control | Acres (Million) | 1.8 | 1.8 | 3.6 |
| Range Seeding | no | 2.8 | 1.6 | 4.4 |
| Fencing | Miles (1000) | 24.0 | 25.0 | 56.0 |
| Water Structures | Number (1000) | 117.0 | 53.0 | 180.0 |

a/ Subcommittee on Public Lands of the Committee on Interior and Insular Affairs, United States Senate. 1963. Review of the Taylor Grazing Act. 88th Congress, 1st session. U. S. Government Printing Office, Washington, D. C. 988 pp. p. 744.

b/ U. S. Dept. of Interior, Bureau of Land Management. 1963-1970. Public land statistics. U. S. Government Printing Office, Washington, D. C.

Compilations by Clawson show investments in range improvements and developments to be about 172 million dollars from 1941 through 1965 on federal land administered by the U. S. Forest Service and the Bureau of Land Management (Table 49). Since land allocated for grazing by the 2 agencies was 262.7 million acres in 1966, the average investment per acre during this period was $0.65.

Average investment on the 105.4 million acres of land allocated for grazing in 1966 by the U. S. Forest Service was calculated as $0.29/acre, using the investment values in Table 49. Similar calculations showed an investment of $0.90/acre on the 157.3 million acres allocated for grazing by the Bureau of Land Management in 1966. Of the $0.90 per acre investment on public domain, $0.26 or 29 percent was contributed by private and other non-federal users. Selected years from 1951 through 1961 show a general tendency for contributions from the private users to be declining. Private users of the public domain contributed 43 percent in 1951, 26 per-

Table 49. Investment expenditures for range improvements and developments on national forest and public domain lands administered by the Bureau of Land Management, 1941-1965. a/

(Thousands of Dollars)

| Fiscal Year | National Forest Lands | | | Public Domain Lands | | | | | | | | | Total Public Domain | Total Both Agencies & All Programs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Soil & Moisture | | | Range Improvement | | | Weed Control | | | | |
| | Re-Vegetation | Range Use Improvements | Total | Federal | Range & Other Users | Total | Federal | Range & Other Users | Total | Federal | Range & Other Users | Total | | |
| 1941 | -- | -- | -- | -- | 203 | 203 | -- | 391 | 391 | -- | -- | -- | 594 | 594 |
| 1942 | -- | 418 | 418 | 937 | 164 | 1,101 | 235 | 303 | 538 | -- | -- | -- | 1,639 | 2,057 |
| 1943 | -- | 219 | 219 | 617 | 98 | 715 | 109 | 192 | 301 | -- | -- | -- | 1,016 | 1,235 |
| 1944 | -- | 283 | 283 | 640 | 98 | 738 | 114 | 210 | 324 | -- | -- | -- | 1,062 | 1,345 |
| 1945 | -- | 305 | 305 | 579 | 132 | 711 | 156 | 232 | 388 | -- | -- | -- | 1,099 | 1,404 |
| 1946 | -- | 339 | 339 | 596 | 177 | 773 | 157 | 219 | 376 | -- | -- | -- | 1,149 | 1,488 |
| 1947 | -- | 685 | 685 | 678 | 170 | 848 | 231 | 480 | 711 | -- | -- | -- | 1,559 | 2,244 |
| 1948 | 548 | 277 | 825 | 711 | 76 | 787 | 253 | 345 | 598 | -- | -- | -- | 1,385 | 2,210 |
| 1949 | 775 | 466 | 1,241 | 987 | 104 | 1,091 | 307 | 346 | 653 | -- | -- | -- | 1,744 | 2,985 |
| 1950 | 712 | 602 | 1,314 | 910 | 191 | 1,101 | 282 | 1,391 | 1,673 | -- | -- | -- | 2,774 | 4,088 |
| 1951 | 687 | 280 | 967 | 983 | 201 | 1,184 | 530 | 1,045 | 1,575 | -- | -- | -- | 2,759 | 3,726 |
| 1952 | 689 | 273 | 962 | 1,174 | 207 | 1,381 | 569 | 1,308 | 1,877 | 1,825 | -- | 1,825 | 5,083 | 6,045 |
| 1953 | 665 | 378 | 1,043 | 1,436 | 291 | 1,727 | 443 | 1,897 | 2,340 | 1,312 | 176 | 1,488 | 5,555 | 6,598 |
| 1954 | 583 | 335 | 918 | 1,711 | 356 | 2,067 | 380 | 1,820 | 2,200 | 1,093 | 153 | 1,246 | 5,513 | 6,431 |
| 1955 | 506 | 174 | 680 | 1,701 | 223 | 1,924 | 532 | 1,672 | 2,204 | 647 | 113 | 760 | 4,888 | 5,568 |
| 1956 | 726 | 336 | 1,062 | 2,739 | 227 | 2,966 | 535 | 1,359 | 1,894 | 699 | 115 | 814 | 5,674 | 6,736 |
| 1957 | 896 | 358 | 1,254 | 3,218 | 227 | 3,445 | 495 | 1,202 | 1,697 | 703 | 61 | 764 | 5,906 | 7,160 |
| 1958 | 829 | 571 | 1,400 | 3,572 | 299 | 3,871 | 591 | 1,404 | 1,995 | 573 | 55 | 628 | 6,494 | 7,894 |
| 1959 | 912 | 570 | 1,482 | 3,765 | 530 | 4,295 | 569 | 1,756 | 2,325 | 1,058 | 89 | 1,147 | 7,767 | 9,249 |
| 1960 | 915 | 593 | 1,508 | 3,721 | 333 | 4,054 | 886 | 1,329 | 2,215 | 833 | 122 | 955 | 7,224 | 8,732 |

Table 49. (Continued)

(Thousands of Dollars)

| Fiscal Year | National Forest Lands | | | Public Domain Lands | | | | | | | | | Total Public Domain | Total Both Agencies & All Programs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Soil & Moisture | | | Range Improvement | | | Weed Control | | | | |
| | Re Vegetation | Range Use Improvements | Total | Federal | Range & Other Users | Total | Federal | Range & Other Users | Total | Federal | Range & Other Users | Total | | |
| 1961 | 1,035 | 753 | 1,788 | 5,117 | 510 | 5,627 | 755 | 1,519 | 2,274 | 797 | 150 | 947 | 8,848 | 10,636 |
| 1962 | 1,432 | 1,217 | 2,649 | 6,345 | 600 | 6,945 | 666 | 1,825 | 2,491 | 894 | 182 | 1,076 | 10,512 | 13,161 |
| 1963 | 1,446 | 1,825 | 3,271 | 9,989 | 886 | 10,874 | 820 | 2,694 | 3,514 | 853 | 269 | 1,122 | 15,510 | 18,781 |
| 1964 | 1,497 | 1,871 | 3,368 | 10,201 | 941 | 11,142 | 1,349 | 2,864 | 4,213 | 850 | 287 | 1,137 | 16,492 | 19,860 |
| 1965 | 1,448 | 1,202 | 2,650 | 11,931 | 1,077 | 13,008 | 1,355 | 3,279 | 4,634 | 907 | 328 | 1,235 | 18,877 | 21,527 |
| Total 1941-1965 | 16,301 | 14,330 | 30,631 | 74,258 | 8,320 | 82,578 | 12,319 | 31,082 | 43,401 | 13,044 | 2,100 | 15,144 | 141,123 | 171,754 |

a/ Source: Clawson, Marion. 1967. The federal lands since 1956. Recent trends in use and management. The John Hopkins Press, Baltimore, Md. 113 pp. pp. 66, 90 and 92.

cent in 1956, and 23 percent of total investments in 1961. [263] Private users of U. S. Forest Service grazing lands have also made significant contributions to range developments; data on these separations were not available.

The federal government has participated with land owners on private lands in range improvement and development practices. Technical assistance was provided private land owners when Congress passed the Soil Erosion Act of 1935 and created the Soil Conservation Service. [264] Conservation practice -- cost sharing assistance -- was made available on private lands with passage of the Soil Conservation and Domestic Allotment Act of 1936. [265] A 1956 amendment to the Soil Conservation and Domestic Allotment Act introduced the principle of long term cost-sharing contracts for conservation work in the Great Plains Conservation Program. [266] Range development and improvement cost-sharing has also been authorized under various other acts. [267]

Total expenditures in 1966 for specified range improvement practices in the 11 western states, under the Agricultural Conservation Program (ACP) and the Great Plains Conservation Program (GPCP), was about 10.2 million dollars (Table 50). The federal share of this program was 57 percent while private land owners invested 43 percent or 4.4 million dollars.

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[263] Subcommittee on Public Lands of the Committee on Interior and Insular Affairs, U. S. Senate, 1963. Op. Cit. p. 746.

[264] Shepard's Citations, Inc. 1968. Digest of public land laws. U. S. Government Printing Office, Washington, D. C. 1091 pp. pp. 519-520.

[265] Looper, J. Don. 1970. Who should pay for conservation? In: U. S. Dept. of Agriculture. The Yearbook of Agriculture, 1970. U. S. Government Printing Office, Washington, D. C. 366 pp. p. 240.

[266] Ibid.

[267] Ibid. p. 241.

Table 50. Total cost and the federal cost-share of range improvements on privately owned rangeland in the 11 western states where owners participated in the Agricultural Conservation Program (ACP) and the Great Plains Conservation Program (GPCP) in 1966. [a]

| Practice | Total Cost | Federal Cost Share | |
|---|---|---|---|
| | | Percent [b] | Amount |
| | (1000 dollars) | | |
| Seeding | 1,898 | 67 | 1,271 |
| Plant Control | 2,266 | 55 | 1,251 |
| Fencing | 1,956 | 50 | 981 |
| Water Development | 4,052 | 56 | 2,262 |
| Total | 10,172 | 57 | 5,765 |

[a] Source: Tables supplied to the Public Land Law Review Commission by the U. S. Dept. of Agriculture, Soil Conservation Service.

[b] Weighted average by state and program.

## RANGE IMPROVEMENTS: COSTS AND RETURNS

The introduction of species, such as crested wheatgrass, the development of herbicides, the use of heavy equipment and the introduction of electrical energy have allowed range managers to improve the productivity of these areas. The development of these new technologies opened new and useful ways to alter the productivity and use of rangelands. The costs of some of these investments are substantial, however, and it may be questioned whether the returns from these investments were (are) worth the costs that must be incurred.

### Range improvements and the alteration of forage production

The production of forage from any area depends upon several variables. The climatic conditions have perhaps the greatest impact, in the short run, on forage production. The amount and timing of rainfall is especially important. The absence of sufficient moisture is a chronic problem that has caused problems for range managers, livestock operators and other users of rangelands for over a century. Winds and high temperatures can "bake" the soil and make growth hard if not impossible. Cold can likewise retard growth and frost can kill some species if it occurs during certain critical periods. In the longer run, the productivity type and depth of soils determine what species naturally grow in these areas. The use of sprinkler irrigation, plowing and other similar practices can alter these conditions, however.

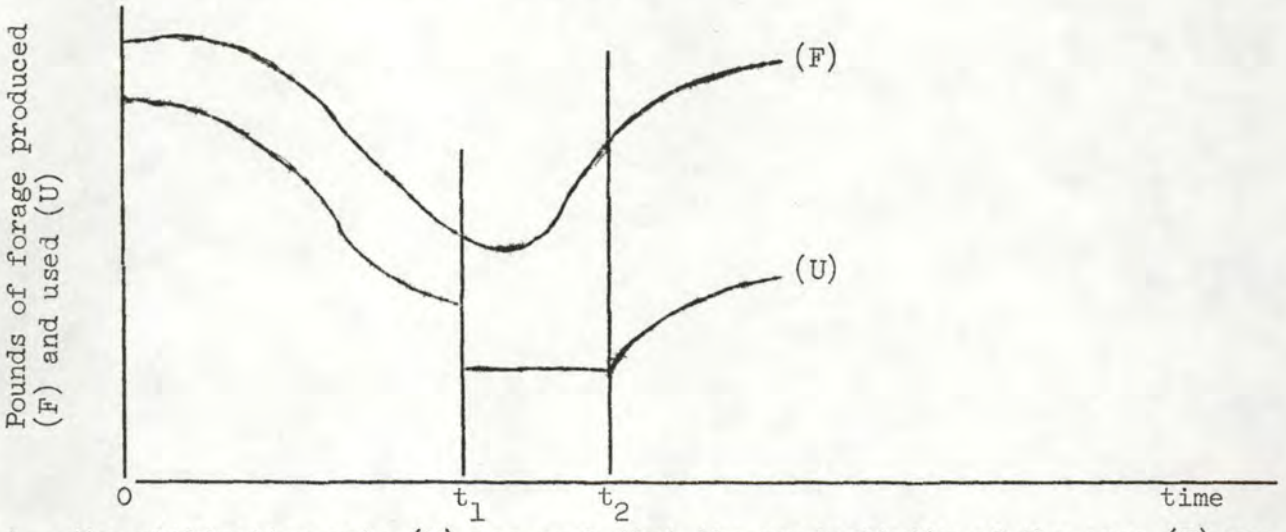
#### Impact of use rates

One of the most subtle and unnoticeable factors that can affect the composition and amount of forage produced in an area is the use that is made of an area. Before the advent of domestic livestock grazing in the west, many areas were primarily of

a grass habitat type. Heavy grazing by cattle and sheep changed these areas from grass to brush type areas. This change in vegetative composition has helped allow the large increase in big game numbers that have occurred since the late 1800's. 268/ In addition to changes in vegetation that may favor the use of some group vs another (i.e., deer vs. cattle), the forage composition may be changed such that an "undesirable" species may be introduced that is useable by most types of animals. For example, the invasion of much of southern Idaho -- Nevada, by Halogeton, made many of these areas unuseable by most animal species.

The productivity as well as the composition of range forage can be affected by use. This phenomenon is illustrated in Figure 1. For example, between 0 and

Figure 1. Forage productivity and use rates.




$t_1$, the utilization rate (U) was such that the productivity of the area (F) was declining. 269/ This is indicative of most rangelands prior to the advent of management by private and public range managers that took these effects into

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268/ Kindel, Fred. 1960. A wilderness deer problem. Idaho Wildlife Review 12(5): 3-6.

269/ This is a simplified representation that does not account for changes in production due to climatic conditions or other variables that can affect the seasonal production of forage. It is also recognized that the "time of use" can affect future productivity, but these effects have been ignored to keep the illustration simple.

account. The common solution to this phenomenon was to "cut" grazing use. The effect of these cuts is illustrated by the period between $t_1$ and $t_2$. The amount of cut would thus dictate the response of the forage to decreases in grazing pressure. Often cuts were not sufficient to result in an increase in production, but were large enough to arrest the decline and provided for a sustained yield.

Effect of range improvements on forage production

The various types of range improvements can affect forage production either directly or indirectly. They can change the composition as well as the productivity of available species. Because of these varying effects, the selection of the methods to be used must consider their effect on the goals to be achieved as well as the susceptibility of the area to the alternative methods that might be used.

Improvements that directly affect production:

Most of the intensive investment methods, such as chaining, spraying, plowing and seeding, directly affect the composition as well as the productivity of the selected species. For example, most brush and juniper control methods (chain, spray, etc.) are designed to kill the less desirable plants (i.e., juniper, sagebrush, mesquite) in an effort to increase the productivity of the "desirable" species (primarily grasses). These efforts can often make the productivity greater than it has been at any time in the past. When soil preparation methods (i.e., plowing, spraying, chaining) are combined with the seeding of selected species, the productivity of the area can often increase beyond the past productivity. These methods have been especially favored by livestock men, but have been criticized by other user groups -- primarily wildlife interest groups. 270/

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270/ These considerations will be discussed later in this chapter.

Investments that indirectly affect forage production:

Some investment alternatives do not directly affect the productivity or composition of range forage. Most of these methods are designed to relieve grazing pressure from one area and transfer it to other areas that have received little, if any, use in the past. The most common methods used include fencing, water developments (springs, wells, pipelines, etc.), salting, and management systems. These methods endeavor to distribute grazing pressure throughout the area being grazed or change the period of use such that the same area is not heavily used during the same period of time each year.

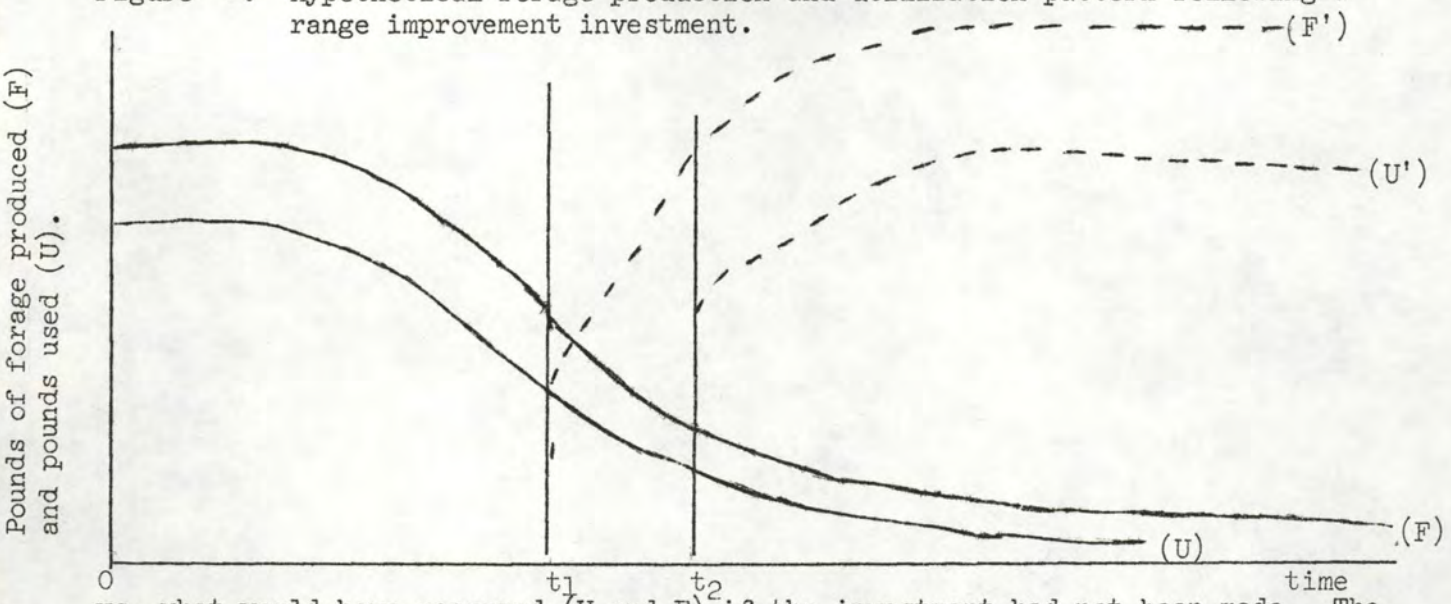
## Economic evaluation of range improvements

Whenever a range improvement is being contemplated, one of the most important questions to be asked is whether the benefits are sufficient to cover the costs of investment. The answer to this question lies within the confines of economic analysis. The return data for this analysis depends, however, upon such things as the response of the area to the investment, the management practices that are being used and the goals to be achieved.

### General framework

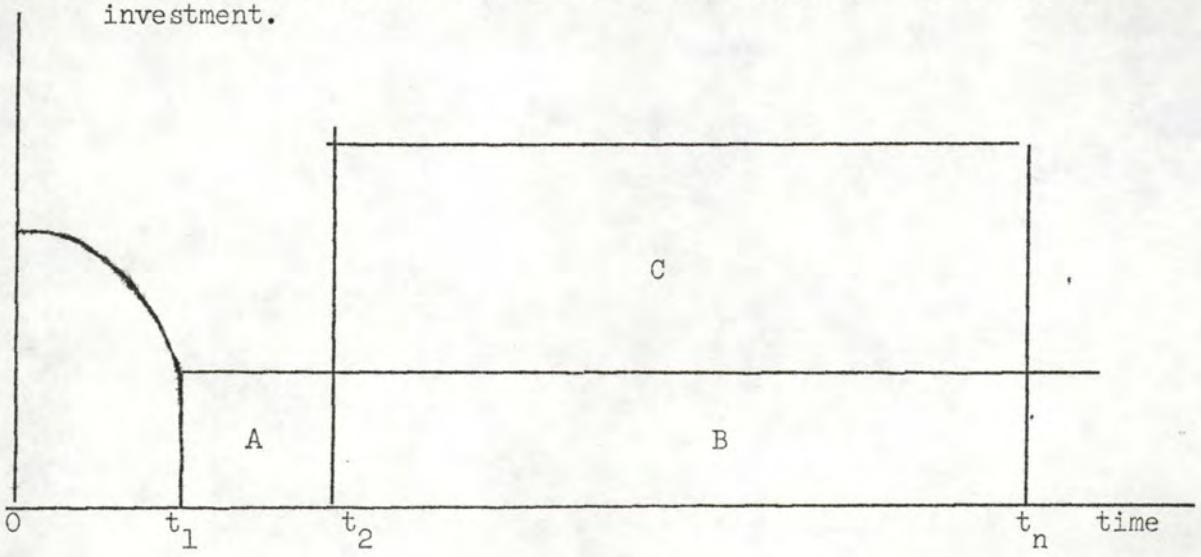
The necessary components of the analysis of the returns from a range improvement include the initial investment costs, deferred costs, if any, the life of the project, the period of deferment, the net income flow resulting from the investment, and the applicable interest or discount rate. These factors are illustrated in figure . From 0 to period $t_1$, use (U) was sufficient that the forage productivity (F) was declining. If the investment (i.e., seeding and/or brush control) was "put in" at $t_1$ and if grazing was deferred between $t_1$ and $t_2$, then the utilization and forage production pattern might look like those illustrated by F' and U'

Figure 2. Hypothetical forage production and utilization pattern following a range improvement investment.




vs. what would have occurred (U and F) if the investment had not been made. The necessary measurement for the analysis then includes an estimate of the difference between curves U-U' and/or F-F' and the period until U' equals U and/or F equals F', which would occur at some period $t_n$. The estimation of these differences would be extremely complex and most researchers have not had sufficient data to make the necessary estimations. It has therefore been commonly assumed that the forage production or utilization pattern is of the type illustrated in figure .

Figure 3. Assumed forage production and utilization pattern following an investment.



Thus, between 0 and $t_1$ forage production or utilization is assumed to decline until $t_1$ when the investment is made. After that point, production or utilization is assumed to remain constant until $t_n$, and from $t_2$ to $t_n$ production or utilization is assumed to be constant at some level above that which would have existed without the investment. These assumptions are not realistic, but due to the lack of data they allow an estimation that is considerably easier.

One of the complicating factors that makes the analysis somewhat cumbersome is the fact that the costs and returns must be made comparable, i.e., costs incurred at one point in time are not directly comparable to returns that will occur at some later date. The method used to make these values comparable is discounting (compounding), whereby the returns are discounted to the same point in time as the costs are incurred. The general formula used is $C = \sum_{i=1+m}^{n} \frac{Ri}{(1+r)^2}$ where:

C = total costs, including costs of deferment
R = net yearly returns,
r = discount rate,
m = period of deferment in years.

However when the production pattern is assumed to be of the form illustrated in Figure , the formula simplifies to

$$C = \left(\frac{R(1-(1+r)^{-n})}{r}\right)(1+r)^{-m}.$$

This formula can then be used to determine the returns according to one of the following criterion: (1) a benefit cost ratio $\left(\frac{R(1-(1+r)^{-n}}{r}\right)(1+r^{-m}/C \geq 1$ which is greater than or equal to 1; (2) solve for n and see if the project life is "reasonable"; (3) determine if the discounted returns $(R(1+r)^{-n}/r)(1+r)^{-m}$ are greater than or equal to the costs or see what returns must be received if the returns are to be greater than or equal to the costs; and (4) solve for the internal rate of return, the rate (r) which would make the costs equal to the returns and compare

this to the opportunity costs of the invested capitol. 271/ The use of these alternative criterion depends upon what parts of the formula are known with a "reasonable" degree of assurity. For example, if one has "good" estimates of C, R, m, and n, the most useful criterion to apply is the solution of the internal rate of return. Most managers and ranchers do not have very good estimates of all of the necessary parts. It therefore becomes necessary to assume arbitrary values for some of the parameters and determine the returns based upon the assumptions made and the available data. The following section summarizes some of the studies that have been conducted in the past. These studies illustrate the use of the preceeding principles and give some indication of the costs and returns of various practices that have, to date, been studied and analyzed.

Economic studies of range improvements

A number of alternative investments have been studied. The returns to each of the practices varies considerably.

Seedings:

One of the oldest range improvement practices that has been used on large acreages is the seeding of selected species (generally some mixture that is compounded heavily of crested wheatgrass is applied to arid lands) to lands which have been prepared in some manner.

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271/ The use of these criterion are discussed in:

Nielsen, Darwin B. 1967. Economies of range improvements: a rancher's handbook to decision making. Utah Agricultural Experiment Station Bulletin No. 466. Logan, Utah. 49 pp.

Gardner, B. Delworth. 1963. The internal rate of return and decisions to improve range. In: Economic Research in the Use and Development of Range Resources, Report No. 5. Committee on the Economics of Range Use and Development of the Western Agricultural Economics Research Council.

Plow and seed. One of the most common methods used in northern rangelands that contain large areas of sagebrush (Artemisia tridentata) is to plow the area with a rangeland plow and seed the area (arially or drilled) to the species selected.

The returns resulting from this practice have varied considerably. Pingree and Dorlignac [272] reported that by seeding areas to crested wheatgrass the differential return would vary from $2.82 to $4.18 per cow-calf month over that which would have existed had the area not been seeded. Nielson [273] reported returns of greater than 3 percent for investments in Oregon (depending upon the level of investment incurred). Gardner [274] reported internal rates of returns of more than 15 percent on investments in Colorado, rates from 14 to 15 percent on investments in Utah, and returns of more than 15 percent to nearly 19 percent on seedings in Idaho. Other studies [275] have also shown returns that were greater or less than those reviewed above but some researchers used methods that were either invalid or were not comparable to other studies.

Spray and seed. Another method that is commonly used is to spray the "undesirable" species with a suitable herbicide and seed the area. This alternative is especially useful in areas in which high potential for erosion and little, if any, understory exists in the area. Godfrey [276] reported that the increased forage must be worth more than $6.00 per AUM if a 5 percent return was to accrue to the

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272/ Pingree, H. B. and E. F. Dorlignac. 1959. Economic evaluation of seeding crested wheatgrass on northern New Mexico rangeland. New Mexico Agricultural Experiment Station Bulletin No. 433. Las Cruces, New Mexico. 80 pp.

273/ Nielsen, Darwin B., William G. Brown, Dillard H. Gates and Thomas R. Bunch. 1966. Economics of federal range use and improvement for livestock production. Oregon Agricultural Experiment Station Technical Bulletin No. 92. Corvallis, Ore.

274/ Gardner, 1963. Op. Cit.

275/ See bibliography at the end of this chapter for an extensive summary of the studies that have been conducted concerning the economic aspects of various types of range improvements.

276/ Godfrey, E. Bruce. 1971. An economic evaluation of the range improvements administered by the Bureau of Land Management in the Vale area of Oregon. Unpublished. Oregon State University, Corvallis, Oregon. 147 pp.

spray and seed projects studied in Oregon.

Other brush control methods and seeding. Some other brush control methods include harrowing, burning, dishing and chaining (juniper and sagebrush primarily). The costs of these methods and the generally poor results have resulted in relatively low returns for these types of alternatives. Kearl and Brannon, 277/ indicated that the values per AUM necessary to cover the costs of railing or "patrolling" sagebrush were generally too high to cover the costs. Beating sagebrush resulted in internal rate of return estimates of approximately 20 percent.

Brush control:

In areas which are susceptible to erosion and which have a "good" understory of "desirable" species, it is not commonly recommended that these areas be seeded. The most common methods used include chaining, clearing juniper by "hand" methods, and spraying with herbicides such as 2, 4-D and 2, 4, 5-T. As one might expect, the returns for this practice show large amounts of variation. Kreng 278/ indicated that the discounted annual returns as a percent of the costs (not equal to the internal rate of return) varied from a loss ($1 per AUM assumed forage value) to 50 percent for spraying sagebrush in Wyoming. Sneva 279/ recently reported internal rates of return of over 50 percent for "spray release" projects in Oregon. The returns to this alternative are especially susceptible to deferment. If deferment is practiced, the costs are generally much higher (often double) and the return

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277/ Kearl, W. Gordon and Maurice Brannon. 1967. Economics of mechanical control of sagebrush in Wyoming. Wyoming Agricultural Experiment Station Science Monograph 5. Laramie, Wyoming. 35 pp.

278/ Kreng, Ronald D. 1962. Costs and returns from spraying sagebrush with 2, 4-D. Wyoming Agricultural Experiment Station Bulletin No. 390. Laramie, Wyoming. 31 pp.

279/ Sneva, Forest A. 1972. Grazing return following sagebrush control in eastern Oregon. Journal of Range Management 25(3):174-178.

stream is moved further into the future. Thus, those spray projects which are not deferred generally have a higher return and there is some evidence [280] that productivity is not significantly affected by deferment.

Sharp and Boykin [281] reported that net ranch incomes increased more than 7 percent as a result of spraying mesquite on the hypothetical ranches studied in Texas. Other studies have also indicated that this alternative can be quite profitable.

Water developments and fencing:

These types of investments are generally designed to alter the historic grazing pattern and allow an even distribution of grazing pressure. The returns for some of these investments are very profitable. Workman and Hooper [282] indicated that spring and pond developments required only a small increase in use to justify the investments studied. Wennergren and Roberts [283] indicated that the springs and well developments for which they had data showed favorable returns.

Roberts [284] in a study of sheep herding vs. fencing found that fencing offered several advantages that were favored by ranchers but an economic analysis was not undertaken. Workman and Hooper [285] found that fencing was probably an unprofitable

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280/ Smith, Dixie R. 1969. Is deferment always needed after control of sagebrush? Journal of Range Management 22:261-263.

281/ Sharp, Wayne W. and Calvin C. Boykin. 1967. A dynamic programming model for evaluating investments in mesquite control and alternative beef cattle systems. Texas Agricultural Experiment Station Technical Monograph 4. College Station, Texas.

282/ Workman, John F. and Jack F. Hooper. 1968. Preliminary economic evaluation of cattle distribution practices on mountain rangelands. Journal of Range Management 21(5):301-304.

283/ Wennergren, E. Boyd and N. Keith Roberts. 1965. Economic evaluation of stock water developments. Journal of Range Management 18(3):118-123.

284/ Roberts, William P., Jr. 1961. Fencing versus herding of range sheep. Wyoming Agricultural Experiment Station Mimeo. Circular 156. Laramie, Wyoming. 15 pp.

285/ Workman and Hooper, 1968. Op. Cit.

investment alternative. They found that salting was an alternative that yielded high returns.

Summary and conclusions:

Most of the investment alternatives studied yielded favorable returns, when studied separately. However, when an area is seeded, for example, it commonly requires water developments and fencing to allow and/or exclude use of the area. When all of these costs are included, many "projects" do not retain their favorable response.

In trying to analyze the returns to alternative investments, a number of problems confront the economists. Perhaps the most crucial and in general the data that is most often found to be "weak" is the returns. Few studies have had reliable estimates of the increased actual use resulting from investment. Another common problem is the lack of data concerning "how long the increased returns will last". This is an especially troublesome problem that relates to the return data, as they both depend upon the management of the area. Most researchers have been quite conservative (to be on the safe side) and have thus shown relatively low returns when the actual returns may have been substantial. With the advent and wide use of management systems, this has become an increasingly important problem that, to date, no one has directly addressed. In general, however, most studies indicated that most of the commonly used improvement practices yielded favorable returns, but these returns can be "driven down" easily by intensive investments.

Many investments on private lands have shown especially favorable returns when federally sponsored cost sharing payments are included in the analysis. These payments have often led to substantial investments on private lands whereby a larger percent of these lands have been improved than have federal lands. 286/

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286/ Godfrey, E. Bruce. 1972. Rangeland improvement practices in Idaho. College of Forest, Wildlife and Range Sciences, Information Series No. 1. University of Idaho, Moscow, Idaho.

Several reasons may be given for the lack of federal expenditures for range improvements. First, and probably most important, the federal agencies have not, in general been allocated large amounts from the federal budget for range improvements. Second, the Bureau of Land Management and the U. S. Forest Service have discouraged private investments on public lands for fear of conveying a proprietory interest on the part of permittees for these lands. Third, many of the impacts of these investments have been unknown and "multiple use" considerations have stopped some investments that may be profitable from the point of view of the livestock producer, but may have serious detrimental impacts on such things as watershed and wildlife.

## Impact of range improvements on watershed and wildlife

One of the major reasons why federal agencies have been reluctant to employ extensive use of range improvements is the fear of possible negative impact on wildlife, watershed conditions and other multiple use considerations. Most of the impacts that have been suspected have been shown to be true, but the meager amount of research that has been conducted to date indicates that the negative impacts may not be as great as was expected.

### Impact on watershed

One of the few and major research efforts that has been conducted to evaluate the impact of range improvements on watershed considerations is in Arizona. This is a cooperative project that is being sponsored by the Rocky Mountain Forest and Range Experiment Station. The results of the experiments are not conclusive, but some general, initial trends have been noted.

It has been found that after cabling an area to reduce the invasion and production of Utah juniper that ". . . . no significant changes in water or sedi-

ment yields, but that total herbage production has increased, particularly forbs and half shrubs" and that there has been no real changes in deer habitat or use. [287] They have also found no significant change in water yields, sedimentation or big game use as a result of filling alligator juniper. [288] It was found, however, that there is some evidence that water yields increase when an area is grazed with no significant change in sedimentation, but there has been some drop in the use of the area by elk -- these conclusions, however, are preliminary and based on limited information. [289] It has been found that there is a significant increase in water yield as a result of converting an area from chaparral to grasses. [290] Thus, it can be concluded from the above experiments that water yields and sedimentation have not been adversely affected by the range improvements studies and that there is some reason to believe that favorable results have been achieved.

Wildlife

The impact of range improvements is especially hard to measure due to the lack of any quantitative data. Some preliminary suggestions can be inferred from the studies that have recently been conducted.

In an unpublished [291] research report for the Oregon Game Commission, it was found that "plowing and seeding" to wheatgrass was of most benefit to antelope and sage grouse. Spraying was found to be somewhat detrimental to deer and antelope use, but chukar and rabbit use may have increased. It was generally concluded that

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[287] Brown, Harry E. 1971. Evaluating watershed management alternatives. Proceedings of the American Society of Civil Engineers 97(IR1):93-108.

[288] Ibid. p. 96.

[289] Ibid. p. 102.

[290] Hiffert, Alden R. 1971. Increases in stream flow after converting chaparral to grass. Water Resources Research 7(1):71-80.

[291] Ruher, James A. 1969. The effects of large scale livestock range rehabilitation on game species. Unpublished report to the Oregon Game Commission for project W60R01-5.

spraying may have a detrimental impact on antelope use, plowing and seeding tends to favor antelope use, and most other improvements probably did not affect the use of areas by other species significantly.

Kearl [292] found that most of the increased deer and antelope harvest in Wyoming had occurred in the eastern portion of the state where more than 70 percent of the land is privately owned and where extensive developments had occurred. He also found in a study concerning spraying sagebrush that ranchers responding to a mail questionnaire indicated that deer and sage grouse used sprayed areas extensively. [293]

Most of the effects of range improvements on wildlife are speculation, but some general conclusions can be inferred from the studies reviewed. Most improvements have not seriously affected wildlife populations or use in a negative direction. There is some evidence that spraying, however, may have a negative impact on antelope and sage grouse, but the results are not conclusive. Improvements, such as water developments, probably have favorable impacts on wildlife populations though no studies have been conducted to substantiate this generally concluded observation. Other types of improvements, such as fencing, may have negative impacts on some species, but provide substantial benefits to other species. In conclusion, [294] the studies to date indicate that the negative impacts of range improvements on wildlife are probably not as great as once suspected and that some methods may be of benefit to wildlife and livestock.

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[292] Kearl, W. Gordon. 1967. Big game harvest and land use in Wyoming. Wyoming Agricultural Experiment Station Bulletin No. 469. Laramie, Wyoming. 19 pp.

[293] Kearl, W. Gordon. 1965. A survey of big sagebrush control in Wyoming, 1952-1964. Wyoming Agricultural Experiment Station Mimeo. Circular 217. Laramie, Wyoming. 37 pp.

[294] _____ 1970. Land use and wildlife resources. National Academy of Sciences, Washington, D. C. 262 pp. Chapter 4.

## ALLOCATIVE JUSTICE AND FAIRNESS

### Allocative policies and objectives

As pointed out above, two concepts exist between the relationship of government to public lands: first, that of a landlord administering the lands for public benefit; and second, that of a custodian administering the land to secure certain stated objectives. The government, as landlord, must optimize its income through its agencies in such a manner as to secure the largest possible monetary returns for present and future generations. To the government as custodian, income optimization is secondary to the attainment of other objectives, social as well as economic.

In general, the first concept has been held with respect to forage by the Department of Defense, the Indian Service, and the Bureau of Reclamation, whereas the second concept historically describes the activities of the U. S. Forest Service and the Bureau of Land Management.

The largest portion of the public land is under the control of the two agencies whose purpose, as custodian, is not primarily income maximization. Consequently in the case of the first users licensed by the federal land agencies price did not perform one of its essential functions, that of allocating resources. As shown later in this section, however, the tenure and transfer policies and procedures of these agencies, once the original allocations were made, permitted the forage resources to pass into the hands of users who are best able to pay a market price for them. In discussing the allocative procedures of the public land agencies, it is necessary to distinguish between the policies by which the public lands were allocated to the first users and the procedures by which transfers were made which put the lands into the hands of the current users.

The initial allocation of grazing lands

When the U. S. Forest Service was first established and later with the passage of the Taylor Grazing Act, the grazing lands of the west were freely used. Allocation policy was to determine which of the current users to select as permanent users of the land, what their allotments would be, and what would be the conditions of their continued tenure.

Early allocation procedures avoided the adoption of a price criterion. Such an objective could have been accomplished through some variation on competitive bids or through appraisal, with preference granted to prior users. Instead, the U. S. Forest Service early enunciated a policy in allocating the range resources in which criteria, other than price, were the main considerations. The criteria actually employed were summed up in a letter by President Theodore Roosevelt to Secretary of Agriculture James Wilson in 1905. The letter reads:

> "In granting grazing permits you give preference first to the small near-by owners; after that, to all regular occupants of the Reserve range; and finally to the owners of transient stock.
>
> "This is exactly as it should be. The small near-by owners are the homesteaders, the men who are making homes for themselves by the labor on the land and to bring up their children thereon. The other occupants of the Reserve range--that is, the larger ranch owners--are only entitled to come after the small man. If, after these have been

To attain the objectives outlined above, allocation of permits was based upon prior use, i.e., dependency, as evidenced by prior use and commensurability. To rate a prospective user as Class I, other conditions were later attached. Indians in New Mexico were allowed free use in proportion to the size of the family. The small rancher was preferred over the large rancher in the case of the U. S. Forest Service. Homesteaders were given permission to graze milk cows and domestic animals. Even the commensurability requirements were modified. In the case of the Bureau of Land Management, parallel lands, i.e., lands of the same quality and season of use as the public grazing lands, could be counted as base property for purposes of commensurability.

Flexibility was injected into the commensurability requirements by permitting ranchers to grow products other than hay on their base property and to purchase hay in the open market. In some cases ranchers rent their base property for grazing to other ranchers, and in turn, rent or lease complementary grazing lands in other areas and thus round out their grazing season. Nevertheless, commensurability still remains as a constraint upon land transfer and upon efficient allocation of range resources.

Implications of the initial allocation procedure to justice and fairness

In evaluating the degree of justice and fairness provided for in the initial allocation of the range resources we may compare the policy employed by the land agencies, in this case the U. S. Forest Service and the Bureau of Land Management, with the policies followed during that period with respect to resources in general. The policy in disposal of public resources to private individuals for their own use was generally motivated by the national purpose to develop the country as rapidly and completely as possible. Lands were given to railways to subsidize the construction of lines, with no restraints upon the railroads in exploiting the lands for their own profit. The Homestead Act permitted private individuals to secure lands in fee simply by occupying and farming them for stated periods of time. Most of the western states permitted

individuals to acquire water rights through proof of prior use. Rights to minerals and oil were granted through discovery. The Bureau of Reclamation continues to grant homesteads on land irrigated and developed by it.

The enlarged Homestead Act of 1909 increased the amount of land that could be acquired by a homesteader from 160 acres to 320 acres, to accommodate the needs of farmers for larger land holdings in regions where land was less productive. Even today, Bureau of Land Management land can be homesteaded under the Desert Land Act when it is demonstrated that the land can be put to higher use than through grazing. Such a demonstration usually requires proof of the economic feasibility of irrigating the land.

The Forest Homestead Act of 1906 authorized the Secretary of Agriculture, through the Secretary of the Interior, to open for entry forest reserve lands chiefly valuable for agriculture which are not needed for public purposes and which in his judgment might be occupied without injury to the forest. Between 1906 and 1915, 1,900,000 acres of forest reserve lands, sufficient for 18,000 settlers, were classified as open to entry. The over-generous interpretation of the Forest Homestead Act led to its partial repeal in 1916. It was finally repealed in 1962 (76 Stat. 1157, PL 87-689).

The policy of the government, in encouraging economic growth through private ownership of resources, fell short in making provision for livestock grazing. Homesteads of 160 acres to 320 acres per family head were adequate for family farms when farming utilized horses and mules exclusively. At no time, however, were farms of this size adequate for family-sized livestock ranches. The organization of the livestock industry, under the U. S. Forest Service and under the agencies set up to administer the Taylor Grazing Act, attempted to extend to the cattle and sheep industries the goals of social and economic stability towards which public policy was striving under the other land disposal acts. These goals included the preservation of the family unit, the

growth of the local community, and the stability of the livestock industry and of the local community. Other objectives included aid to Indians and assistance to established ranchers by permitting them to graze their horses, sheep, and cattle, and to have free use of the timber in the forest reserves for their ranch operations.

Other allocative criteria, such as limitation of numbers and prevention of monopoly, were set up by the U. S. Forest Service to prevent large itinerant ranchers from utilizing the public range to the exclusion of the small operator. The theory involved here was that the small family ranches would lend stability to the industry and to the local community and would build up the region. Large operations would not do this; they would employ itinerant riders, would raise no families, and would spend in the local area only a small amount of the income earned.

It presented no problem that the initial permittee received a privilege which could later be capitalized into value of the permits he held, whereas individuals who held no permits did not secure such a windfall. All land disposal was expected to generate a capital value for the user, as a reward for the pain and privation of pioneering. Even at present our agricultural programs generate capital values. Grain land, with a wheat or feed grain base, sells for more than comparable land without an allotment. 295/ Although many individuals decry this tendency it nevertheless exists. It is even less justified today, when such windfalls granted by the government are more rare than a generation or two ago when the country was still in the process of development and all forms of resources were more abundant.

Initial allotments are still encountered in connection with allocations made because of increased grazing capacity resulting from revegetation or other range development

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295/ In 1957 a study of _____ cured tobacco in Virginia and North Carolina showed that depending on conditions, an acre of allotment was worth $2,500.

Maur, Frank H., James I. Hendricks and W. I. Gabor, Jr. 1960. The sale value of _____ cured tobacco allotments. Virginia Polytechnical Institute Agricultural Expt. Sta. Technical Bulletin #148.

work. If additional grazing capacity is achieved at the permittee's expense, he is granted the increased capacity. Other increases are allotted in the following order of priority:

(a) To existing permittees on the allotment under a temporary permit;

(b) To another allotment which is in need of relief for more livestock;

(c) To Bureau of Land Management permittees where the ranges need protection;

(d) To new permittees or as an increase to permittees on other allotments, to the extent that they have commensurate property; and

(d) To permittees from other allotments whose permits are at or above qualifications (U. S. Forest Service manual 2232.4).

The Bureau of Land Management has similar classes of priorities in allocation of such land. It will give additional privileges to permittees who previously suffered reduction in permits and to permittees responsible for increased grazing capacity. If grazing capacity grows to exceed Class I qualifications and is greater than the needs for other multiple uses, increases may go to Class II base property; but before this group is qualified, "full consideration must be given to Class I qualifications from other range areas." When Class II applicants are considered, "primary emphasis will be on need, regardless how small an operator may be, together with a history of continuance in the livestock business" (Bureau of Land Management Manual, 411.4284).

It is apparent from the above order of priority that the decision to bring in new permittees would be quite rare. In the analysis of permittees, in the eight counties surveyed in this study, no cases were encountered of allocations of privileges to new permittees as a result of range improvements.

We may summarize the initial allocative policies of the U. S. Forest Service and the Bureau of Land Management and its predecessor, the Grazing Service, as follows:

1. The agencies, from the first, considered their obligations to be custodians rather than landlords, and consequently placed other policy goals above income maximization;
2. The non-economic policies of these agencies were consistent with the goals and objectives employed in the disposal policies of other federally owned resources;
3. The actual allocation practices were designed to attain these objectives;
4. The possible injustice and unfairness in treatment of individuals excluded from the largess granted to the permittees is probably no more flagrant than in past and current examples of similar discrimination in programs; and
5. Finally, problems arising out of the initial allocations of grazing privileges are over for the most part. What concerns us is how we proceed from here.

Allocation of privileges subsequent to the initial allotments

Once allocations of grazing privileges were made, subsequent renewal and transfer policies were established to provide security in tenure to the original permittees. Although for the most part licenses and permits are issued for given terms, they are renewable. Term permitees, under both the U. S. Forest Service and Bureau of Land Management, are given a preference right of renewal by statute as long as the provisions and requirements under which they are issued continue to be met, and as long as it is in the public interest to renew them. 296/ Temporary permits do not have the same statute, but do have protection given by the stability objective of both agencies. 297/ Consequently, the permittees have what comes close to permanent tenure on the grazing

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296/ 43 U. S. C. 315b (1964) and 43 C. F. R. 4113.1 (1962)

297/ The U. S. Forest Service instructional manual provides that a primary objective of range management is to: "Promote stability of family ranches and farms within local communities in the areas of which the national forests and national grasslands are a part." Forest Service Manual 2002C

lands as long as they obey the rules, and as long as the grazing resource remains available for livestock. The permittee consequently has what amounts to permanent tenure on the grazing lands. There is little evidence that permittees have any concern over their ability to renew their permits or to remain on the land. 298/ Their concern, rather, is over the possibility or reductions in privileges, increased emphasis on multiple use, and withdrawals for higher use, especially withdrawals for wildlife purposes.

The concern at this point over security of tenure is threefold:

1. Has security of tenure given the permittee a reason to believe that he has acquired a property right in the public grazing lands?
2. Have actions by the federal land agencies contributed to this belief?
3. Have the tenure provisions prevented an efficient allocation of the range resources after the initial allocation?

Security of tenure and property rights in public lands

Interviews with ranchers indicate that they believe they have acquired a possessory interest in the public grazing lands. The survey of permittees in 8 selected counties in the 11 western states revealed that 97.5 percent of all the permittees acquired their range privileges from other permittees, and that only 2.5 percent were original holders of permits. Those acquiring their permits from relatives, a large proportion of which were acquired from inheritances, comprised 37.8 percent of the total. The largest proportion, however, acquired their permits through purchases from non-related individuals.

The percentage of permittees acquiring their lands from non-relatives varied from 52.2 percent in San Juan County in Utah to 66.7 percent in Lemhi County in Idaho, whereas Blaine County in Montana had the largest percentage of original holders of permits, 8.0 percent. Since the major portion of the permittees acquired their permits in the

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298/ This is evidenced by answers to a questionnaire used in a survey of 8 counties in the western states of permittees on public rangelands.

open market and presumably paid a market price for them, the idea of a possessory interest in the land is very strong. 299/

The second question involves the degree of the responsibility of government agencies for the assumption of a possessory interest by the ranchers. There seems to be little doubt on the part of the users of the range about the right of the agencies to withdraw land for a higher use, to decrease privileges in order to prevent further deterioration of the land, or to exercise supervisory control over range and conservation practices. This is not to say that the users are not exorcised over such actions; in fact, they often make strong protests against them, but there seems to be no question about the rights of government in these areas. That the agencies may plan such constraints upon the user and that they have done so in the past is recognized.

There seems to be little difficulty over the removal of leases of Department of Defense or Indian Service lands where an individual secures his rights to use the land through competitive bids or through appraisal. An individual who does not meet the bid can expect to lose his privilege to graze the land. These attitudes can be attributed to the methods of allocating privileges and the arguments about the nature of tenure employed by those agencies.

The Park Service tenure privileges, granted those who use the lands under the jurisdiction of the Park Service, can be classified into five categories:

1. Life term grazing privileges. These are often granted to individuals who grazed the lands before they were incorporated into national parks. They are given the right to graze the lands during the lifetime of the operator under rules and regulations set by the Service. Generally, such permittees are not allowed to sell or transfer these privileges, and if they fail to continue in the livestock business the permits are generally terminated. 300/

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299/ A detailed description of the survey of the 8 counties is included in Appendix

300/ National Park Service Manual VI(2):17. Ch. 4.

2. On and off permits. These privileges are issued on a temporary basis to legalize what would otherwise be trespassing of cattle which stray on or off Park Service lands due to absence of fences. 301/

3. Term grazing permits. These are generally granted to the life term grazing permittees in (1) above. The term permit gives the agency a better opportunity to review the extent to which compliance with regulations has been adhered to.

4. Agricultural use permits. These permits are granted in order to preserve historical scenes. The permits are granted for only 3 to 5 years but cannot exceed 20 years. 302/

5. Pack and saddle stock permits. These are special use permits granted to visitors who have their own saddle stock. They are usually not charged for the use but their grazing activities are closely supervised.

Grazing privileges on Park Service lands are granted only as a means of improving the recreational value of the national parks. Fees are comparble to those State or Federal lands that are adjacent. Privileges in no way justify the belief or creation of a possessory interest by the user. They are permitted to graze only under strictly prescribed rules, and no rights whatever of transfer of these privileges. 303/

The Bureau of Reclamation frequently withdraws land for irrigation in advance of the construction of the project, since the construction may require several years to complete, or even to get the construction started, but it may be used for agriculture or grazing during the interim. 304/ The permits for grazing are allocated either through

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301/ National Park Service Manual. Op. Cit. p. 17.

302/ Ibid.

303/ National Park Service. 1968. Resource management handbook. Part 1, Ch. 5.

304/ U. S. Government Organization Manual. 1967-68. p. 483.

competitive bidding or through negotiation of leases. Usually the Director of Reclamation advertises the land to be leased and grants the lease to the highest responsible bidder. 305/ Negotiation is resorted to when the division director, either considers that there will be no response to advertising, or when the cost of advertising would be greater than the returns of the lease would justify. The method of allocation thus represents merely an income optimization activity. The grazing leases need not require base property commensurability or prior use. 306/ This does not mean that there are no eligibility requirements whatever. Certain restrictions are placed on alien corporations owing money to the U. S. Government. 307/ Prospective irrigation water users may be given preference as may former owners of the property who may request a negotiated lease payment rather than depend upon a competitive bid, 308/ but, by and large, the competitive bid prevails.

In a similar manner the Department of Defense allocates land through competitive or negotiated bids. 309/ Exceptions from this general rule may apply to former owners, or tenants of former owners who used the land prior to acquisition by the Department of the Army, or to a spouse of such owner or tenant under special situations. 310/ In all cases of leases, the leasee is required to use the land under strict conservation practices.

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305/ Reclamation Instruction. 215.5.19.
306/ Report of the Interdepartmental Fee Committee. p. 12.
307/ Reclamation Instructions. 215.5.2
308/ Ibid. 215.5.6
309/ Department of the Army, Office of the Chief of Engineers. Regulation 405.1-800.
310/

The significance of the leasing arrangements of the Park Service, the Bureau of Reclamation and the Department of Defense is that the leases were granted for the most part on the basis of ability to pay the highest price. No other economic or social considerations were taken into account in allocating the land. In the case of the Bureau of Land Management and the U. S. Forest Service land, careful consideration was given to the social and economic effects of the choice of permittee. In addition, the agencies themselves treated the permittees, once they had been allocated the land, in a manner different than organizing tenants of leases of land under private ownership.

In two important respects the government has recognized the possessory interest of the permittee or has acquiesced in practices which tend to create an impression that these interests do in fact exist. These examples lie in the policy of permit transfers and in the policy towards compensation for loss or restrictions of permits.

## Transferability of permits

Although the sale of privileges by permittees is not recognized in statutes or in regulations, such sales have been going on for a long period of time, and much of the grazing lands are now in the hands of individuals who paid the full market value for the privileges. The agencies have always been aware of the sale of these privileges at about 50 percent of the value of the private grazing lands of equal productivity. 311/ Banks also regard the capitalized value of these permits as an asset item on the ranchers' financial statemen

Surprisingly enough, while the land agencies have not recognized, by expressed administrative sanction, the sale of these privileges (probably no such recognition was necessary) both the U. S. Forest Service and the Bureau of Land Management gave tacit assent to the practice through permit waivers to the Farm Credit

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311/ Interview with Chesniss, Vice President, Federal Land Bank, Spokane Washington, July 16, 1968.

Administration. In a memoranda of understanding with the Farm Credit Administration, [31] a provision is contained that when individuals apply for credit in order to purchase grazing privileges, the Farm Credit Administration notifies the public land agencies of the transaction and those agencies will permit no other transfer until the loan is paid. If, during the course of the loan, the land agencies decide to put these lands to a higher use or to decrease the number of privileges, the credit agency will be notified and it will be given one year to adjust (interview with officials of the Farm Credit Administration). [313/] These memoranda thus indirectly recognize the sale of privileges during a transfer and also their value for loan purposes. The agencies specify that the extent of the loan in no way alters the agency's control over the land, nevertheless most of the characteristics of a property right are embodied in this procedure. It would be inconceivable that such a situation would exist with respect to bona fide leases or rentals.

A second means, by which a property right was embodied in the initial allocation of permits, was the granting to permittees the right to transfer their permits to individuals of their own choosing. The reason for permitting the initial permittee to transfer his privileges in this manner was summed up in a letter by the Secretary of Agriculture on April 24, 1936, to the Senate of the United States in response to Senate Resolution No. 289, "A Report on the Western Range." The letter states: [314/]

> "In order to interfere as little as possible with legitimate business transactions, the permit of an established permittee is renewable to the purchases of the

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[312/] On February 10, 1938, the Department of Agriculture entered into a memorandum of understanding with the Farm Credit Administration regarding the status of escrow waivers on a permittees' grazing permit when the permittee pledges his ranch unit or livestock to which grazing permits are attached as security for a loan. The following argument was concluded:

> "If for any reason it should become necessary to discontinue, in whole or in part, further use of the range by a permittee-borrower, through his noncompliance with the regulations or otherwise, this matter will be discussed with the loan agency and at least one year allowed for possible adjustment before the stock are removed." Forest Service Manual 2231.95a

[313/] Interview with Chesniss, 1968. Op. Cit.

[314/] U.S. Department of Agriculture, Forest Service. Senate document 199. 1936. Op. Cit. p. 268.

> department and otherwise qualify ranch property of an established patentee, or of permitted livestock, if the purchaser already owns properly qualified property. Since a grazing preference is a privilege and not a right, it must be waived by the seller of the ranch or livestock to the government, which in turn renews it to the new purchaser. In the case of the death of an established user the permits may be renewed to the heirs. Whenever the ranch is overstocked or there is a demand by other qualified users, the size of the permit to the purchaser or heir may be reduced prior to renewal."

The policy of reducing privileges at the time of transfer was apparently practiced for a number of years. By doing so the U. S. Forest Service could accomplish these objectives: to reduce overgrazed range without adversely affecting the current users, to reiterate by action the expressed concept that a grazing permit is a privilege and not a right, and to provide additional rangeland to ranchers too small to earn an adequate living, and to provide public rangeland forage to new settlers. The last objective was exercised to only a very limited extent as testified to by the following statement: 315/

> "Some grazing permittees and others have felt that the U. S. Forest Service automatically reduces the number of permitted livestock whenever a transfer of preference occurs. The facts are that in the past 5 years, 1948-52, about 6 percent of the 19,000-odd paid permits annually were involved in transfer cases. Reductions were made in 44 percent of these transfer cases or an average of 467 each year (Table ). Of the transfer reductions, only 3 were for distribution (to other permittees) and only 28 cattle were involved. All the rest were for range protection or conservation. In terms of livestock, less than 1 percent of permitted numbers were affected during the 5-year period.
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> "Some of these reductions, at time of transfer, have been strongly protested and are the source of the impression that reductions are automatic at time of transfer of preference. A revised policy, tentatively approved and now under consideration by the livestock industry, would help to prevent further misunderstandings on this point by providing that reductions would be made as and when needed without relation to transfer of grazing privileges."

The present U. S. Forest Service policy was later changed and it now reads: "No grazing permit will be reduced solely because it is being waived by the government and issued to the purchaser of land or livestock. Needed protection reductions will be made as and when planned without relation to waiver and issuance of permit." 316/

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315/ U. S. Department of Agriculture. 1953. Report of the chief of the Forest Service. p. 11-12.

316/ Forest Service Manual 2231.91. 1968.

From the above analysis it is apparent that the desire of the agencies to provide security of tenure for the initial permittees caused the permittees to feel that they had acquired a property right in the land they grazed. There is strong evidence to support the initial position taken by the agencies that security in tenure is necessary to accomplish the objectives of the agencies in the preservation and improvement of the range, the stability of the livestock industry, and the stability of the local community.

A serious question arises, however, over the policy of transfer of the range privileges. If through security of tenure, a capital value arises from the use of the public lands for grazing, the capital gains thus occuring will be realized by the initial permittees when they sell their privileges along with their land and cattle to the next operator. Had the agencies insisted, however, that when the privileges were waived, the agencies themselves would transfer them to the next permittees, these capital gains of the permits would not have been realized by the initial patentees. Even if, at this point, the agencies had reallocated the privileges on the basis of criteria other than economic value of the grazing privileges, the capital value of the privileges would not have been acquired either by the initial user or any subsequent users at the time of transfer. Under these circumstances, the government would have maintained a flexibility in the public land use which would have enabled it to vary its allocative objectives without harming the current users of the lands. This position would have been similar to that of the lands administered by the Park Service, the Bureau of Reclamation, and through the Department of Defense. In these agencies, capital gains seldom arise.

As it was pointed out above, this was not done. Not only did the agencies permit the transfer of lands by the initial permittees to whomever they designated, provided the designated transferee met the commensurability and other social and economic requirements enforced by the agencies, but they tacitly recognized the right of the users to acquire a capital value at the time of the transfer. This, in our opinion, has placed a

constraint on the agencies in their ability to change their policy objectives with respect to the allocation and use of the rangelands and, in fact, allowed the permittees to acquire a property right in the lands which they could sell on the market for a significant price.

Compensation for loses of permits

A further question of a possessory interest or property right arises over compensation by the agencies to the permittees when permits are exchanged or transferred. The U. S. Forest Service and the Bureau of Land Management have consistently maintained that the grazing of livestock on lands under their jurisdiction are privileges not rights. Section 3 of the Taylor Grazing Act provides that the issuance of a permit "shall not create any right, title, interest, or estate in or to the land." 317/ The U. S. Forest Service grazing regulations state: 318/

> "A grazing permit or grazing agreement conveys no right, title, or interest, of the United States in any lands or resource use authorized thereunder, and is a privilege for the exclusive benefits of the person or organization to whom a permit is issued or with whom a grazing agreement is entered into."

These statements, however, do not completely settle the matter. Although the courts have consistently upheld the agencies in their interpretation of the states of the privileges, a federal court has nevertheless ruled that the permits are "something of value to the possessor and something which have their source in an enactment of Congress..." 319/ This seems to imply that in the opinion of the Court, Congress intended to bestow upon the permittees something more than privilege to use the land at the discretion of the public land agencies. A summary of this may be that those

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317/ 43USC #315b(1964)

318/ 36C FR #231.3(b), as amended

319/ 22 98F.2d 308 (D.C. Cir 1938)

having permits do have "rights," but those rights have not all been defined by category. Whatever those rights are, the permittee does not have the right to retain his grazing as against the United States when the Government has duly exercised its sound judgement to transfer or exchange the privileges on public lands. 320/

While the nature of the "right" itself has not been completely defined by the courts, certain actions by way of compensation of individuals for loss of rights would incline one to believe that the agencies themselves have recognized such status of privileges. We have seen in a previous chapter that the agencies, as a matter of policy, have compensated the permittees for the value of improvements which were lost as a result of exchange or transfer.

There are two legislative acts which provide for the compensation of permittees for the loss of capital value when the permits are cancelled by act of the government. The Act of July 9, 1942 321/ as amended provided that grazing permittees "shall be paid" for the losses suffered as a result of use of such lands for war or national defense purposes. The Act directed that the payment was to be made by the agency or the department using the lands.

During the war and shortly thereafter, the Department of Defense compensated ranchers for the full market value of land withdrawn for defense purposes. 322/ The most complete record we have been able to obtain was that of the McGregor Range in New Mexico in 1955. This range consisting of 71,000 acres of deeded land and 626,000 acres of federal and state land was acquired by the Corps of Engineers. This comprised

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320/ In this same case, Red Canyon Sheep Co. vs. Ickes, the court stated "...having been grazing this livestock upon these lands and who bring themselves within a preferred class set up by the statutes and regulations are entitled as of right to permits as against others who do not possess the same facilities for economic and beneficial use of the range." 98F.2d at 314.

321/ 56 Stat. 634; 43 U.S.C. 319

322/ This information was secured from Dr. Arthur D. Smith of the Public Land Law Review Commission staff from converstaions with the Department of Defense Arizona 1967 -

a number of small ranches which were based upon irrigated land for commensurable property, but the value of the land was derived from the public land privileges. The land was grazed the year around.

The Corps of Engineers appraised the several ranches as integral units. A fair market value was established for these units, and then the non-federal land was purchased at a price which reflected the fair market value of the entire unit. The Act referred to above was cited as a justification for this procedure. As a consequence, the individual ranches were in fact compensated for the capitalized value of the range privileges which they lost as a result of this withdrawal. 323/

The second act is the Navajo Indians Exchange Act of September 2, 1958. 324/ This act provides that: "... owners of range improvements of a permanent nature placed ... on lands transferred ... shall be compensated for the reasonable value of such improvements ..." Precedent in the same act was set when it was specifically required that the Bureau of Reclamation compensate the Indians for the loss of the use of their lands in accordance with the same standards expressed in 43 U.S.C. 315q above. As for the above, these compensations were to be a fair and reasonable amount. It is not known how this fair and reasonable amount was calculated. However, most government appraisal methods give due considerations to values of adjacent private property having similar characteristics and locations, to detailed book values, and to all similar sources of information which will yield insights to real market values. Assuming that this was done in this case, and assuming that the Bureau of Indian Affairs was its usual assiduous self in assisting the Indians to obtain maximum values, it would be most unusual if the full capitalized value of the permits was not included in the compensation.

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323/ Telephone conservation with Mr. V. P. Szuozitzki, Corps of Engineers. Albuquerque, New Mexico. April 16 and 17, 1969.

324/ 72 Stat. 1686.

However, a personal investigation of the original records plus personal interviews with those originally involved, should be accomplished before citing this as a positive example.

The examples above, of compensation for loss of grazing privileges, are not extensive. Also, except for residual values in grazing land improvements, compensation has been granted only as a result of the use of such lands for war or national defense purposes. There is at least one positive example where the Government has paid permittees for the capitalized value that has accumulated over the years in their permits. There are some others where the Government probably has paid. No doubt this can be determined one way or another by additional research. In any event, it is important only in that it is one point in a subject that has grown large over the years, while all interested parties have watched the problem grow without taking steps to solve it.

Summarizing this portion, even though the U. S. Forest Service and the Bureau of Land Management have consistently maintained that grazing livestock on their lands is a privilege and not a right, some undefined "rights" of some sort are associated with the grazing privilege. In a very few instances, these "rights" have been recognized, although perhaps indirectly, through the Government's paying for capitalized permit values when privileges have been lost because of conditions associated with war and national defense. In any event, the custom of permittees selling permit values to each other has been not only common but also open and above board for many years. The two large land management agencies have known of these practices and have participated in discussions concerning them during all these years. Because of this, it appears, as with the policy of permit transfers, the position of the U. S. Forest Service and the Bureau of Land Management has helped to create an impression that some possessory rights do in fact exist.

Security of tenure and the allotment management plan

An example of a recent policy change which has implications for security of tenure is the Allotment Management Plan. Its purpose, as stated by the Bureau of Land Management, is to attain the long-term goal of that agency, which is "to obtain livestock grazing management of public lands where grazing is importantly involved and when retention for multiple use management can be reasonably expected." The plan is a written action program designed cooperatively by the livestock operator and the Bureau of Land Management with the purpose of maintaining and improving the rangelands. The fact that the plan is entered into jointly by an agency and the user and that it covers a program for a number of years would seem to provide more security in tenure for the cooperator. 325/

Only a small percentage of the permittees are as yet under either the Bureau of Land Management allotment management plan or the U. S. Forest Service range management plan. In the interviews conducted for this study 15.3 percent of the ranchers were under the Bureau of Land Management plan and 13.3 percent under the U. S. Forest Service plan. No additional privileges were granted under the Bureau of Land Management plan but ranchers expect privileges to be increased in the future. Under the U. S. Forest Service program increases were granted in 18.2 percent of the plans, and ranchers expected further increases in the future. Almost all ranchers believed that their security in tenure would be improved by entering into the plans.

Economic efficiency and the forage allocation policies

What has been the effect upon the efficient allocation of resources of the forage allocation policies in operation before January 1969? As pointed out above, under the

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government programs economic efficiency was not a criterion in forage allocation to the first permittees, although the criteria applied did not necessarily exclude considerations of efficiency. Once the allocations were made, however, the policies of security in tenure and of transfer of privileges tended to permit the market price to reallocate the resources after they passed from the hands of the first users. There are, however, exceptions which we shall consider later. These exceptions include the limit on the number of new users granted permits by the agencies because of policies relating to free use, the additional privileges resulting from increases in carrying capacity, the reallocation of privileges by the U. S. Forest Service at the time of transfer discussed above, and the restraints on transfer resulting from considerations of commensurability, stability, family farms, and the prevention of monopoly. Let us now consider the process by which the free market would tend to allocate resources in the absence of effective constraints.

In a competitive economic situation market prices perform two basic functions: (1) they determine how resources will be allocated; and (2) they distribute the income to be derived from the resources to the factors of production involved.

Price as an allocative factor has distinct advantages over various non-economic criteria in resource allocation. Price tends to allocate the property to the most efficient operator. This is of particular importance in agriculture in general and in the livestock industry in particular where economies of scale exist. The report of the special committee on the analysis of grazing costs, which reanalyzed the data compiled by the Interdepartmental Grazing Fee Study, made the following statement: 326/

> "Variations among individual allotments of the grazing costs per AUM were very large within every category (geographic area, season of use, and size of

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326/ Report of technical committee on the analysis of grazing cost, . Op. Cit. p. 8.

permit). The strongest and most consistent ralationship found among the many analyses was the relationship between costs per AUM and size of permit. Other relationships might have existed but, if they did, they could not be firmly established because of large random variations in this data."

In the analysis of the ranches covered by the Western Regional Research Project (W-79) special attention was paid to the factor of scale. 327/ It was discovered that the economies of size followed a hyperbolic trend; i.e., as the number of animal units on a ranch increased, costs declined, but at a decreasing rate, and approached an asymptote. In the general correlation model for the study three variables affecting scale were included: labor per AUM, investments per AUM, and the number of animal units. The number of animal units was positively correlated with labor per AUM and negatively correlated with investments per AUM, although the correlations were very small. To secure the net regression of scale on the cost of producing a hundredweight of meat, therefore, labor and investments were dropped from the equation. By doing this the coefficient of multiple determination $\overline{(R)}^2$ was reduced from .5443 to .4553 where scale was correlated with cost per hundredweight of meat, with labor and investment per AUM omitted from the equation. For the entire region, with a sample of 334 ranches of cow-calf and cow-yearling combined, using a hyperbolic equation of the type $y=a+b\frac{1}{x}$, the b value was significant at the 1 percent level. This was true also for the cow-calf, cow-yearling operations in all four areas within the region of the eleven western states, although the coefficients of determination varied considerably from area to area. In Area I with 90 observations, the coefficient of determination was .3507; in Area II with 80 observations it was .2810; in Area III with 87 observations it was .5249; and in Area IV with 77 observations it was .4569. This seemed to verify the statement from the Technical Committee quoted above, that scale seems to be the

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327/ Appendix p.

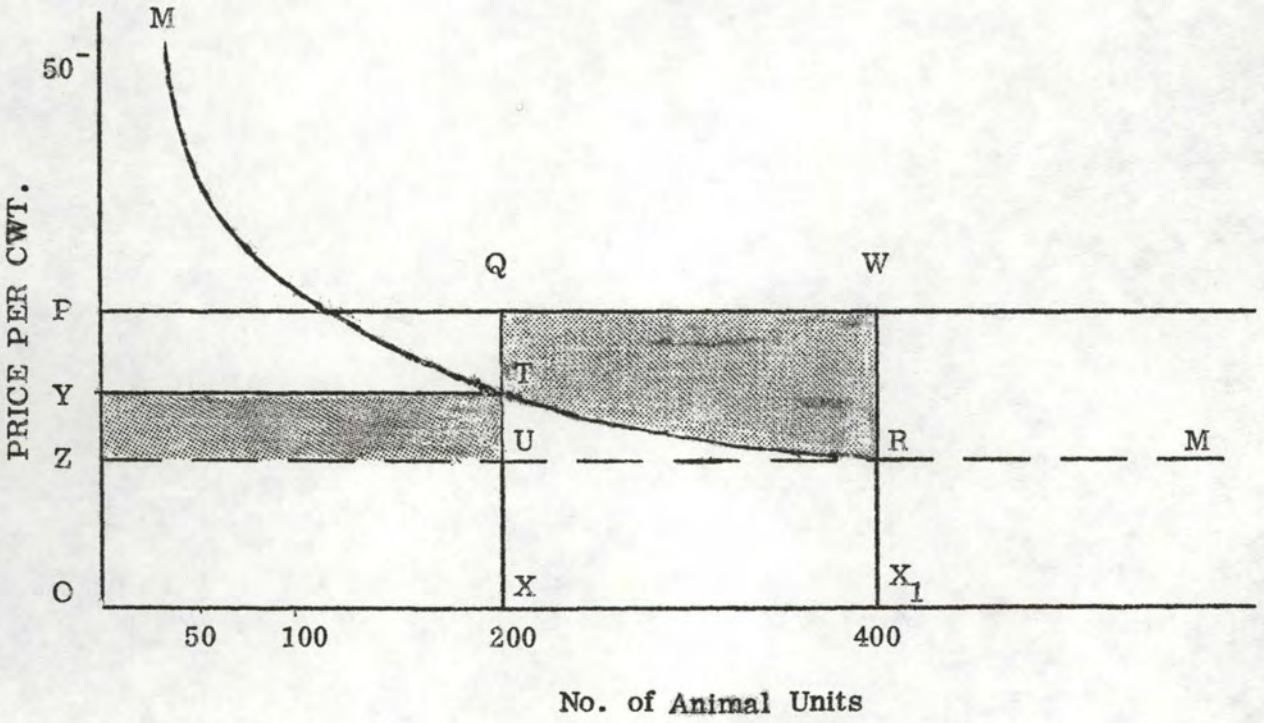
only consistent factor throughout the region that affected costs of production of beef. In the discussion which follows only the correlation model using the earlier 334 observations from the western region will be used for analytical purposes.

Because of the existence of pronounced economies of scale, the value of rangeland, and consequently of the grazing privileges, varies with the size of the operation. A ranch with 100 animal units produces beef at a total cost of $31.78 per hundred weight; for a ranch of 200 animal units the costs decrease to $25.01; for 300 animal units they drop to $22.75; for 400 animal units they fall to $21.62; and for 1,000 units, they become $19.59.

From the above data it is apparent that size of operations is very significant to the cost of production and efficiency in producing meat. Of even greater significance, however, is the effect of scale upon the value of land to ranchers in operations of varying size. A small rancher, for example, who has 200 animal units, has a cost of $25.01 for producing 100 pounds of meat. His long-run expectation of the average price he will receive for 100 pounds is, let us say, $28.00. If each animal unit provides 300 pounds of meat, the 200 animal units will produce 600 cwt. of meat, from which the rancher will receive a net profit of $1,794, plus wages for his own and his family's labor. If he increases the size of his operation to 400 animal units, his cost per cwt. of meat produced will decline to $21.62 per cwt. at an estimated price to be received of $28.00 per cwt. He will now have net profits of $6.38 per cwt., or $7,656 on 400 animal units. The extra 200 animal units added to his ranch will net him $5,862, or $29.31 per animal unit added to his operations, or $2.50 approximately per AUM. Another individual, who has no ranch property and wishes to buy the same ranch of 200 animal units, would find his costs of operation $25.01 per cwt. On a ranch of 200 animal units he would earn net profits of $3 per cwt. produced and he would produce 600 cwt. of meat. The ranch operation would yield him only $1,800 in net profit, or $9 per animal unit of rangeland purchased. Converted to AUM's the second bidder for

the land would have a profit of only 75 cents per AUM. If economic factors were the only considerations, this new rancher could not compete with the rancher already in business in the purchase of a new ranch which may come up for sale. We may illustrate this situation graphically.

Figure 4




In the above figure the costs of operations by scale are represented by the curve MM, the price of beef by OP. Rancher A starts with an operation of 200 units on which his costs are XT and his profits YPQT. If he expands the size of his operation to X by adding $XX_1$ animal units, his costs per unit will decrease to OZ and

his profits will increase by the shaded area ZYTQWR. Any individual wishing to purchase $XX_1$ animal units who has no operation to which to add would be at a disadvantage, because he would be faced with higher unit costs and consequently less profits per unit.

If property, or in this case grazing permits, were allocated on the basis of competitive bidding, the tendency would be for ranchers to bid to increase their operations to the most efficient units. Ranch sizes, like sizes of farms generally in the Unites States, would increase to over twice their present size. The smaller operations would be absorbed into larger units and the cost per unit of meat produced would tend to decline. However, the policy of the land agencies, the Bureau of Land Management and the U. S. Forest Service, has been to allocate the land in accordance with criteria other than economic efficiency.

Present system of allocation and income distribution

We see from the above discussion that the allocative procedures of the major public land agencies permitted the original permittees to secure an income return above that of private land owners during the period of their use of the public lands. The permittees also received a capital value when the permits were transferred to the next users. We must now consider the allocative justice between those who now possess the range permits and those who do not. The nomadic or itinerant sheepmen or cattlemen who grazed their flocks or herds on government lands, who owned no property and had no headquarters, are for the most part gone and have made their adjustments to exclusion from the rangelands. There still exist the nomadic Indians on the southern range. These persons, however, are given free use in proportion to the size of their families and are consequently being taken care of in some measure by this procedure.

The question of fairness to the former group who have been excluded from the range is by now an academic question. They were victims of the desire of the public land agencies and local communities to provide for stability of the livestock industry

and for stability of the local community. Having little or no base property, they were excluded from the rangelands on the basis of these criteria. Whether or not fair allocations were made it is fruitless to debate at this date. In fairness to the agencies and to the original policy framers we must point out that much of this policy was formulated at a time of great instability in the livestock industry. The U. S. Forest Service developed its policies and executed them during the instability arising from the sudden expansion of demand for livestock and livestock products during the First World War and the subsequent collapse of the market in that industry during the early 1920's. The Bureau of Land Management encountered its allocative problems during the great depression of the 1930's. These situations were made even more severe by the nature of the cattle industry, characterized by cattle cycles, those long swings in beef prices which provided rising prices for about six years to be followed by declining prices for a subsequent seven-year period. 328/ The agencies can be excused, therefore, if in their preoccupation with stability, it may have been overstressed. The question which we shall probe in the next chapter is whether or not considerations of stability are as essential today as they were a generation or two ago.

There is, however, another group whose interests should be considered. It is comprised of the individuals who do not have grazing permits, who could not meet all the requirements of commensurability for the grazing permits, but who up to this point have not been provided with permits. This problem is of considerable significance in cases where land has become either rehabilitated or improved and where the carrying capacity of the rangeland has increased. In these situations allocation was not difficult when the number of privileges of current permittees had previously been cut and later

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328/

was restored as a result of range improvements. In situations, however, where a permittee had improved his land through good management or through investments either on his own or in a cooperative agreement with the agency, the agency had to decide whether to increase the privileges of the current user, to increase the privileges of other users, or to bring entirely new users onto the land. The U. S. Forest Service has limits on numbers which restricts the expansion of old permittees, unless the permittee is responsible for the increased grazing capacity. While the Bureau of Land Management has no upper limit on permits, nevertheless it attempts to spread its largess among current users, with emphasis on the restoration of reductions previously imposed, and on "need."

In general, the endeavor to bring new permittees onto the range will tend to continue to encourage units which are too small to earn an adequate income for their owners and will keep the majority of users below the level of economic efficiency.

Tax payments on public grazing lands

No analysis of allocative justice and fairness would be complete without consideration of tax obligations to users and non-users. Recognition of a possessory interest in the land by the user, to the point of permitting a capital value to arise, should in all fairness involve a tax obligation equal to that of owners of private grazing lands.

Most states exclude public lands from the tax rolls. California and Washington are the only exception. Oregon at one time tried to tax these lands but the courts have ruled that they are not taxable.

It is readily recognized that although range permits are not directly taxable they may be indirectly taxed because of the value they add to the base property of the ranch. An attempt was made in this study to determine the extent to which indirect taxation may or may not have occurred. We attempted to secure information by which we

could compare assessment procedures on lands that had no public grazing privileges with assessments on lands that did. This information was not attainable in any form that would support a reliable conclusion.

In the questionnaire used in the 75 ranches selected for intensive interviews, the ranchers were asked whether they felt that they paid taxes on the privileges they secured on the public range. They were almost unanimously of the opinion that they were not taxed.

The issue of equitability, however, does not hinge upon the taxes involved but on the additional costs to a permittee in using public land over the costs incurred by an owner of private land. The private land owner in many cases secured title to his land through homesteading. To make the two situations equitable, it should be decided whether or not the fees that the public land permittee pays exceed or fall short of the taxes that the private owner must pay. There is evidence that the taxes paid by the private owner may be even less than the fees paid by the public land permittee.

Both the U.S. Forest Service and the Bureau of Land Management remit a percentage of the fees they collect back to the counties in lieu of taxes. Clawson and Held state: "Chapter will show that total payments from the federal government to all states and all counties, out of receipts from the federal lands, are probably as high as would be the yeild from taxes. Probably they are even higher." 329/

Further evidence of costs of fees paid for privileges exceeding taxes was secured from members of the Public Lands Council of the Idaho Cattlemen's Association. Several members stated that the taxes on their privately owned rangelands were significantly less than the fees paid on comparable lands on a per acre basis on public ranges. 330/

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329/ Clawson and Held. 1957. The federal lands: their use and management. John Hopkins Press. Baltimore, Maryland. p. 243.

330/ Minutes on meeting of the Public Lands Council of the Cattlemen's Association. November 9, 1971.

if this comparison could be established, the question of unfair treatment of private owners as compared with users of public lands would be resolved in favor of private owners

Discrimination in favor of small farmers

If efficient allocation of resources were the only criterion of justice in allocation of range resources, discrimination in favor of the small farmer would not be justified. As late as August 3, 1968, the Division of Range Management of the U. S. Forest Service made the following statement of objectives:

> "Small scale operations are typical of the U. S. Forest Service grazing land users. One of the most important U. S. Forest Service objectives is to promote stability of the family ranching units and local communities in the areas of which national forest system lands are a part. Only 8 percent of the U. S. Forest Service permittees own more than 500 head of cattle. Approximately 74 percent own less than 200 head. Fifty-three percent own less than 100 head."

It will be shown that a cattle operation with less than 200 animal units cannot expect to cover all its costs, and those of less than 100 cannot provide an adequate living unless the ranch operator can supplement his income from outside sources.

Evidence from statistics of size distribution of livestock on federal lands shows an increase in size of U. S. Forest Service lands since 1909. The Class I permits, less than 40 head, decreased from 65 percent of the total permittees to 55 percent in 1965. All the other size classes showed increases. Even in 1965, however, only 9 percent of the U. S. Forest Service permits were for over 200 head. The Bureau of Land Management showed figures only for 1950 and 1960. This was a period in which adjudication activities were at their height. Many ranchers sustained cuts during this decade. Class I permits under 50, as defined by the Bureau of Land Management, increased from 43 percent to 47 percent, whereas Class IV permits, over 200, declined from 18 percent to 20 percent. Size of permits does not necessarily indicate the size of the ranches. In the case of the public land agencies it indicates, however, that the small size units have been favored.

## Small ranches

It must be recognized that national welfare may require the continuation of a small ranch policy. Recent studies of rural poverty and migration have indicated that the removal of low income farmers from the land does not relieve the poverty problem. 331/ It is difficult to justify the large number of small operations on the public lands. It may be well for the agencies to give greater attention in their allocative policy to the problem of efficient resource allocation. At least attempts should be made to eliminate those features of the allocative procedures which tend to encourage ranch operations which are too small to provide adequate family incomes. The only exception to this argument is in the case in which small diversified farmers may wish to add another enterprise to their operations. If such farmers have a base property in which they grow forage in their normal rotation, they may find that with little additional cost they could add a number of cattle which would be largely complementary to their current operations. In this case the cause of economic efficiency may best be served. 332/

## Restrictions on free market allocations of forage resources

In the preceding section it was pointed out that under free market conditions the ranches that were already established but wished to decrease their cost of operation could do so by increasing the size of their operations. Such firms could usually succeed in doing so by bidding the land resources away from other ranchers who had no property to begin with. The rancher striving to secure an efficient unit could afford to pay more for his land because it yielded more to him in terms of cost differentials. The theoretical analysis depends, of course, on the assumption that other things remain equal.

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331/ Day, R. H. 1967. Technological change and the sharecropper. American Economic Review. LVII: 1.

The President's report of the National Advisory Commission on Rural Poverty. 1967. The people left behind.

332/ Cooperative Grazing Association sponsored by the Farmers' Home Administration on a case in point. However, these associations seem to have not met with success. There also seems to be opposition to them by the federal land agencies and the established cattlemen.

In general agriculture this trend has been going on for the past two decades. There is no good measure of size of farms and ranches on a comparable basis for any long period of time. An indirect measure, however, is the number of farms. In the western states the average number of farms reached a peak in 1935 and declined thereafter. Livestock farm numbers did not reach a peak in the 11 western states until 1945, but thereafter declined rapidly. Between 1945 and 1964 all farms declined 40 percent in the west, but livestock farms declined only 21 percent. It would be improper to attribute the smaller decline in livestock ranch numbers to the policies followed by the federal land agencies in favoring the smaller family farm units, but some evidence may be gleaned from such statistics. When compared with livestock farms in the north central states, the pattern of rise and decline was the same. Livestock numbers reached a peak there also in 1945 and subsequently declined. The decline in livestock ranch numbers in the north central states was more precipitous than in the west. The decline was 33 percent between 1945 and 1964 as compared with 21 percent in the west. 333/

Most of the restrictions relating to size of ranches arise from commensurability requirements, limitation of numbers on U. S. Forest Service lands, the requirement of the purchase of animals or of land for transfer of privileges, and restrictions in numbers to prevent further deterioration of the land.

A serious question arises as to the significance of the commensurability requirements which were so closely tied to stability. An analysis of the stability objective will be reserved for the next chapter. It is questionable that the agencies themselves put as much emphasis on this criterion as formerly because of the exceptions which are being made. Cases arise where farmers discover that they can use their base property to greater advantage by growing cash crops than by producing hay. In some cases they have

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333/ U. S. Department of Commerce, Census of Agriculture.

been able to irrigate their base property and thus provide a greater opportunity cost in cash crops than in hay. In such cases it would pay the farmer to sell his crops and to purchase hay. Other situations arise where ranchers can extend their season by renting land at lower elevations than their base property. They optimize their income by renting their base property for grazing and renting the better land for winter pasture. In still other cases encountered in the interviews with ranchers, it was discovered that it is cheaper to buy hay than to pay the high costs of labor to produce it themselves. There is also the situation with respect to parallel land where the rancher claims as his base property private land producing forage at the same season as the public land on which he has privileges. In this situation the rancher does not have property which will provide him year around provision for his cattle.

In all the above cases the public land agencies have been flexible in their interpretation of commensurable property. By doing so they also tacitly recognize that the entire concept has no meaning. If the financial ability to provide for the cattle throughout the year is the goal, other tests than base property could better be used.

There are situations that arise, however, in which attempts by ranchers to reorganize their operations to increase efficiency are met with refusal by the agencies on the grounds that transfers have been made but strict commensurability has not been accomplished. For example, an attempt to obtain better management on a large ranch by transfering part of the ownership to the management firm was balked by the agency on the theory that neither land nor animals were transferred in the operation.

Still another situation arises in the use of water instead of base property for commensurability requirements in the southwestern states where year around grazing occurs. The question has been raised as to whether or not this provision constituted a discrimination in favor of ranchers operating in areas where year around grazing is practiced. No indication of discrimination was obtained from any of the interviews conducted in this study. From the standpoint of value derived from the rangelands in the southwestern regions, the study of the 334 cow-calf, cow-yearling ranches in the correlatio

model showed that the southwest desert area utilized on the average 6.125 months of grazing on public lands per animal units compared with 3.313 months for the western region as a whole. The net regression of public land on the cost of meat per cwt. was very much less in the southwest area than for the region as a whole. The correlation showed a net regression of -.1188 for that area compared with -.1576 for the region as a whole. The regression in neither the southwest area nor in the west as a whole was significant at the 5 percent level of significance. What these regressions mean is that assuming that an animal unit on the average produces 300 pounds of beef, in the southwest an AUM of public grazing would reduce the cost of producing 100 pounds of beef by 35.6 cents, whereas for the region as a whole an additional AUM would reduce the cost of beef by 47.2 cents.

In Area I, the plains area, the value of public rangeland was -.7925 per animal unit and it was significant at the 5 percent level; and in Area II, the Rocky Mountain Area, the value of public rangeland was -.8189 per animal unit, and this coefficient was significant at the 1 percent level. In Area I the average public land per animal unit was only 1.179 and in Area II it was 2.521. This means that public land was valued in terms of cost of beef at $2.38 per animal unit in Area I and in Area II at $2.46. It would seem that while commensurability requirements were lower in the southwest the value of land is also lower. What the ranches are given in the northern region is of more value than in the southwest.

The public concern in allocative justice

The determination of the degree of justice and fairness of income distribution between the Government and individuals is a permanent issue. Like most issues of this nature it is never settled. When criteria were determined that emphasized the custodial rather than the landlord relation of the Government to the public lands, the decision was made not to use maximization of income as the basic criterion. As a consequence, the

public has not secured the optimum returns on its land resources. Nor has the public been completely satisfied with the allocation of the income between the Government and the users of the forage lands. A more complete analysis of the new policy to secure for the Government the full user cost differential in public lands is reserved for the next chapter.

No analysis of allocative justice and fairness would be complete without consideration of tax obligations to users and non-users. Recognition of possessory interest in the land by the user to the point of permitting a capital value to arise, would seem in all fairness to involve a tax obligation equal to that for owners of private grazing lands.

All states exclude federal public lands from the tax rolls. California and Washington do tax the possessory interest obtained by users of the public land. It is readily recognized that, although range permits are not directly taxable, they may be indirectly taxed because of the value they add to the base property of the ranch. An attempt was made in this study to determine the extent to which indirect taxation may or may not have occurred. This attempt included an effort to secure information by which assessmer procedures on lands that did not have public grazing privileges could be compared with assessments on lands that did. This information was not attainable in any form that would support a reliable conclusion.

In the questionnaire used in the 75 ranches selected for intensive interviews (Chapter , Section ), the ranchers were asked whether they felt that they paid taxes on the privilege they secured on the public range. They were almost unanimously of the opinion that they were not taxed.

Since both the U. S. Forest Service and the Bureau of Land Management remit a percentage of the fees back to the counties in lieu of taxes, it would seem that in this respect at least an approach to an equitable arrangement has developed.

## STABILITY OF THE LIVESTOCK INDUSTRY AND OF THE LOCAL COMMUNITIES

### Policy statements and programs relating to stability

It was pointed out in the previous chapter that the major public land agencies, the U. S. Forest Service and the Bureau of Land Management, placed great emphasis on stability as an objective of public land policy. In allocating forage resources, stability rather than market price was one of the principal criteria by which individuals to be granted grazing permits were selected.

Although the objective of stability was affirmed on numerous occasions, the exact nature of the stability to be attained and the process by which it would be reached has not clearly been stated. The U. S. Forest Service, which has been most concerned with stability as a criterion, has mentioned several areas which its concept of stability would embrace: stability of the livestock industry, stability of the family farm, and stability of the local community. Stability would be attained through commensurability, or sufficient land resources to provide for the livestock throughout the entire year; through limitation in size of the permits granted individuals using forest lands; through prevention of monopoly and the maintenance of the family farm; through free use of forest grazing resources by non-commercial domestic livestock to benefit local farmers; and through management practices which would insure permanent use of the land. Under the Taylor Grazing Act also stability was a stated objective which the Bureau of Land Management was instructed to observe.

The problem of stability is posed at this point because it is usually in conflict with other goals or objectives of policy. Kenneth E. Boulding has stated

that the national issue of stabilization is "what may be the greatest dilemma of economic policy: can we stabilize both output and prices? And if not, what do we abandon, and how do we divide the efforts between them?" 334/ The issue in grazing is especially basic: can we stabilize the range livestock economy and at the same time secure the optimum conservation, multiple use, and progress in the local communities and in the region through public land policies?

In this chapter we propose to examine the objective of stability as it relates to policies of retention or disposal of public lands; to consider fees derived from the grazing lands under the policy in effect before January, 1969, and under that effective after that date; to study the results of the old and new policies on income distribution and on stability; and to weigh the effect of current policies on stability of tenure.

## Disposal policies as they relate to stability

It was pointed out in Chapter I that there are 3 concepts in relation to retention and disposal of public lands: (1) the disposal of public lands to remove them from public responsibility and to get them into the hands of others as, for example, disposal to states or to private individuals; (2) retention, subject to disposal, as by the Bureau of Land Management or the General Land Office; (3) retention in the sense of permanent withdrawal from private use, as in the situation with respect to the forest reserves. It is necessary to keep the distinctions in mind, especially in consideration of the difference in policy between the U. S. Forest System and the Bureau of Land Management.

The Bureau of Land Management continues to dispose of the public lands. Lands can still be homesteaded under the Homestead Act, the Desert Land Act, the Enlarged

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334/ Boulding, 1958. Op. Cit. p. 78.

Homestead Act, and the Grazing Homestead Act. They can be withdrawn for reclamation development under the Reclamation Act. All of these acts provide that the land will ultimately get into the hands of farmers in family-sized farm units. To secure lands under any of these provisions it is necessary to demonstrate that the land can be put to a higher use for intensive farming or other more important public or private uses than grazing.

The U. S. Forest Service early in its existence continued to permit homesteading under the Forest Homestead Act of 1906. This Act authorized the Secretary of the Interior to open for entry forest reserve lands which in his opinion were chiefly valuable for agriculture and were not needed for other public purposes, and could be farmed without injury to the forests. By 1915, 1,900,000 acres had been classified and opened to entry. Later the U. S. Forest Service regretted this overliberality in granting homesteads. The Act was finally repealed in 1962.[335/]

The homesteading provisions of the U. S. Forest Service and the Bureau of Land Management, by permitting individuals to file for homestead entry on public lands, have 2 implications for stability. Homesteading and reclamation withdrawals lessen the security in tenure of the livestock ranchers and thus the stability of the livestock industry. On the other hand, by changing the nature of the activity from extensive agriculture in cattle grazing to intensive agriculture in crops, the stability and growth of the local communities is greatly enhanced. Intensive agriculture tends to lead to a higher concentration of population in a given area, to produce a much higher income per acre of land cultivated than does livestock grazing. The impact of the land on the local communities is therefore greatly increased, provided, of course, that the farms are operated in family-sized units. [336]

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335/ Dana, 1956. Op. Cit. p. 392; Gates, 1968. Op. Cit. p. 512; and 76 Stat. 1157, PL 87-869.

336/

Other provisions for withdrawal are not so easily reconciled with the objective of stability. Withdrawals for national parks, for wildlife refuges, for recreation, for scenic rivers and wilderness areas, all these may detract from the stability of the livestock industry without adding to the stability of the local community. The fact that the public land agencies or the Congress are tending to provide for more of this type of withdrawal would seem to indicate that the stability objective is becoming less significant for public land administration.

Pricing policies -- fees

The concern with considerations of stability reflected itself in the fee structure of the major public land agencies. The collection of grazing fees on the forest reserves began in 1906. The principle of competitive bidding was not adopted because the U. S. Forest Service felt that it would be disadvantageous to the small operator and would lead to instability in agriculture. 337/

In a similar manner the Grazing Service and later the Bureau of Land Management, operating under the Taylor Grazing Act, charged fees for the use of the grazing land from the inception of the program. In setting the fees for range use the Secretary of the Interior was directed to take into account the extent to which grazing districts yield public benefits over and above those accruing to the users of the forage resources for livestock purposes. 338/ At a district advisers conference in Salt Lake City on January 13 and 14, 1936, the following statement from Secretary of the Interior Harold Ickes was read to the delegation: 339/

> "One of the principal purposes of the present conference is to discuss the question of grazing fees as provided by the law. I will refer again to a statement I made at the Denver conference which I still believe to

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337/ U. S. Dept. of Agriculture, Forest Service, 1936. Op. Cit. p. 257.

338/ Taylor Grazing Act, Section 3 (?).

339/

be applicable. I quote:

> 'The Interior Department will have no quarrel with stockmen on that subject. You are willing to pay reasonable fees, and that is all we will expect. I believe that fees should be on a sliding scale varying with the earning capacity of the land as measured by the market value of the livestock grazed upon it. Fees should not be so low as to arouse the envy of those not entitled to public range rights or as to subject the permittees to a charge of receiving a Government subsidy. The whole question of fees, at the beginning, will be experimental. We will approach the matter with an open mind and consider it from the standpoint alike of the public interest and of the welfare of the stockmen.'"

In remarks made by the then First Assistant Secretary of the Interior T. A. Walters at the same conference, the following statement occurs: 340/

> "The Department of the Interior has not now, and never had, any intention of adopting a scale of high fees. One of the purposes of this meeting is to work out a fee which will be reasonable and satisfactory to the industry."

The concept of what constituted a reasonable fee began to undergo a change early in the history of each agency. The U. S. Forest Service began studies in 1916 to determine a fair fee for national forest ranges having comparable value to those of privately owned western rangelands. 341/ Objections by the U. S. Forest Service in 1920 to an attempt by the House Committee on Agriculture to increase fees by as much as 300 percent led to the Rachford Range Appraisal. This Appraisal of rental values on comparable private rangeland was to provide a basis for determining values of national forest range. A conference was held in Salt Lake City in 1927 to consider grazing fee matters on the national forests. Chief of the Forest Service W. B. Greely made statements at the conference that amalgamated the early concepts of user charges and the emerging concepts. His remarks emphasized

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341/ DeNio, R. N. 1962. Principles governing grazing fees on lands administered by the U. S. Forest Service. Proceedings of the Society of American Foresters, Atlanta, Georgia.

the need for continuation of the policy to consider the economic and social stability of nearby communities in charging a fee for the use of national forests by grazing livestock. He restated the need for a principle of fair compensation reasonably applied. 342/ Secretary of Agriculture Jardine in a talk to the National Woolgrowers just prior to the 1927 fee conference in Salt Lake City remarked: 343/

> "The livestock industry can hardly expect the permanent status in the National Forests which it desires unless the principle of fair compensation for the value of the forage is recognized and accepted. On any other basis, the industry would be in an indefensible position. It would be constantly subject to attack."

Jardine also stated in the same message that "I do not believe in charging all the traffic will bear."

A new fee schedule was imposed in 1928 and plans were developed for relating future grazing fees to market prices of livestock and comparable private land values. The new plan was implemented in 1933 at the request of the users of the national forests. 344/ This was and has been the basis of establishing fee rates on national forests until the recent announcements by the Secretary of Agriculture and the Secretary of Interior.

The Grazing Service initiated a study of fees in 1941, and the results indicated higher fees based on land values were justified. 345/ Studies were conducted by the Bureau of Land Management between 1946 and 1950 to determine the true value relationship between federal and private land grazing. 346/ Additional studies conducted by the Bureau of Land Management and various State Agricultural Experiment Stations to determine and relate fees on public land to market value followed

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342/ DeNio, 1962. Op. Cit.
343/ Ibid.
344/ Dutton, 1953. Op. Cit.
345/ Clawson, 1950. Op. Cit. p. 401.
346/ U. S. 88th Congress, 1st Session, 1963. Op. Cit.

the earlier studies. These studies, pressure from Congress, and the Independent Offices Appropriation Act of the 82d Congress [347] led to a revision of the fee schedule on public domain lands. Beginning in 1958, fees were based on the average of the previous year's livestock price per pound. Continued criticism of the fee rate on public lands prompted Secretary of Interior Udall in 1963 to change the base for calculating the fee from the previous year's livestock price per pound to 1.5 times this price. Secretary Udall commented at the Annual Convention of the American National Cattlemen's Association held at Las Vegas, Nevada, on January 30, 1963: [348]

> "People who use the public domain should help pay the costs. We think that is true if you use the land for grazing livestock. We also think it is true in the case of people who use the land for outdoor recreation."

Continued concern and criticism of user charges for federal natural resource uses prompted the Bureau of the Budget to issue Circular A-25 in 1959 providing guidelines to establish user charges for federal resource use. Inconsistencies in the interpretation and application of policies specified in Circular A-25 caused the issuance of the circular, "Natural Resources User Charges: A Study by the Bureau of the Budget" in June of 1964. To implement the directives of the Bureau of the Budget, a cooperative fee study was undertaken in 1966 by the Departments of Agriculture, Defense, and Interior. The outcome of that study is the basis for establishing the present fee levels.

Historically, grazing has been an important use of land administered by the U. S. Forest Service. After transfer of the forest reserves to the Department of

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[347] Public Law 137, Chapter 376, p. 268, 1952.

[348]

Agriculture in 1905, grazing receipts made up the largest part of the total receipts derived from the forest reserves. In 1906, grazing receipts were 67.7 percent of the total receipts. Through the years, the percentage that grazing receipts contributed to total receipts has steadily declined, until in 1965 this activity supplied only 2.1 percent of the total receipts derived from national forests (Table ). Timber receipts in 1906 were 31.2 percent of the total and 93.3 percent in 1965.

Fees for grazing on the public domain were not initiated by the Grazing Service until 1936. At that time they made up about 1 percent of the total receipts from the public domain. Grazing receipt percentages of total receipts were highest (about 10 to 12 percent of total receipts) in the period from 1938 to 1942 and have steadily declined to 1.8 percent of total receipts in 1965 (Table ).

The principal source of revenue from the public domain has been from mineral production rents and royalties. This activity contributes 70 to 85 percent of the total receipts. Timber receipts on acquired and revested public domain were 10 times higher than grazing receipts in 1965. This is principally due to timber harvest on the O & C and Coos Bay revested lands.

Income effects of current and proposed fee charges for public lands

To assess the effects of fees upon the economy it will be necessary to consider their effects: first, upon the ranch firm; second, upon the community; and third, upon the state and nation as a whole.

From the standpoint of the ranch firm, the fees assessed at the level established up to January 1, 1969, have not been large in comparison with other costs. In 1964 the average fee charged by the U. S. Forest Service was 48 cents per AUM and for the national grasslands 53 cents per AUM. The Bureau of Land Management charged 30 cents for Bureau of Land Management lands and 27 cents for leased lands.

Table 51. National forest lands: summary of receipts on national forests, grazing receipts and the percent that grazing receipts are of total receipts. a/

(Thousands of Dollars)

| Year | Total Receipts | Grazing Receipts | Percent Grazing Receipts is of Total Receipts |
|---|---|---|---|
| 1906 | 758 | 513 | 67.7 |
| 1907 | 1,530 | 857 | 56.0 |
| 1908 | 1,788 | 947 | 52.7 |
| 1909 | 1,766 | 1,023 | 57.9 |
| 1910 | 2,041 | 970 | 47.5 |
| 1911 | 1,969 | 928 | 47.1 |
| 1912 | 2,109 | 961 | 45.6 |
| 1913 | 2,392 | 999 | 41.8 |
| 1914 | 2,438 | 1,002 | 41.1 |
| 1915 | 2,481 | 1,130 | 45.5 |
| 1916 | 2,824 | 1,210 | 42.8 |
| 1917 | 3,457 | 1,550 | 44.8 |
| 1918 | 3,575 | 1,726 | 48.3 |
| 1919 | 4,358 | 2,609 | 59.9 |
| 1920 | 4,793 | 2,486 | 51.7 |
| 1921 | 4,152 | 2,132 | 51.3 |
| 1922 | 3,422 | 1,316 | 38.5 |
| 1923 | 5,336 | 2,341 | 43.9 |
| 1924 | 5,252 | 1,916 | 36.5 |
| 1925 | 5,000 | 1,725 | 34.5 |
| 1926 | 5,156 | 1,422 | 27.6 |
| 1927 | 5,167 | 1,531 | 29.6 |
| 1928 | 5,442 | 1,714 | 31.5 |
| 1929 | 6,300 | 1,740 | 27.6 |
| 1930 | 6,752 | 1,943 | 28.8 |
| 1931 | 4,993 | 1,961 | 39.3 |
| 1932 | 2,294 | 830 | 36.2 |
| 1933 | 2,626 | 1,498 | 57.0 |
| 1934 | 3,315 | 1,359 | 41.0 |
| 1935 | 3,289 | 1,151 | 35.0 |
| 1936 | 4,063 | 1,441 | 35.5 |
| 1937 | 4,936 | 1,580 | 32.0 |
| 1938 | 4,671 | 1,696 | 36.3 |
| 1939 | 4,903 | 1,574 | 32.1 |
| 1940 | 5,859 | 1,463 | 25.0 |
| 1941 | 6,630 | 1,429 | 21.5 |
| 1942 | 7,165 | 1,595 | 22.3 |
| 1943 | 10,056 | 1,973 | 19.6 |
| 1944 | 15,617 | 2,459 | 15.7 |
| 1945 | 16,048 | 2,159 | 13.5 |
| 1946 | 13,875 | 2,060 | 14.8 |

Table 51. (Continued)

(Thousands of Dollars)

| Year | Total Receipts | Grazing Receipts | Percent Grazing Receipts is of Total Receipts |
|---|---|---|---|
| 1947 | 18,372 | 2,294 | 12.5 |
| 1948 | 24,374 | 2,898 | 11.9 |
| 1949 | 31,208 | 3,276 | 10.1 |
| 1950 | 33,672 | 3,385 | 10.1 |
| 1951 | 56,293 | 4,166 | 7.4 |
| 1952 | 69,955 | 5,023 | 7.2 |
| 1953 | 74,939 | 4,416 | 5.9 |
| 1954 | 66,014 | 3,107 | 4.7 |
| 1955 | 78,250 | 2,953 | 3.8 |
| 1956 | 112,307 | 2,906 | 2.6 |
| 1957 | 108,027 | 2,682 | 2.5 |
| 1958 | 88,973 | 3,013 | 3.4 |
| 1959 | 118,820 | 3,751 | 3.1 |
| 1960 | 141,804 | 3,644 | 2.6 |
| 1961 | 100,352 | 3,268 | 3.3 |
| 1962 | 109,112 | 3,195 | 2.9 |
| 1963 | 120,169 | 3,385 | 2.8 |
| 1964 | 131,567 | 3,181 | 2.4 |
| 1965 | 142,200 | 3,040 | 2.1 |

a/ Excludes receipts from national grasslands.

Source: Clawson, Marion. 1967. The federal lands since 1956: recent trends in use and management. Resources for the Future, Inc., Washington, D. C. Appendix Table 5.

Table 52. Public domain acquired and revested lands: summary of total cash receipts and grazing receipts, 1936-1965. a/

(Thousands of Dollars)

| Year | Total Receipts All Sources | Receipts from Grazing | Percent Grazing Fee Receipts is of Total Receipts |
|---|---|---|---|
| 1936 | 5,195 | 49 | 0.9 |
| 1937 | 7,400 | 530 | 7.2 |
| 1938 | 8,447 | 866 | 10.2 |
| 1939 | 7,748 | 977 | 12.6 |
| 1940 | 7,520 | 748 | 9.9 |
| 1941 | 8,655 | 1,114 | 12.9 |
| 1942 | 9,921 | 1,095 | 11.0 |
| 1943 | 10,568 | 980 | 9.3 |
| 1944 | 15,118 | 1,016 | 6.7 |
| 1945 | 14,371 | 997 | 6.9 |
| 1946 | 14,087 | 965 | 6.9 |
| 1947 | 21,100 | 1,111 | 5.3 |
| 1948 | 33,913 | 1,454 | 4.3 |
| 1949 | 37,984 | 1,246 | 3.3 |
| 1950 | 36,991 | 1,551 | 4.2 |
| 1951 | 50,348 | 1,708 | 3.4 |
| 1952 | 65,967 | 1,999 | 3.0 |
| 1953 | 67,274 | 2,112 | 3.1 |
| 1954 | 78,693 | 2,057 | 2.6 |
| 1955 | 231,852 | 2,240 | 1.0 |
| 1956 | 212,004 | 2,440 | 1.2 |
| 1957 | 112,059 | 2,286 | 2.0 |
| 1958 | 127,385 | 2,763 | 2.2 |
| 1959 | 136,721 | 3,228 | 2.4 |
| 1960 | 371,068 | 3,488 | 0.9 |
| 1961 | 159,246 | 2,982 | 1.9 |
| 1962 | 173,518 | 2,780 | 1.6 |
| 1963 | 530,693 | 4,028 | 0.8 |
| 1964 | 199,052 | 4,406 | 2.2 |
| 1965 | 234,361 | 4,251 | 1.8 |

a/ Source: Clawson, Marion. 1967. The federal lands since 1956; recent trends in use and management. Resources for the Future, Inc., Washington, D. C. Appendix Table 27.

The National Park Service charged 30 cents per AUM. These fee rates contrast greatly with those of the Bureau of Indian Affairs, which charged $1.59 per AUM, and of the Bureau of Sport Fisheries and Wildlife, which charged $1.20 per AUM. The latter agencies used an appraisal system for charging fees. The fact that Bureau of Indian Affairs lands bring higher rates of return to the agencies may not be due entirely to the procedure in assessing fees. The Bureau has acted as a trustee for the tribes and consequently has endeavored to secure as large a return as possible for their lands. Thus, it has acted as a landlord trying to optimize rental income. It must be recognized, however, that Indian lands are probably more productive than either Bureau of Land Management or U. S. Forest Service lands (Section B, p. ).

That the fee charge is below the true value of the lands has been established by comparison between the rental values of public lands and private lands and by cost analyses of public and private ranges as developed by the Interdepartmental Fee Study and by the W-79 schedules used in this report.

Because of the enormous variations in costs in ranching enterprises, it is difficult to come to a conclusion about the reasonableness of the fees. The same land is not worth the same to all individuals. As stated above, economies of scale are a very important factor in costs, and affect the value of land differently to different operators depending of their size. Cattlemen point out that when private land is rented, the cattlemen often know the condition of the grass before the rent is determined, whereas on government land the fees are assessed without regard to the forage supply on the range in any 1 year. They indicate that frequently the cattlemen encounter poor forage conditions on their public ranges and resultant shortages of feed occur. They are willing under these conditions to pay practically

any price for additional rangeland on a temporary basis to protect their herds. Dr. M. L. Upchurch has pointed out that [349]

> "in some areas private range may sell or lease at a high price because the price of public range is institutionalized at a relatively low level. Under such circumstances arbitrarily setting the price of public grazing equal to that of private grazing would not make sense."

All of these factors enter into the price paid for private rangeland under varying circumstances. [350] Sufficient evidence exists from the fee study and from other sources to justify the conclusion arrived at by the public land agencies that current fees are below the economic value of the public lands to the users.

A correlation analysis was made for this study of 334 ranch records. The data were supplied by the Western State Experiment Stations which had cooperated in the Western Regional Project W-79. Two basic equations were used. Equation 1 correlated the cost per hundredweight of meat with public land per animal unit, purchased feed per animal unit, hired labor per animal unit, the number of animal units, investment in machinery per animal unit, and the percentage calf-crop per breeding cow. Exponential functions were applied to the equipment and cow-calf functions, and a hyperbolic function was applied to scale. In analyzing the results, it was discovered that intercorrelations existed between the number of animal units, labor, and equipment. To avoid these intercorrelations, equation 2 was developed, in which labor and equipment were dropped and the economies of scale function were represented in the estimating equation by the number of animal units alone.

The highest correlation (coefficient of multiple determination) ($\overline{R}$= .5548) was secured by equation 1. Equation 2 reduced the coefficient of multiple deter-

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[349] Upchurch, M. L. 1963. Public grazing lands in the economy of the west. In: American Association for the Advancement of Science: Food and Water Use. Washington, D. C. p. 93

[350] Interviews with cattlemen in Boise, Idaho.

mination to 0.4553. In the analysis which follows, the net regression showing the highest correlation (equation 1) will be used for analysis purposes, except when scale is being examined; when scale is the important variable, equation 2 will be used. (For the complete analysis of the correlation study, see Chapter III, Section )

The W-79 data show very little effect of public land on reducing costs of meat as compared with private land, and the results obtained were not significant for the region as a whole. The independent variable used in analyzing the effect of public land was the number of AUM's of public grazing land per animal unit. In the correlation model, private land was valued at $2.50 per AUM. If public grazing land on which no fees were included had a significant value over private land in the multiple correlation equation, it would have been reflected in the net regression coefficient of public land on the cost of meat produced. In the overall correlation estimating equation, using equation 1, the net regression of public land on costs was -16 cents; this indicated that each AUM of public grazing decreased the cost of meat per 100 pounds produced by 16 cents. If we assume that an animal unit is equivalent to 300 pounds of meat produced, the overall value of public land is worth approximately 50 cents per AUM. This assumes that private land costs $2.50 per AUM. Had another value been placed on private land, the returns from public lands would have been affected, as would also have been the degree of significance of the net regression equation. If the value of private land had been assumed to be higher than $2.50 per AUM, the value of the public land would have been increased. The reverse would have been true if a lower value had been assigned to private land.

The net regression coefficient using equation 1 did show significance in two of the sub-areas. In sub-area I, the plains area, comprising parts of Montana, Wyoming, and Colorado, the net regression of public land on meat costs was signifi-

cant at the 5 percent level. The regression coefficient was -.7928; on a total AUM basis, an additional AUM of public land is worth $2.37 in that region. In area II, the regression coefficient was significant at the 1 percent level. Area II, the Rocky Mountain area, consists of the mountain counties of Idaho, Wyoming, and Colorado. Here the net regression coefficient was -.8189, or an AUM value of $2.46. In other words, in the 2 areas in which public land showed significant effects on the cost of producing beef in comparison with private land, the cost of meat produced decreased 80 cents per hundredweight for every increase in public land per AUM of animals grazed. Since an animal unit is equivalent to 300 pounds of meat, each animal unit month of grazing was worth about $2.40 more to the users than equivalent private lands.

Even though the net regression coefficient of public land on the cost of meat produced was not significant in the other sub-areas, the coefficients are worth noting. In sub-area III, the southwest desert area, which includes New Mexico, Arizona and the southern portions of Nevada, the net regression coefficient was -.1188, or a value of 31.6 cents per AUM. In sub-area IV, the intermountain area, northern Nevada, northwestern California, and eastern Oregon, the net regression coefficient was -.2226, or 66 cents per AUM.

The significance of the net coefficient of public land on cost of meat per cwt. depends upon the multiple correlation equation applied. Equation 2, which drops from the equation the quantity of labor per animal unit and the amount of investment in machinery per animal unit, does give a significant net regression coefficient of public land on the cost of producing a hundredweight of meat. However, by using this equation, the coefficient of multiple determination decreases from .5548 to .4553. For the western region as a whole, the net regression of public land per AUM is -.2170 and is significant at the 5 percent level of signi-

ficance. Assuming as above the amount of meat produced per animal unit is 300 pounds, the value of public land in terms of decreasing costs of production per AUM is 66 cents.

In area I, the net regression equation was -.6931 and it was significant at the 5 percent level. The coefficient suggests that public land in the plains area was worth $2.10 per AUM. In area II, the net regression coefficient is -.7789 and it was significant at the 1 percent level. This suggests that in the Rocky Mountain area, public grazing land was worth $2.34 per AUM. In areas III and IV, however, equation 2 does not provide significant coefficients to the 5 percent level. The net regression for area III is -.1657 and for area IV -.03354. These figures show that the value of public rangelands in these areas are respectively 50 cents and 11 cents per AUM. Since these coefficients are not significant at the 5 percent level, very little importance can be attached to them.

The U. S. Forest Service study of user fees in 1967 estimated the survey average permit value in 1966 to be $25.35 for cattle and $19.45 for sheep per AUM. 351/ If we can assume, as the U. S. Forest Service affirms, that 50 percent of the value was paid for by the ranchers, the other 50 percent represents appreciation of value since the time of purchase. At no time have the current fees actually decreased the capital value significantly.

The effect of the fees on income, however, is quite different. Costs of ranching have risen more rapidly during the last 2 decades than the price of the animals produced. As a consequence, ranchers, like farmers generally, have experienced a cost-price squeeze. Although there has been a pronounced tendency for all agricultural firms to become larger, crop farms have increased in size more rapidly

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351/ U. S. Forest Service, 1967. Op. Cit. p. 7.

than cattle and sheep ranches. Since 1940, all farms in the 11 western states have decreased in number from 510,000 to 300,000, a decrease of 40 percent. Livestock ranches, on the other hand, decreased from 75,000 to 63,000, a decrease of only 16 percent.

The persistence of the very small ranches has had the effect that a large percentage of them do not cover their costs through ranching operations alone. The W-79 data described above indicate that unless ranches reach a size of about 200 animal units they have difficulty in covering all their costs of operations, including wages for the ranchers and their families. Any fee charged on an operation of this size has to be borne by cutting the living standards of the ranch family, or by securing off-ranch employment.

The average number of AUM's of public grazing land per animal unit for the entire area was 3.30 months. The highest average was in area III with 6.12 months per animal unit, and the smallest was in area I with 1.17 months, with 2.52 months in area II; these were the areas with the highest value per AUM.

The impact of the current fee on ranchers is quite small. The loss in capital value of the privileges resulting from past fee charges and their increases would not exceed their appreciation over the years. The Bureau of Land Management fee of 33 cents capitalized at 6 percent would be only $5.50 and a U. S. Forest Service charge of 51 cents would only be $8.50. The Bureau of Land Management varies its fees only with the price of beef and the price of lamb; the fee per AUM is 1.50 times the average of the price of beef per pound plus price of lamb per pound. 352/ The U. S. Forest Service base rates are established by comparison with private land,

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352/ U. S. Dept. of Agriculture, Forest Service. 1967. The present forest service user fee study. Prepared for presentation to the Secretary of Agriculture's Advisory Committee on Multiple Use of National Forests. Appendix, Table A.

and annual adjustments in base fee rates are tied to livestock prices. As a consequence, all rates vary somewhat with the returns to the rancher for his product, meat. U. S. Forest Service fees on the average reached a low in 1934 and a peak in 1952 when beef and lamb prices were also at a peak. Bureau of Land Management fees have shown a constant rise since 1953, but since the capital values of the grazing privileges have also been rising steadily, the ranchers have found the capital assets in the range privileges rising at a more rapid rate. 353/ 354/

It has been pointed out that the fees represent only a small percentage of the cost of operating ranches. Nielson showed that current fees amount to 0.6 to 1.2 percent on typical size groups of sheep ranches. 355/ On an intermountain cattle ranch in Utah, the fees represent from 1.99 to 2.3 percent of operating costs, and on mountain cattle ranches in Utah from 2.1 to 2.5 percent; only 2 size classes were included. These percentages are not very impressive, but in an industry in which costs exceed total returns in a majority of ranches, a loss of 1.7 to 2.5 percent of their total cost may be substantial.

The average farm price of cattle per hundredweight in the 11 western states for the years 1962-1966 was $24.80, say, $25.00. In the correlation model from the W-79 data, the ranch size of 200 animal units gave an estimated cost of $25.01. (See Chapter III, Section , p. ). We can conclude that for the area as a whole it requires a ranch of that size to cover costs. In arriving at this figure the correlation model used was one in which investment and labor was omitted to provide a better measure of net regression of size on costs. This is equation 2 in the

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353/ Interviews with bankers and insurance companies.

354/ Clawson, 1967. Op. Cit. pp. 58 & 67.

355/ Nielson, Darwin B. 19 . The potential impact of alternative fee adjustments. U. S. Forest Service, U. S. Dept. of Agriculture, and Utah Agricultural Experiment Station. Utah State University Cooperating, Logan, Utah.

model discussed in the appendix. (See Chapter III, Section , p. ). Ranches of less than 200 A.U.'s will not cover all their costs, whereas those above 200 A.U.'s will show net returns over costs.

These costs adhere fairly closely to one another in the various sub-areas within the region. In sub-area I, the plains area, the average price received by farmers for the period 1962-66 was $26.20. The estimate for a 200 animal unit using the estimating equation from W-79 data is $24.94. In sub-area II, the Rocky Mountain area, the correlation model estimate of costs for a ranch of 200 A.U.'s was $23.73, whereas the average period price was $25.70. In sub-area III, the southern desert, the estimating equation for 200 A.U.'s gave $25.00 and the average price received by ranches for that area was $23.70. Finally, in sub-area IV, the northern desert, the estimating equation for 200 A.U.'s gave $26.16 and the price received by ranchers for the period was $23.70. 356/

From the above figures it can be seen that there is variation between sub-areas, both in prices received and in costs. During the 5-year period a rancher with 200 animal units could expect to earn a small profit on his operation in sub-areas I and II, but he would lose money in sub-areas III and IV.

Further evidence of low returns to the average rancher can be ascertained from the following quotation: 357/

> "On the average, cattle and sheep ranches in the western states received 2.0 percent and 2.6 percent returns respectively on their investment. One-half obtained between 1.0 and 3.0 percent rate of return. About one-fourth of the ranchers received less than one percent or a negative return, while only one-fifth received over 4 percent. These same ranchers were paying 5 percent interest on borrowed capital."

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356/ Prices received data were taken from the U. S. Dept. of Agriculture, Statistical Reporting Service, Agricultural Prices.

357/ U. S. Forest Service. 1968. Important considerations in revising Forest Service grazing fee structure. Prepared by the U. S. Forest Service, Division of Range Management, for an August 5 meeting with the National Conservation Organization. p. 1.

This same study showed also that small ranches comprise the largest percentage of the permittees. About 53 percent of the permittees have less than 100 animal units in their herds, and another 30 percent have beteeen 100 and 200 animals. As a consequence of the predominance of small ranches in the U. S. Forest Service lands, fees tend to weigh more heavily on the small operator. From the W-79 data referred to above, it would appear that only 17 percent of the ranchers grazing U. S. Forest Service ranges are actually covering their cost at the current level of grazing fees. In fact, our greatest range problem relating to income is the predominance of uneconomically small ranches. This problem has its roots in the allocation criteria used by the federal land agencies at the start, a policy which discriminated in favor of small family ranches. As pointed out in the previous chapter, ranch operator efficiency was never a criterion of public land agencies. While the fee situation may have aggravated the small ranch problem, it was too minor proportionately to be considered a prime cause of it.

The impact of the new fee structure on range livestock ranches

Pursuant to the Budget Bureau Circular A-25 of September 23, 1959, referred to above, Secretary of Agriculture Orville Freeman and Secretary of the Interior Stewart L. Udall announced on November 14, 1968, a change in the methods of determining fees for range livestock on the U. S. Forest Service and Bureau of Land Management lands. The new base which would be equal to a fair market value was to be attained over a 10-year period beginning in 1969.

After the Budget Bureau Circular in 1959, the U. S. Forest Service and the Bureau of Land Management began a series of grazing fee studies. These studies consisted of a background study undertaken by several western land grant universities, the development of a model for the analysis of user value by Utah State University, and finally, an interdepartmental study of user costs by the Statistical

Reporting Service in cooperation with the Bureau of Land Management and the livestock industry.

The area covered by the cooperative study was made up of the 17 western states. Ten thousand individuals were interviewed. The purpose of the study was to determine the difference in costs between grazing on public lands and on private lands, assuming that no fees were charged on the public lands but including the cost of leases or rentals on private lands. The difference between the 2 types of lands would provide an estimate of the user cost differential between public and private lands. This difference would be considered the value of the public grazing lands to the user.

The results of the study can be briefly summarized: The average costs of operating on private land for cattle was $5.31 per animal unit, while the comparable non-fee costs of operating on public land was only $3.75, thus providing a differential between private and public land of $1.57. The average cattle grazing fee for the survey area in 1966 was 51 cents per AUM in the U. S. Forest Service and 33 cents in the Bureau of Land Management. It was determined that the variations in grazing costs were very large within and between geographic areas, livestock type, season of use, and size of permit. Size of permit was the largest and most consistent cause of variation in costs. The other relationships did not show significant differences. The analysis also showed a cost differential of 62 cents on the average between the Bureau of Land Management and the U. S. Forest Service lands. When adjustments were made for the pattern of seasonal use and for size of permits, this differential was reduced to 11 cents. Since the standard error was 22 cents, the difference in costs between the lands of the 2 agencies was not deamed significant.

It was also determined that the difference of $1.60 per AUM between private lands and public lands was too large. The private land leases were smaller in AUM's than public land permits. After adjustment was made for this cause of cost variation, the difference in costs between private lands and public lands was reduced to $1.26. 358/ Significant differences probably exist also for sheep, but the variations were so great that no generalizations could be made from these data. "The Committee concluded that the grazing cost data do not provide a basis for establishing differential fees between cattle and sheep." 359/ As a consequence, an overall weighted average figure for cattle and sheep of $1.23 has been used as the differential between costs on private and public lands for combined cattle and sheep operations. The $1.23 average was arrived at by using the average difference between private and public land of $1.13 for sheep and of $1.26 for cattle. These averages were weighted by the numbers of sheep and cattle.

Various estimates have been made of the loss to current owners which would be sustained by them if fees equal to the full value of the privileges were established. Dr. Darwin B. Nielson of Utah State University estimated that the total value of permits for Utah were $5.7 million for sheep ranches and $7.3 million for cattle ranches. 360/ If the entire value from public land were captured by grazing fees, the capital value of the permits would decline to zero. A capital loss in Utah of approximately $13 million would be sustained by the cattle and sheep industry. An

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358/ Special Committee on Grazing Fee Survey, Earl E. Hauseman, Chairman. 1968. Report to Boyd L. Rassmussen and Edward P. Cliff of the Bureau of Land Management and the U. S. Forest Service, respectively. p. 8.

359/ Technical Committee on Analyses of Grazing Fees Costs, Earl E. Hauseman, Chairman. 1968. Supplemental report for sheep (report to B. L. Rassmussen and Edward P. Cliff). pp. 2 & 3.

360/ Nielson, 19 . Op. Cit. p. 16.

individual who secured the permits free of charge, it may be argued, had received a windfall gain for which he had made no payment. If this windfall were now recaptured, no serious loss would be sustained by him.

Our survey of San Juan County in Utah showed that 52.5 percent of the public land permittees acquired their property from unrelated previous owners, that 66.7 percent of the transfers of permits which occurred since 1953 were acquired from non-related previous owners, and that 45.8 percent of the ranchers had purchased or sold permits after that date. (See Chapter III, Section , p. ). Since there is a strong presumption that property obtained from non-relatives was acquired at the full market value, at least 50 percent of the capital value of $13 million, or $6.5 million, was purchased at full market value. In addition, a portion of the property acquired from relatives would ordinarily involve a monetary consideration in buying out other relatives in the case of inheritance. 361/

The U. S. Forest Service study submitted to Congressman Wayne N. Aspinall on November 12, 1968, states: 362/

> "To obtain possession of a permit to graze livestock on Forest Service land, qualified ranchers must purchase the base property and/or livestock from a current permit holder. Ordinarily, they must pay a premium to the permittee for the permit. An estimated 85 percent of current permit holders have been acquired in this manner from the original permit holder. Thus, most permittees have paid a monetary value for the permit. Only about 50 percent of the $178 million value estimated as the value of Forest Service permits at current prices, however, is accounted for by the monetary payments, the remaining 50 percent was accrued through value appreciation over time. The livestock industry has taken the position that a new fee equivalent to the full user-cost difference would be requiring most of the present permittees to pay twice for the privileges of grazing public lands."

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361/ Nielson, 19 . Op. Cit. p. 16.

362/ U. S. Dept. of Agriculture, Forest Service. 1968 Studies, alternatives, and recommendations on the Forest Service grazing fee issue. A report to Congressman Wayne N. Aspinall, November 12. p. 5.

The 8-county survey shows that in the western states as a whole, approximately 60 percent of all the ranches owned by permittees was acquired from non-related individuals and 37.8 percent from relatives; that is, 97 percent was acquired from sources other than the government. (See Chapter III, Section , p. ). The proportion of the land acquired for which payment for grazing privileges was made at their market value is unknown. However, the current owners rely upon federal grazing land for 28.4 percent of their AUM's of grazing. We estimate the total value of grazing permits in the western states for 1966 at $380,377,060, exclusive of national grasslands and land utilization project lands. Of the capital value, 60 percent represents purchases at some market price and approximately another 20 to 25 percent represents purchases at some indeterminate price from relatives. It is fair to say, therefore, that 75 percent, or $285 million, represents the value of privileges which have been purchased and would be lost to the users if full cost differentials were charged for the grazing fees. 363/

In addition to the loss in capital value, the ranchers face the danger of losing income. It is stated above that the grazing fees comprise only a small fraction of the costs of ranching. Such a statement creates a false impression. Very few ranches in the entire west actually show a net profit if an adequate charge is made for the labor of the operator and his family and for interest on his investment. Using the W-79 material presented above, an increase in the fee to the full user cost differential would have the following effects.

In the western region as a whole, a rancher with 200 animal units would produce, on the average, 300 pounds of meat (in this case beef) for each animal unit. He

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363/ Estimated from public land AUM privileges; see Appendix Table VII-10 and value of privileges from Chapter III-E, Tables 3 and 4.

would have received, on the average, $24.80 per hundredweight, or $14,880, his costs would be $15,000, and his net loss with no fees on his public land would be $120. Should a fee of $1.23 per AUM be charged, his income would be reduced as follows: On 200 animal units he would require 2,400 AUM's of forage per year. The average use of public land per animal unit for the entire region is 3.3 AUM's. With 200 animals the ranch would require 660 AUM's of public land, or 27.5 percent of the total AUM's required for the entire ranch. This compares with 28.4 percent of the total AUM's required by the permittees responding to the 8-county questionnaire. A ranch of this size would, therefore, have to pay $811.80 in fees and the rancher would sustain a loss of his operation of $931.80.

The Census of Agriculture of 1964 shows that only 21.3 percent of the ranches in the western region have more than 200 animal units. This would indicate that approximately 80 percent or more of the ranches would be losing money. In order to reach the break-even point after the increase in fees, the average ranch will have to expand to approximately 250 animal units. At this point income will be $18,600 and costs will be reduced to $23.50 per hundredweight, or $17,625, a return over total costs of $975.00. Similar results will show for the various sub-areas within the region.

Nielson's study shows that on Utah sheep ranches a move to the full user cost differential would cause a loss in income over current costs of from $387 per year on ranches with 814 ewes to $2,836 per year on ranches with 5,370 ewes. On the intermountain cattle ranches in Utah, such a program in one market area would cause a loss in annual income of from $90 to $374 per year respectively on ranches varying in size from $154 to $646 per year on ranches of the same size. In the mountain ranches only 2 sizes of ranches were analyzed, a 48-cow ranch and a 150-cow ranch. On the 48-cow ranch the annual increase in costs would be $119 and on the 150-cow

ranch $263 in market area I, and $203 and $454 annually on ranches of the same size in market area II. 364/

Income effects on the local communities

One of the functions of price is income allocation, the determination of an equitable distribution of the income derived from the land between the government as landlord and the individual as supplier of labor, capital, and management. In the past, the government has moved in the direction of allocating as much as possible of its resource assets to the individual. In doing so it has created external economies which have yielded revenue indirectly to the government through the growth and development of the country. The indirect returns have been recognized as providing more abundantly for government needs than would have been realized by optimizing its ownership income. 365/

What was the nature of the indirect returns? These returns were the result of the development of the economy through the use of the resources. It was the western lands and the agriculture which developed around them, the mineral discoveries and the ferrous and non-ferrous smelting plants, the ore and steel ingot plants, the oil industry and its derivative industries that developed the west. It was the intensive and extensive development that occurred in the United States during the 19th and 20th centuries which created the vast income structure of this country from which the revenues for governmental purposes are generated.

In recent years considerable interest has been centered in the analysis of the economic structure of the nation, states, and communities. The purpose of such

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364/ Nielson, 19 . Op. Cit. p. 22.

365/ Folz, William E. 1953. The theory of the relation of resource development to economic development. In: Western Agricultural Economics Research Council. Committee on Water Resources Development, Proceedings, March 2-3, Berkeley, California. pp. 1-15.

analysis, usually in the form of an input-output study, has been to analyze the interdependence of the economic activity within the entire economic area. By this type of analysis both the direct and indirect effects of changes in business activity in any one sector can be assessed as to its impact on the entire economy of the study area.

It is recognized here that the most complete and mathematically sophisticated type of interindustry economic analysis is the input-output study. This procedure, however, is very costly and time consuming and for this reason a study in such detail in the 8 counties selected for intensive study was not feasible. The approach used in the 8-county study was a less ambitious type of analysis. We used net income figures which approximate value added rather than transactions, which are more of the nature of gross sales figures. As a consequence, the multiplier effects are much higher than encountered in the regular input-output matrix. The approach of this study is outlined in detail in Appendix . It attempts first to determine the income derived from basic industry. Basic industries are defined as those industries which are located in a county because of the existence of resources or locational factors other than markets. In most counties in the study these basic industries consist of range livestock, other agriculture, forestry and lumbering, mining, tourism, and recreation. In some cases other types of "footloose" industries may be included as basic industries. In Chavez county in New Mexico, for example, an Army base is located in the county. Since the source of income was neither market oriented nor resource oriented, it was treated as a basic industry.

After the income derived from basic industries was evaluated, the entire income of the county was estimated, and appropriate multipliers were applied to determine the effect of the livestock industry upon the income of the counties.

These multipliers were also used to determine the effect of changes in range fees upon the income of the county.

In using the foregoing analysis, certain limitations appear when it is compared with the input-output approach. The use of income rather than transactions has the advantage of availability of information; its weakness is that it treats only a limited part of economic activity, although the most important part. 366/

In order to arrive at an appropriate multiplier to use for estimative purposes, an analysis was made of the results of similar studies made of comparable areas. A study of 12 small cities of about the same size and of similar economic structure showed that community multipliers based upon employment figures varied very little, between 2.3 and 2.5. On the other hand, when cities of varying size are compared, their multipliers do vary considerably. For example, in a study comparing 13 cities varying in size from 6 thousand in Arlington, Washington, to 12 million in the New York Metropolitan area, the multipliers varied from 1.8 in Arlington to 3.1 in New York City. 367/

In general, studies of counties and other smaller economic divisions have shown that the multiplier derived from agriculture is larger than ones from other types of basic industries. An input-output study of southwestern Wyoming showed a multiplier for agriculture of 2.31, as compared with one of 1.64 for mineral, oil, and gas, and with one of 2.22 for lumber manufacturing. 368/

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366/ This approach to economic analysis was first suggested by: A.C.B. Fisher. 1935. Economic implications of material progress. International Labor Review. pp. 5-18; and, 1939. Primary, secondary, and tertiary production. Economic Record. pp. 24-38. It was utilized by: Colin Clark. 1940. The conditions of economic progress. St. Martin's, New York.

367/ Harmston, Floyd K. and Richard E. Lund. 1967. Applications of an input-output analysis to a community economic system. University of Missouri Press, Columbia. pp. 16-17.

368/ Lund, Richard E. 1962. Resources, people, and economy of southwestern Wyoming. Wyoming Natural Resource Board, Cheyenne.

In a more recent input-output study of Grant County in Oregon, the multiplier effect of the dependent range livestock industry (dependent, that is, on public rangeland) was 1.80, as compared with multipliers for other agriculture, of 1.53; for lumbering, of 1.60; for mining, of 1.08; and for logging, of 1.47. The purpose of the study was to show the significance of the range livestock industry on the local economy. 369/

Recent studies of input-output nature were made for the Upper Colorado River Basin. Some 6 sub-basins were selected, each sub-basin comprising a marketing area. Multipliers for agriculture and the range livestock were generally lower than those cited above. Only 5 sub-basins had livestock separated from agriculture and those multipliers were computed for the year 1960. In the San Juan sub-basin the multiplier for range livestock was 1.58; for the Gila sub-basin 1.50; for the Upper Main Stem sub-basin 2.38; for the Little Colorado sub-basin 1.42; for the Green sub-basin 1.98; and for the Lower Main Stem sub-basin 1.41. 370/

In the early 1950's, the Bureau of Reclamation sponsored a series of studies based generally upon the income approach used in this study. The purpose of these studies was to discover the effect of irrigated agriculture on the local trading area. The first such study was made by M. E. Marts, who found a multiplier effect from irrigated agriculture on the economy of the Payette, Idaho area of 2.27. The study of Marts was followed by several others using essentially the same methods. 371/

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369/ Broomley, D. W., G. E. Blanch, and H. H. Stovener. 1968. Effects of selected changed in federal land use on a ranch economy. Oregon State University Agricultural Experiment Station Bulletin No. 604.

370/ Transaction tables and inverted marticies secured from Dr. Clyde Stewart of the U. S. Dept. of Agriculture.

371/ Folz, William E. 1957. The economic dynamics of river basin development. Law and Contemporary Problems 22(2):214-215.

In 1951 a study was made of the Yuma-Gila irrigation project which discovered a multiplier effect of irrigated agriculture on the local economy of 2.74. The study was followed in 1952 by one of Weld County, Colorado, which showed a multiplier effect of 2.29. Finally, the study of the Newlands project showed a multiplier of 2.20.

The difficulty with using counties as economic units is that they vary greatly as to the degree of dependence on basic industries within the county alone. Some counties may include large trading centers which serve several other counties, while other counties may not have a single important trading center within their boundaries. Another problem is to assess the full impact of tourism and recreation. In Elko, Nevada, for example, the service industries alone had a net income of $50 million. This was obviously due for the most part to gambling and the trade it generated. How much should be attributed to gambling and how much to county agricultural industries is difficult to determine. The location of a prison in Graham County, Arizona, and of an air base close to Roswell in Chavez County, New Mexico, present equally difficult problems. A university, or a military academy, as in Chavez County, generates income not only through salaries and wages of the staff but from expenditures for the support of the students.

With these difficulties in mind, it was decided in this study to use some average multipliers to assess the impact of the range livestock industry on the local community. A figure of 2.5 was decided upon. This figure is a little higher than the input-output studies of counties and trading areas described above, but it is about the same as that for the income analyses previously cited, and somewhat lower than the 3.0 figure we have been estimating in our current study of counties which have no great amount of tourism or other outside sources of income.

As pointed out in a previous section, one of the objectives of the land agencies, especially of the U. S. Forest Service and the Bureau of Land Management, was to stabilize the communities dependent upon the public land enterprises. All agriculture is subject to great instability from weather and prices. The range livestock industry is subject to 2 other instabilities which in turn affect the ranching communities. These instabilities are the reduction in privileges or even the withdrawal of land from grazing for other uses, and the increase in fees or price of the federal range.

The current fees affect the rancher by decreasing the income he will have to spend on purchases of ranch inputs, on investments in his ranch enterprise including improvements on the public range, and on expenditures for family living expenses. The effect of the current fees on the 8 counties surveyed would be of the following magnitudes:

In Table  it will be observed that in Lemhi County the U. S. Forest Service currently has issued permits for 37,713 AUM's for cattle and 21,055 AUM's for sheep. The county average fee rate for cattle is 38.5 cents per AUM and for sheep 14.6 cents per AUM, making a total figure for fees collected in 1966 for grazing on U. S. Forest Service lands of $14,519.62 for cattle and $3,074.03 for sheep, or a total of $17,593.65. The Bureau of Land Management has issued privileges currently for 68,387 AUM's and collected fees at 33 cents per AUM for a total of $22,567.71 (Table  ). The total fees collected from Lemhi County amounted to $40,161.36. From this figure must be deducted 25 percent of the U. S. Forest Service fees which reverts to the county in lieu of taxes and approximately 8.4 percent of the Bureau of Land Management fees which are given to the counties for the same reason (Table  ). This amounts to $4,391.91 for the U. S. Forest Service and $1,861.65 for the Bureau of Land Management. If we assume, therefore, that the

portion of the fees collected and returned to the county has approximately the same multiplier as rancher income on the county, the net withdrawal of purchasing power for the county in 1968 was $33,903.80. Using a multiplier of 2.5 as the probable impact on the county through the direct and indirect effect of lowering ranchers' purchasing power, the full impact of the grazing fees on Lemhi County would be $84,259.50. This loss compares with an estimated net personal income for Lemhi County in 1964 of $8,303,575.

If we assume now that the rates for grazing fees are increased to their full cost differential, as present policy of the U. S. Forest Service and Bureau of Land Management proposes to move to within the next 10 years, the fees will be increased to $1.23 per AUM for both cattle and sheep on both U. S. Forest Service and Bureau of Land Management land (Table ). In Lemhi County the fee per AUM on U. S. Forest Service land will be raised 84.5 cents for cattle and $1.08 for sheep. This will increase fees collected by the U. S. Forest Service for cattle by $31,867.74, and for sheep by $22,823.62, a total increase by the U. S. Forest Service of $54,691.36. The Bureau of Land Management fees will increase by 90 cents, a total increase in Lemhi County of $61,548.30. The total fees collected from the county in addition to current fees will amount to $116,239.66. Applying the multiplier effect of 2.5, the impact of increase in fees on Lemhi County would be $217,949.35 (Table ). Compared with the total income of the county, the increase in fees would reduce its income about 2.6 percent. The impact of all the fees on the county would be in the neighborhood of $293,252 or 3.5 percent. The impact on the remainder of the 8 counties is shown in Table .

It will be observed from Table that the impact of the former fee structure on the local economies was almost negligible. Lemi County experiences the largest percentage impact on total county income of 1.8 percent, and Johnson County, Wyoming,

the next largest with .8 percent; whereas, Chaves County, New Mexico, Graham County, Arizona, and Baker County, Oregon, experience income effects of .2 percent, .3 percent, and .4 percent respectively. It may be concluded, therefore, that the current fee schedule has a negligible effect upon the local communities.

Under the proposed advance in fee rates, the income effect on Lemhi County would be 3 percent of total income; on Johnson County, Wyoming, about 2 percent. The income effect upon the remainder of the 8 counties in the survey would be negligible (Table ).

That stability of the local community can be attained by pricing policy of the land agencies with respect to grazing lands is questionable. It is certain that any reduction in privileges or any significant increase in fees will put the smaller ranches in a still more precarious position than they are at present. The impact on the local community through the multiplier effect would also be substantially greater with an increase in fees. The small local community, however, is doomed anyway. Farms generally are becoming larger and more specialized. The opportunity for diversified agriculture of the type in existence when the federal land agencies first began to administer lands has disappeared. Very few of the ranch communities now have their own milk distributing plants. With the disappearance of these plants went the opportunity of many ranchers to supplement their incomes by keeping dairy cows. Poultry is now a mass production industry and small farm flocks have also disappeared. With the decrease in number of farms, we are finding a tendency for the small local trading center either to disappear or to shrink in size relative to the larger trading center.

The way out of the instability problem for the livestock industry is for ranches to grow larger. Such a trend, of course, means fewer ranchers; with fewer ranches and farms the small agricultural communities will tend to decrease in population.

This has taken place in other sections of the country and it will occur also in the west. In a recent article Karl Fox stated: 372/

> "Galpin conceptualized the functional community of 1911 as one (implicitly) comprising 2,000 to 4,000 people. The 'functional community' of 1968 contains about 100,000 to 500,000 people. If we want to serve the community in addition to serving commercial agriculture, we must learn to work with communities of the size indicated. These communities include farm and non-farm residents indiscriminately."

Since it is impossible to stabilize both the range livestock industry and the local community, it would be best for the land agencies to concentrate on livestock industry itself. As pointed out above, fees set at any rate within the limits of the cost differentials will prcbably not bring about the establishment of efficient farm units unless the decrease in income of the smaller ranches forces them out of existence more rapidly than otherwise. The experience in agriculture generally over the past 2 decades has demonstrated that the forcing process of low incomes is not only brutal, but also uncertain. The wrong people tend to be forced out. A more successful procedure would be to let the pull of the market bring this about, rather than the goad of poverty. 373/ This would require that the agencies eliminate all impediments to market allocation of privileges, including such factors

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372/ Fox, Karl. 1968. Agricultural policy in an urban society. American Journal of Agricultural Economics 50(5):1141.

373/ For a complete analysis of why farmers do not leave agriculture when incomes decline, see:
Hathaway, Dale E. 1963. Government and agriculture. MacMillan Co., New York. pp. 101-130.

Cochrane, Willard W. 1958. Farm prices: myth and reality. University of Minnesota Press, St. Paul, Minn.

Johnson, Glen L. and Lowell S. Hardin. 1955. Economics of forage evaluation. Purdue University Agricultural Experiment Station Bulletin 623, Lafayette.

Johnson, Glen L. 1958. Supply function--some facts and notions. In: Agricultural Adjustment Problems in a Growing Economy. Iowa State College Press, Aimes, Iowa. p. 78.

as limits on the number of animal units that can be grazed by 1 rancher on forest lands, the emphasis on dependency and commensurability, and any tendency to vary fees to favor the small operator over the larger one. The allocation of privileges resulting from an increase in carrying capacity of the range through good management and improvements should be to those users who have demonstrated their ability to manage the range properly. They should be given preference over new users or over older ones who have not demonstrated such capabilities. In this manner, more efficient operators will be encouraged to grow larger.

Impact of fees on stability of the supply and price of meat

No complete analysis of pricing policies can be made without assessing their effects upon the regional and national economy. What is the nation's stake in the forage industry based upon public lands concentrated in the 11 western states?

From the standpoint of national interest, the production of meat, especially beef, is of considerable importance. 374/ Robert R. Nathan Associates estimate that consumption of beef at the medium level projection will jump from 19 billion to 30.3 billion pounds by 1980, an increase of 60 percent. By the year 2,000, it will rise to 54.7 billion pounds, an increase of 188 percent. Factors affecting the supply and cost of beef are of concern, therefore, to the public generally. Pricing policies of the federal land agencies can influence the supply of meat in 2 respects; first, their pricing policies can affect the cost of production of meat: and second, through the impact of costs on the ranch firm, these policies may affect the amount of improvements in rangelands and in this way the total supply of meat.

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374/ Robert R. Nathan Associates, 19 . Op. Cit. p. 83.

Estimates of the degree of dependence on the range for the supply of meat in the United States are somewhat sketchy at best. From the figures supplied to the Public Land Law Review Commission by the federal land agencies, it was estimated that the public lands supported 22,554,000 AUM's of cattle in 1966. This was 12.1 percent of the total AUM requirements of domestic foraging animals in that year in the 11 western states. If the public grazing lands were improved to their marginal value product, their carrying capacity could be expanded to supply 19.4 percent of the total requirements. In that same year, 10.6 percent of the forage requirements of beef and 20.5 percent of the requirements of sheep were supplied by public forage.

In the United States as a whole, public forage lands accounted for 3 percent of the total supply of forage for the year 1966. If range improvements were expanded, this percentage could be increased to 4.6 percent of the total meat supply for that year. The forage provided the requirements for 2.6 percent of the beef and for 9.5 percent of the lamb and mutton. (See Chapter III, Section , p. ).

The above estimates of the probable effects of range improvements do not prove, of course, that such improvements would be economically sound, i.e., that they could be expected to earn marginal returns equal to the marginal costs of investments if expanded to this level. This issue was discussed in more detail in Section of this chapter.

The above figures were in terms of AUM's of forage only. Since cattle and sheep ranches represent a combination of both public and private grazing land, it cannot readily be concluded that only 12 percent of the supply of meat in the western states and 3 percent in the country as a whole would be affected by the pricing policies of the federal land agencies. A pricing policy adversely affecting

the public forage land utilized by a rancher may cause the entire ranch enterprise to become uneconomical, and this then will affect the cost of producing all the animal units on the ranch. For example, the 8-county survey revealed that the permittees on the public grazing lands secured only 28.4 percent of their total AUM requirements from that source. A pricing policy which would increase the costs of that 28.4 percent of the AUM's would affect the cost of all the animals produced on those ranches. 375/

While the above estimates indicate that the nation as a whole is somewhat independent of the public lands from the standpoint of production of beef and lamb, the same cannot be said of the west. This area is greatly dependent upon the grazing lands for meat. Contrary to most beliefs, the west does not produce a surplus of beef, veal, or lamb. During the 5-year period, 1962-66, the 11 western states showed a deficit in beef and veal production over consumption for each year of that period. The amount of the deficit varied from 131,414,000 pounds in 1963 to 283,540,000 pounds in 1966. The sheep and lamb deficit varied from 52,640,000 pounds in 1963 to 81,920,000 pounds in 1965. In this commodity also, the west showed a deficit every year (See Chapter II, Section , p. ). A pricing policy that would increase the cost of producing cattle and sheep on the public lands could adversely affect the cost of meat in the western region. It should be noted, however, that a change in the fee rate would have the same effect as a tax increase and would be borne by the permittees as an increased cost of operation. Since the livestock ranchers who use public grazing are a minority of all livestock producers, the fee would not necessarily affect the marginal producer and thus be passed on to the consumer in the form of higher costs of meat. The more likely situation is that it will be borne by the property owners who depend upon the rangelands and will not be passed on to consumers in the form of increased prices.

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375/ Upchurch, 1963. Op. Cit. p. 91.

The effect of fees on stability
of investments in range improvements

Probably more important to the supply and price of meat than the cost effects of the increase in fees on the rangelands would be the effect of the increase in fees on the ability of the ranchers either to finance improvements on rangelands themselves, or to cooperate with the federal government in making such investments in improvements. On this point the U. S. Forest Service made the following statement: 376/

> "it is likely that an increase in grazing fees will cause a decline in cooperative work. Presently, Forest Service range permittees contribute $1.3 million a year in the installation, construction, and maintenance of Federally owned range improvements. If cooperative work declines, the Federal government will bear the burden in some combination of the following ways: (1) increased appropriations for the necessary range improvement construction and maintenance; (2) decline in value of Federally owned land due to deteriorating range land and watersheds; and, (2) declining or lowering fee collections due to decreases in capacity and use."

In addition to the private expenditures by the permittees on U. S. Forest Service lands, those on Bureau of Land Management land contribute another one-half million dollars to range improvements and maintenance. It is to be expected that ranchers who cannot cover their entire costs on their operations will have to make up the loss either by decreasing their living expenses or by cutting down on their operating expenses. Experience in all farming sectors has been that when farm incomes decline, as during periods of depression, farmers tend to cut back first on investments in and improvements on farm lands. 377/ In this connection, B. Delworth

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376/ U. S. Dept. of Agriculture, Forest Services, 1968. Op. Cit. p. 12.

377/ Hathaway, D. E. 1957. Agriculture and the business cycle. Policy for Commercial Agriculture. Washington, D. C.

Gardner made the following statement: 378/

> "As permits have been cut and because livestock people expect the trend to continue, security of grazing tenure has been reduced. Investment in range improvement that would have been undertaken under more optimistic tenure expectations has been curtailed. Rancher investments have declined sharply on the forest. In 1957 the rancher share in cooperative range improvement projects with the government was only 6 percent of the rancher share in 1949. Over the identical time, the rancher share of the Bureau of Land Management district, where little or no cutting has occurred, increased by 327 percent. There can be little question perpetual grazing would tend to augment range management and investment in range improvement by the rancher."

If this was the result of a decrease in privileges, a similar occurrence would certainly follow an increase in fees, which would also decrease the rancher's income.

## Stability of tenure

In the previous section it was pointed out that stability of tenure was striven for by the federal land agencies as a means of attaining maintenance and development of the public lands and stability of the livestock industry and of the local communities. Commensurability requirements, emphasis on family farms, limitation in numbers of permits and prevention of monopoly, security of tenure, and ability to transfer privileges to other owners possessing the specified qualifications were among the means by which stability was to be maintained.

Economic stability, in the sense of a decrease of failures or bankruptcies among public land users, would be hard to measure, and, if measured, it would be difficult to attribute the stability to specific public land policies. During the period since 1940 there has been a general trend upward in livestock prices; even

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378/ Gardner, B. Delworth. 1963. A proposal to reduce misallocations of livestock grazing permits. Journal of Farm Economics 45(1):116.

the beef cycle has been of shorter duration and of less amplitude. Such evidences of stability can more properly be attributed to the secular increase in incomes and in the preference for beef in the diet rather than pork, lamb, and veal. 379/ Some measure of stability can be secured, however, from the history of tenure of permittees as described in the questionnaire used in the 8-county survey used in this study.

The average number of years the respondents had owned their ranches was 20.2. Of the total of 327 ranches, 157 or 48 percent had transfers of permits since 1953. Of these transfers, 102 involved the Bureau of Land Management and only 55 were from the U. S. Forest Service. One hundred thirty-six of the transfers were purchases and 21 were sales. The length of tenure in the ranches did not vary much between the 8 counties. Four of the counties had an average tenure between 21.1 and 21.6 years. The shortest years of tenure were in Lemhi County in Idaho and Elko County in Nevada, both of which had an average length of tenure on the present ranches of 18.9 years.

In the more detailed questionnaires used in the 75 ranch survey, additional information was secured on tenure. In 1934, just prior to the institution of the government regulations under the Taylor Grazing Act, the owners of the ranches and their heirs conprised 32 percent of the number interviewed. About 40 percent of the ranches had their original number of privileges reduced since their acquisition of ranches and only 2.8 percent had increases.

Almost 40 percent of the ranchers also purchased additional privileges since the ranches were acquired; most of those, 57 percent were for the purpose of

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379/ Robert R. Nathan Associates, 19 . Op. Cit. pp. 80-81.

enlarging their operation to attain economies of scale. Another 28 percent indicated that they had purchased additional privileges to balance their operations or to consolidate their holdings. Only 9 percent purchased additional privileges to compensate for reduced privileges, and 6 percent represented family transfers.

About one-third of the ranchers interviewed rented additional private grazing lands. About 64 percent of them claimed that they rented their land for 33 cents to $1.50 per AUM. About 18 percent paid between $2.25 and $3.00 per AUM, but these ranchers claimed that they rented private range only intermittently.

Security in tenure and in the transfer of privileges from one generation to another tends to perpetuate the uneconomically small ranchers. The existence of this large number of very small units came about in many cases through inheritance. Had the agencies taken over the permits and distributed them with a view to providing more adequate sizes of ranch units, as the U. S. Forest Service tried to do at one time, much of the problem of the very low income farm unit could have been avoided.

Evaluation of stability policies on the economy

Probably the most important current issue relating to stability is the recent change in methods of assessing fees on the public lands. The basic features of the issue were effectively stated by Edward P. Cliff, Chief, Forest Service, U. S. Department of Agriculture, in his recent testimony before the Senate Commiteee on Interior and Insular Affairs on February 27, 1969. 380/ Mr. Cliff stated, after reviewing the findings of the Interagency Fee Study Committee,

> "In essence, we reached agreement with the livestock industry and interested groups on all issues but one in connection with the study."

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> "Recognition of permit value as a cost of grazing on public lands for purposes of calculating fee levels as proposed by the livestock industry would tend very strongly to convert National Forest grazing privileges to grazing rights . . . . We recognize clearly that the grazing fee regulations and the new fee structure will have some impacts. Our overriding concern has been to sympathetically and responsibly weigh these impacts in deciding how to implement the results of the grazing fee studies and analyses. However, I should like to point out that the impacts are the result of values which ranchers have built up among themselves. They have made no payment for the value to the real owner of the resource upon which it is based. This value has come into existence primarily because the fees which have been paid the government for the use of the resource have been less than their fair market value . . . . The questions which underlie the new grazing fee regulations are complex, and reasonable arguments can be made to support the many sides involved. As we see it, the issue is not whether the full market value is being paid for grazing on public lands. It is to whom it is being paid."

In Section C of this chapter, evidence was presented to show that the agencies were somewhat more involved than Mr. Cliff's testimony implied while the capital value was being built up among users. They could and probably should have exercised ownership prerogatives at the time transfers were made to prevent such a capital value from arising. Instead, they permitted it to arise and recognized its existence by positive acts on their part. Our problem in this section was to analyze the economic impact of the change in fee assessment methods.

It was pointed out at the beginning of this section that all agencies recognize or have in the past recognized withdrawals of land from public ownership under the various homestead acts, under the reclamation program for wildlife and scenic purposes, for defense, and for protection of the watershed. All these types of withdrawals still exist. The idea expressed by Mr. Cliff in his testimony is that if the present value of the permit now capitalized in land values is recognized 381/

> "it logically follows that permittees could demand compensation for any portion of a grazing permit value that is no longer available to them

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> because of Forest Service resource management actions affecting the size of the permit."

In view of the continuous history of withdrawals, it is our opinion that this does not "logically follow."

One significant feature of withdrawals for the issue of stability is that in most cases of withdrawal, while there may be some instability created in the livestock industry itself, the ultimate effect is that it puts the land to a higher use. The effect of intensive agriculture is to induce the growth in the local communities more rapidly than would the livestock industry if the land were left in the hands of ranchers. The same result may not occur in the case of withdrawals for recreation, wildlife, national defense, and for watershed protection. Recreation through tourists' expenditures may, however, have a greater income generating effect than cattle grazing.

The impact of the fee on the livestock farm would be depressive. The cost analysis presented in this section indicated that a rancher should have 200 animal units in his operation if he wished to cover all of his costs including an adequate return on his investment. With the fee in effect before January 1, 1969, the rancher of this size unit would barely cover costs. After the 10-year period when the full fee increase will have come into effect, a rancher of that size unit would sustain a loss on his operation of about $922 per year. To cover all his costs with the increased fee, he would have to expand his operation to a 250 unit ranch.

The opportunities for a rancher to adjust his ranch size is often limited. Experience in agriculture generally has shown that the cost-price squeeze since 1952 has had the effect of causing farmers to earn less than the full costs of their operations; failing to receive either their full wages of labor or an adequate return on their investments. Since the range livestock industry is characterized

by small ranchers, it is likely that an increase in fees would decrease the net earnings of the rancher.

The increased fee structure is also likely to discourage rancher participation in investments in improvements and to induce more exploitative ranching methods on the public range and on the private base property. Since all livestock producers will not be faced with the increase in fees, it is unlikely that the cost will be reflected in the price of meat. Its impact will be on the current user in the form of higher costs of operation and consequently of less profits and of loss in the capital value of the ranch.

Like farming generally, the livestock industry has contributed to the growth and the stability of the local community. In the 8 counties selected for intensive survey, the direct contribution of the livestock industry to the income of the county was over 20 percent; in the case of 3 counties, Lemhi County, Idaho, 24 percent; Johnson County, Wyoming, 22 percent; and Blaine County, Montana, 22 percent. In Baker County, Oregon, and in Graham County, Arizona, it contributed over 10 percent. In San Juan County, Utah, livestock ranching was overshadowed by mining; in Elko County, Nevada, by tourism; and in Chavez County, New Mexico, by diversified industries, other agriculture, mining, and manufacturing.

In Lemhi, Johnson, and Blaine counties, the importance of the livestock industry is great enough that an increase in fees to the full user cost differential would have some effect upon the stability of the total economy of the counties, assuming that the economic structure in these counties remains essentially as it is until the full fee schedule goes into effect. In the other counties, the effect of the new fee schedule upon them would be negligible.

The regional and national stake in the range livestock industry is limited for the most part to the effects on the supply and price of meat. As it now stands,

only 3 percent of the supply of cattle and sheep is directly supplied from range forage. If the rangelands were improved to their economic potential, this could be increased to 4.6 percent of the total national meat supply. Although this may seem quite insignificant in view of the projected increase in demand for beef and lamb, the range supply should still be considered important.

For the western region, the supply of forage secured from the public lands amounts to 12.2 percent in 1966. If the lands were improved to their economic potential, they could provide up to 20.2 percent of the total requirement of the west for beef and lamb. This is a very important contribution of the rangelands to the livestock industry of the west. But even so, it would be difficult to assess the effect of an increase in fees on the supply and price of meat. Since only a minor segment of the entire livestock industry is dependent on the range, the price of fees would probably not be passed on to consumers but would have to be borne by the owners of the range livestock ranches.

In most cases, the stability criteria to which the agencies have conformed were attained. The range livestock industry is more stable today than previously, the family farm was preserved. The local community was maintained and stabilized. The important question, however, is whether or not these objectives are relevant for today and for the future.

Certainly the stability criteria used have not led to efficient allocation of resources. The family farm defined in terms of small ranch operations does not provide a sufficient income to maintain adequate standards of living. Rangelands have not been developed to their fullest economic potential, and possibly some flexibility to meet changing future needs has been sacrificed.

Small local communities no longer perform the services for neighboring agriculture that they did in the past. Larger units are necessary in order to

become functional communities. To provide stability for the local community through control of public land resources is probably no longer possible, if it ever was. Resource development in agriculture and in forest and mineral lands very likely will not be as directly related to community growth as it was in the 19th and early 20th centuries. 382/

Finally, the problem of rural poverty will probably not be solved by providing a large number of very small farms. This issue will become an essential one in the next half-century.

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382/ Heady, Earl G. 1966. Agricultural problems and policies of developed countries. Oslo, Norway.

# MULTIPLE USE

The plaudits of multiple use have been sung by foresters, ranchers, environmentalists and land managers for over 2 decades. The role of multiple use in making land management decisions reached a new high during the past decade. The term, however, has been used to justify actions of such opposing nature as clearcutting and wilderness. Both sides of an impending decision have used multiple use as the basis of winning a favorable decision. One of the major reasons why multiple use has been so widely used is because it, like conservation, has been defined to meet the needs of the group using it.

## Present status

### History and definition

The basis of multiple use probably originated in the Pinchot-Roosevelt era of conservation. Behan[383/] indicated that "So far as I have been able to discover, the earliest reference to multiple use per se was. . ."[384/] on May 24, 1934, by Major Evan W. Kelly, the District (now Regional) Forester at Missoula, Montana when he said:

> "Popularly conceived, the national forests are wild lands, the primary use of which is to grow trees for the production of lumber. . . . This conception is altogether a narrow one. . . . Forests also have significance in providing food and shelter for wildlife and domestic animals. . . . regulating stream flow, and furnishing recreation in various forms.
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> Federal foresters are engaged in the intricate technical business of managing such properties for all these purposes. One of the greatest difficulties inherent in this undertaking is the proper correlation of the multiple uses to which forest land can be put in order to accomplish the prime objective of their management. This objective is to produce the maximum of. . . products and services, including wood products, animal products,. . . recreation, . . . preservation of scenic values. It is a proposition of general farming,

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383/ Behan, R. W. 1967. The succotash syndrome, or multiple use: a heartfelt approach to forest land management. Natural Resources Journal 7(4): 473-484.

384/ Ibid. p. 474.

involving the grand-scale production of perennial crops on a sustained-yeild basis over an unlimited amount of time, rather than one single crop farming on an annual cropping basis with little or no thought of the morrow."[385/]

"The first use of the term 'multiple use' applied to forest land management, however, seems to have occurred in the 1933 'Report of the Forester' "[386/] when it indicated that"...it is through demonstrations of the workability of the principle of multiple use that the national forest experiment has perhaps had its greatest value."[387/]

The above statements seem to be the earliest statements of multiple use, but the genesis of the term probably occurred much like conservation:[388/]

"I was riding my old horse Jim in Rock Creek Park one day...I think it was in February 1907...when suddenly the idea that put the stone on the end of the club occurred to me. The idea was that all these natural resources which we had been dealing with as though they were in watertight compartments actually constituted one united problem. That problem was the use of the earth for the permanent good of man... The idea was so new that I did not even have a name. Our little inside group idscussed it a great deal. Finally Overton Price suggested that we call it 'conservation' and the President said 'OK'."

The basis of multiple use was laid in Secretary Wilson's letter to Pinchot when he indicated that the forest reserves are to be devoted to their "...most productive use for the permanent benefit of the whole people..." and that

"The permanence of the resources is therefore indispensable to continued prosperity...of the agricultural, lumbering, mining and livestock interests is directly dependant upon a permanent and accessible supply of water, wood, and forage, as well as upon the present and future use of their resources under businesslike regulations, enforced with promptness, effectiveness, and

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385/ Behan, 1967. Op. Cit. p. 475.

386/ Banzhaf, George and Company. 1969. Study of public land timber policy. Report to the Public Land Law Review Commission. Clearinghouse for Federal Scientific and Technical Information, Springfield, Va. PB 187 730. Volume III, p. C-4.

387/ Ibid. p. C-4.

388/ Pinchot, Gifford. 1939. How conservation began in the United States. Agricultural History XI:255-256. In: McConnell, Grant. 1954. The conservation movement - past and present. Western Political Quarterly 7(3):463-478.

common sense."[389/]

This statement did not enunciate the criterion of multiple use, nor did it include the use of the term, but by recognizing different valid uses (users), the groundwork of multiple use was laid. A similar argument is laid by Davis when he indicated that the principal purpose of the Taylor Grazing Act[390/]

> "...was to provide for the economic use of the vast areas of grazing land under adequate supervision and control. It thus represented a radical departure in the management of the public domain which theretofore had been exclusively one of disposal and, which consciously or not, laid the basis for multiple use of the lands and their minerals."

The popularity of the term in management circles waited for a number of years to grow as indicated by Clarence Davis, Under Secretary of the Interior in 1955, when he said "The principle of multiple use is still an infant in swaddling clothes."[391/] Multiple use was the topic of much debate and discussion in academic and professional circles for many years. The Journal of Forestry has published a number of articles on multiple use with the first major articles by Ciriacy-Wantrup and Evans in 1938 and numerous other articles since that time. These and other similar articles have not lead to a uniformly accepted definition of the term.

Some indications of the wide divergence of opinion concerning multiple use are expressed in the following definitions:

1) "Multiple use is a principle of management rather than a system or method of land use."[392/]
2) "Multiple use is the skillful adjustment of land resources and uses into a pattern of harmonious action to achieve overall objectives for the area

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389/ Cited in: McConnell, Grant. 1959. The multiple use concept of Forest Service Policy. Sierra Club Bulletin 44(7):14-28.

390/ Davis, Clarence. 1955. Multiple uses of public lands. I Rocky Mountain Mineral Law Institute. p. 495.

391/ Ibid. p. 503.

392/ U. S. Dept. of Agriculture, Forest Service. 1958. Forest Service Manual, title 2100, p. 3. In: Behan, 1967.

being managed."[393]

3) "In a restricted economic sense, the term (multiple use) simply means that forests and wildlands have more than one use--that the typical forestry enterprise produces more than one product."[394]

4) "Multiple use of wild land, for instance of forests, might mean two different things: first, the administration or management of several uses of wild land by a single agency, and second, the use of a single unit (acre) of wild land for several purposes."[395]

5) "Multiple use is a principle or concept of the desirable approach to overall land planning and management rather than a specific system of planning or an exact formula for management. It is not a scheme whereby all conceivable uses are superimposed upon another on each acre of land. Rather, its ultimate goal is to assure on a continuing basis that all the acres which combine to make America be permitted and encouraged within their varying capabilities, to produce an optimum of values to meet the broad needs of the whole country."[396]

Other definitions might be stated (most authors have defined it to meet their needs) but in 1960 and 1964 the U. S. Congress declared that the U. S. Forest Service and the Department of Interior administer public land in accordance with the doctrine of multiple use and defined multiple use in the following ways:

" 'Multiple use' means: The management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily in combination of uses that will give the greatest dollar return or the greatest unit output."[397]

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393/ U. S. Dept. of Agriculture, Forest Service. 1963. Forest Service Manual title 2100, zero code, amendment No. 10, p. 2100-03. In: Behan, 1967.

394/ Zivnuska, John A. 1961. The multiple problems of multiple use. Journal of Forestry 59(8):555-560.

395/ Ciriacy-Wantrup, S. V. 1938. Multiple and optimum use of wildlands under different economic conditions. Journal of Forestry 36(7):665-674.

396/ Penfold, Joseph W. 1963. What is multiple use? Outdoor America, The Izaak Walton Magazine 28(5):4-5.

397/ Multiple Use - Sustained Yield Act of 1960. 70 Stat. 215.

> " 'Multiple use' means the management of the various surface and subsurface resources so that they are utilized in the combination that will best meet the present and future needs of the American people; the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; and the harmonious and coordinated management of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output."[398/]

The land management angencies frequently develop policies or rules where the law, which the agencies as part of the executive department must administer, is silent to guide administrative action. Multiple use is one such policy and was developed first by the U. S. Forest Service. This policy was poorly defined, however, and resulted in alternative actions being justified by the definition of multiple use that was accepted by the relevant parties at the time of the controversy. If the 1960[399/] and 1964 Acts did nothing else, they provided for the first time a uniformly accepted definition. The definitions do not, however, provide specific guidelines and they leave considerable latitude for interpretation. The many interpretations are illustrated by the ways various authors have tried to classify these "schools of thought."

PLLRC Forest Study

In the study report for the PLLRC[400/] concerning public land timber policy,[401/] authors separate 6 viewpoints or classes of multiple use. The first concept, termed naive , implies simple recognition of the existance of many uses on forest property. Second, the my use concept is simply that any use is multiple as long as it is my use. Third, the ecological monism concept emphasizes the biological and physical interdependencies of resources with minor emphasis on the social and/or economic values associated with resource use. Fourth, the single acre concept seeks to maximize the total return

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398/ Classification and Multiple Use Act of 1964. 78 Stat. 986.

399/ It should be noted that the Multiple Use and Sustained Yield Act was essentially drafted by the U. S. Forest Service and passed by Congress.

400/ Public Land Law Review Commission.

401/ Banzhaf, 1969. Op. Cit.

over-all products on the same unit of area land or acre. The fifth concept emphasizes the dominant use position of some resources whereby the dominant use is maximized and other uses are allowed so long as they do not interfere with the dominant use. The sixth concept which was first stated by Ciriacy-Wantrup is the economic optimum. This concept emphasized the economics of joint production and has been theoretically elucidated by a number of authors.[402/]

Ridd

Merrill Ridd indicated that:[403/]

> "Multiple use management of the land may be accomplished by any one of the following three options, or by any combination of the three: (1) concurrent and continuous use of the several resources obtainable on a given land unit; (2) alternating on rotational use of the various resources or resource combinations or the unit, so that multiple use is achieved on a time bases; or (3) geographical separation of uses or use combinations so that multiple use is accomplished across a mosaic of units."

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402/ Ciriacy-Wantrup, 1938. Op. Cit.

Hall, George R. 1964. Product quality and public land management. Land Economics 40(1):59-67.

Hopkin, John A. 1952. Use of economics in making decisions relating to range use. Journal of Farm Economics 38(5):1594-1603.

Muhlenberg, Nicholas. 1964. A method of approximating forest multiple use optima. Forest Science 19(2):209-214.

Pearse, Peter H. 1969. Toward a theory of multiple use: the case of recreation vs. forestry. Natural Resources Journal 9(4):561-575.

Richards, Allen B. 1958. Some economic considerations of the multiple use of forest land. Land Economics 50(6):456-459.

Gregory, Robinson. 1955. An economic approach to multiple use. Forest Science 1:6-13.

Worley, David P. 1969. Strengthening the wildlife manager's hand in multiple use conflicts. Transactions of the Twenty-Sixth Northeast Fish & Wildlife Conference, White Sulfur Springs, West Virginia. pp. 11-25.

Hopkin, John A. 1954. Economic criteria for determining optimum use of summer range by sheep and cattle. Journal of Range Management 7(4):170-175.

403/ Ridd, Merrill K. 1965. Area-oriented multiple use analysis. U. S. Forest Service Research Paper INT-21. Ogden, Utah. 15 pp.

He notes that these methods refer to what he calls an "area oriented approach" which is similar to the dominant use position outlined above. He distinguishes this from the "resource oriented approach" which seeks to discover the interrelations among the several resources and is similar to the "economic optimum" position above. He indicates that the separation between the two approaches is not always clear cut and that both are essential in any management scheme.

It can thus be seen from the above that, of the schools of thought that concern themselves with competition between uses, most differences arise from opinions over how big an area the concept is to be applied to. Those schools that apply multiple use to a relatively small area generally have emphasized the dominant use-economic approach. Those schools that ascribe to the larger area approach have felt that multiple use is only applicable to the forest or region. This approach tends to beg the question and nearly approaches the naive approach because the larger the area viewed, the easier it becomes to find different uses in the area--thus infering multiple use. The dominant use-economic approach likewise has contained some fallacies because they have either emphasized the importance of the "ecological suitability" of some use in the area with no consideration of the demand for the products produced in the area, or they have placed emphasis on the demand with little consideration of the ecological constraints and/or to the fact that the demand for products produced in one area is a function of the supply (and demand) of these products produced in alternative (competitive) areas. This approach has lead many managers to view wildlife production, for example, as the only suitable use of an area (ecologically), even though little or no use is made of the area for hunting or sightseeing, and yet it may have great potential as a ski area from a demand point of view. Furthermore, many managers have felt that some specific recreation use in an area should be emphasized because there is, in general, a large demand for it and have not considered the fact that other areas are presently supplying (and will be

able to for some time in the future) all the demand that exists in the region. Perhaps Behan expressed the basis for these conflicts best when he outlined the history or basis of multiple use forestry in the following way: 404/

> "In February of 1936, Professor Frank A. Waugh of Massachusetts State College published an article in an obscure periodical called The Journal of Land and Public Utility Economics. The title of Professor Waugh's paper was 'Reconciliation of Land Uses,' and in it he proposed that a farmer would maximize the benefits from his farm by 'intercropping,' or planting beans in between the rows of corn. He could grow both corn and beans, in other words, on no more land than he had used previously for corn production alone. This idea, and others like it, or the 'succotash syndrome,' as I have chosen to call it, was easily transposed from farm management to forest management. It became the rationale for what we know today as 'multiple use,' the nearly sacrosanct modus operandi of professional forestry, which lists wood, water, forage, recreation, and wildlife as commingling products of the forest."

Thus, from a production point of view "succotash"--more than one thing--can be grown in an area, but perhaps society does not prefer "succotash" or more than one use of the area. Furthermore, by producing more than one thing in an area, you may allow one product to be harvested (i.e. cut the timber--harvest the beans), but this harvest would destroy the other use (deer--corn). Thus, just because more than one use can be made of the area is neither a necessary nor a sufficient reason for allowing both uses to exist in the area. This problem has recently led to the dominant use controversy that resulted from the recommendations of the Public Land Law Review Commission (PLLRC).

Dominant use

In reviewing the laws and goals that govern the use of public lands, the PLLRC was forced to look critically at the principle of multiple use. This analysis must have left the Commission with a very empty feeling, for they abandoned multiple use as the guidling criterion upon which to base land management decisions. Several possible explanations have been offered to explain the position taken by the Commission.

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404/ Behan, 1967. Op. Cit. p. 473.

Members of Congress made up the majority of the Commission's membership. The composition of the Commission could therefore be expected to reflect national and legislative points of view. After reviewing the first study reports and after conducting a number of public meetings, it was concluded that there had been a substantial undermining of the role of Congress in making land management decisions by the executive department through the agencies--especially with respect to withdrawal of public lands from disposal to private or other forms of public ownership. 405/ In as much as the concept of multiple use provided no clear cut criteria, withdrawals were made as the line of least resistance which were objected to by some members of Congress who served on the PLLRC. This course of action was noted by President John F. Kennedy when he said, 406/

> "My predecessors have been acutely award of the dilemmas facing the Secretaries of Agriculture and Interior as principal administrators of the original public domain. Whenever they have been faced with the reasonable alternative of continued public ownership and management, or disposition, they have generally elected the former."

One of the major reasons why this represented the line of least resistance is because there was generally a lack of strong countervailing power. 407/ Local interests would generally favor private ownership, but are usually allowed to continue their historic use of public lands if federally administered. They therefore may object to federal retention, but not as strenuously as in cases where exclusion is eminent. Furthermore, there seems to be substantial national support for retention. 408/ The agencies have therefore found political support for retention, so that the lands can be administered in accordance with multiple use (however interpreted). Administrators have thus not had to squarely face the tough

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405/ Hagenstein, Perry R. 1972. One third of the nation's land: evolution of a policy recommendation. Natural Resources Journal 12(1):56-76.

406/ Cited In: Harvey, 1969. Op. Cit. pp. 238-249.

407/ Galbraith, John K. 1952. American capitalism: the concept of countervailing power. Houghton Miffin Co., Boston.

408/ One might question whether this support has not been generated by the federal agencies by such programs as Johnnie Horizon, who states "This land is your land."

decision of whether it would be "better" to dispose of large acerages. This conflict and other problems of withdrawal helped lead to the establishment of the PLLRC, made this area one of the first major problems faced by the commission, and laid the need for a critical evaluation of public land management by multiple use.

In 1964, Congress passed the Classification and Multiple Use Act which gave the Bureau of Land Management interum authority to determine by classification whether lands under their jurisdiction whould remain in federal ownership or be subject to disposal. This represented a change in policy with respect to the Bureau of Land Management action. Previous to that time, the Bureau of Land Management had received applications from interested parties to purchase or otherwise acquire federal lands. Once the application was received, the Bureau would classify the lands as to their suitability for disposal. With the enactment of the 1964 Act, the Bureau changed their action and actively classified lands for disposal or retention whether applications had been made or not--much to the dismay of interested members of Congress (primarily from the west). This precipitated actions by Congressional members of the PLLRC that Congress assert leadership in making reservation-disposal decisions and to review those withdrawals that had previously been made. This essentially meant that Congress should take the leadership in setting out criterion for public land management.

When the PLLRC began reviewing the various study reports that had been made, they were led to the refection of the[409/]

> ....idea of priorities applicable in all cases by regognizing that even protection of rare and endangered species not be afforded a complete priority over all uses. It further recognized that one use does not necessarily preclude all others and some form of zoning would be necessary."

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409 / Hagenstein, 1972. Op. Cit. p. 67.

As the Commission continued to review the other study reports, they were eventually forced to evaluate the study on multiple use.[410/] The Commission found that this led to a "can of worms" which required some directive. Furthermore, the Commission had not been able to find anyone who had "...been able to explain satisfactorily how multiple use could be interpreted in deciding on uses to be assigned in a particular area."[411/]

> "Throughout its life, the Commission had struggled with the notion of developing criteria, or a specific model such as that used by the water resources agencies, for making land use decisions. In the end, it rejected these as being inappropriate because of the great variety of conditions and demands on public lands. While discussing multiple use guidelines, the Commission made a final attempt to find some more definitive rules than it had previously adopted. It again considered whether general priorities among uses should be adopted and even considered the idea of establishing priorities among categories of criteria, which would assign an environmental quality, economic efficiency, regional growth, or other overriding imperative to public land decisions.
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> In the end, it recommended that Congress consider the idea of establishing priorities among uses for resolving irreconciliable conflicts and that Congress also consider assigning an environmental quality, economic efficiency, or other imperative to public land decisions. However, it despaired of Congress being able to go far in these directions, as well it might have, considering the likelihood of a busy Congress being able to deal with a problem that baffled this blue-ribbon study Commission. Thus, after considering both the establishment of a model for decision making, the Commission decided to rely instead on a land use planning process for resolving conflicts. And this process was the one it had discussed almost from its first meeting, and it included the indentification of dominant use zones.
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> The Commission, at the same time, could find no inconsistencies between existing multiple use authorities and its concept of dominant use zoning. Such zoning would be done by the land management agencies and no use would be afforded priority over other uses until a decision to do so had been made with respect to a particular area after considering the various production possibilities and the net social benefits of pursuing alternative courses of action. The decision was made to tie the various dominant use decisions together and make them the basis for recommending that the fundamental management authorities of the multiple use acts be continued, but that Congress provide greater legislative guidance to the land management agencies by directing them to zone public lands where feasible, for dominant use management. In effect, the Commission would take the directives for dominant use zoning

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410/ Multiple use is discussed in a number of reports. The study by Davis, Kenneth P. et. al., dealt specifically with multiple use. Davis, Kenneth P. et. al. 1970. Federal public land laws and policies relating to multiple use of public lands. Report to the PLLRC. National Technical Information Service, Springfield, Va. 110 pp.

411/ Hagenstein, 1972. Op. Cit. p. 72.

> contained in the House and Senate Committee reports on the 1960 Multiple Use and Sustained Yield Act and make them a directive in the legislation itself. An identical paragraph appearing in each of these reports stated: 'It is recognized that the priority of resource use will vary locality by locality and case by case. In one locality, timber use will dominate; in another locality use of the range by domestic livestock; in another wildlife or outdoor recreation, including wilderness will dominate. Thus, in particular localities, various resource uses will be given priority because of particular circumstances.' The Commission's recommendations for changes in multiple use authorities would, if implemented, increase the degree of explicit legislative directives, without greatly changing the substance of these authorities."[412/]

The Commission thus recommended that the "Management of public lands should recognize the highest and best use of particular areas of land as dominant over other authorized uses."[413/] The reception this recommendation received by the public was unexpected, however. Environmentalists, industries, recreationists and various other interested parties helped make this recommendation become the most controversial statement made by the Commission. Each group saw the potential of "my use" being excluded from many areas that may have been considered and/or allowed under the multiple use doctrine. Thus, the "my use" interests of multiple use have been brought to the fore under the dominant use proposal of the PLLRC.

Dominant vs. equal priorities doctrine

Throughout the history of debate concerning the meaning and application of multiple use, a corresponding discussion concerning whether each of the uses have equal priority or whether one or more have dominant status over the others.

In Wilson's letter to Pinchot it was indicated "You will see to it that the water, wood and forage of the reserves are conserved and wisely used for the benefit of the homebuilder first of all, upon whom depends the best permanent use of lands and resources

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412/ Hagenstein, 1972. Op. Cit. p. 73.

413/ U. S. Public Land Law Review Commission. 1970. One third of the nation's land. U. S. Government Printing Office, Washington, D. C.

alike." Furthermore, he added that "In the management of each reserve local questions will be decided upon local grounds; the dominant industry will be considered first,..."[414/] This would seem to indicate a priority of uses, especially in as much as recreation and wildlife are not specifically stated. In the hearings concerning the enactment of the Multiple Use, Sustained Yield Act of 1960, the commodity interest argued that the Act of 1897 did establish priorities among the various uses.[415/] This bill, as well as most judicial interpretations thereafter, did establish watershed, timber, mineral and forage as "primary objects"--with the preservation of forests taking top priority. In fact, there are only 3 legal cases that give any hint that recreation, wildlife and grazing uses should be on a par with watershed or timber.[416/]

The U. S. Forest Service has claimed, however, that all uses are to be given equal priority. Chief Forester McArdle best enunciated this when he said that "One of the basic concepts of multiple use is that all of the five resources in general are entitled to equal consideration, but in particular or localized areas the relative values of the various resources will be recognized."[417/]

With the enactment of the 1960 and 1964 multiple use bills, however, the establishment of the equal priorities doctrine is complete--with exception that the 1960 Act states that it is "supplemental to, but not in derogation of, the purposes for which the national forests were established as set forth in the" 1897 Act. Thus, there is still some area for debate, but the policies of the U. S. Forest Service and the Bureau of Land Management have established their intent to manage public lands with each of the

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414/ Cited in: McConnell, 1959. Op, Cit. p. 17.

415/ For a discussion of this point as well as a history of the 1897 and 1960 Acts see: McClosky, J. Michael. 1961. The meaning of the Multiple Use--Sustained Yield Act of 1960. Oregon Law Review 4(1):49-78.

416/ McClosky, 1961. Op. Cit. pp. 58-63.

417/ The five uses are wood, water, forage, recreation and wildlife. McClosky, 1961. Op. Cit. p. 54.

various uses having "equal priority".

Summary and conclusions

Multiple use is of the same vintage as other doctrines that came out of the depression era. It has served a real purpose in expanding the horizons of early public land administrators who generally were concerned with one use and often were guilty of narrow tunnel vision. The criticism that land administrators manage for the thing they are trained in--timber by foresters, domestic cattle grazing by range managers and wildlife by wildlife managers--is not as valid today as it was in the 1930's and 40's. U. S. Forest Service and Bureau of Land Management administrators consider many uses today, but they are not led by meaningful criterion when hard land management decisions between alternative users have to be made. Perhaps Davis best summarized the state of multiple use when he said:[418/]

> "Multiple use has been developed primarily by the Forest Service as a large area concept and with concern to its own situation. Any combination, limitation, or sequence of uses on a single area, or of single uses where they are considered desirable, may be applied. When it is recognized that wilderness use, which may be designated in units up to about a million acres, is consistent with the multiple use concept (so stated in the act), the area scale can be very large and often is. This is also mainly true of other large public ownerships.
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> Applied to all ownerships, public and private, the terms can have no specific meaning and here is where difficulties arise. The Forest Service, and with the best of intentions, has attempted to apply the general concept to all kinds of sizes of ownerships without adequate discrimination. It has not only been advocated as a concept, a principle, or as an approach but by implication as a formula, a panacea, a guide, and as meeting all questions about desirable forests and related land use. People have been told that multiple use will give them what they want, and that application of the 'principles of multiple use' will somehow lead to desirable answers in most any situation. This is not sufficient; specific questions remain as to what kind of multiple land use is appropriate in given circumstances.
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> Small wonder that people, individually and collectively, can be and often are confused and also use the term for their own ends. I know of a good many instances where people were for or against 'multiple use' depending

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418/ Davis, Kenneth P. 1969. Multiple land use and for whom? Journal of Forestry 67(10):718-722.

> on their interests. This does perhaps have a virtue in keeping the forum open for debate but not in obscuring a sound basis for applying desirable land use in a particular area. Without better discrimination in usage, it seems likely that multiple use will wear out as a term of any generally understood meaning and go much the way of conservation and selective logging."

Thus, the recommendation made by Ciriacy-Wantrup nearly 35 years ago that if "...the use of one specific acre of wildland is under consideration, the concept of 'optimum use' is more applicable than that of multiple use."[419/] If optimum use were to become the guiding criterion, however, numerous studies concerning joint production problems would have to be conducted. These studies would have to evaluate the role of non-market goods, amenities, and all of the problems outlined in the chapter concerning measurement of public agency performance. These problems have plagued decision makers for many years, but the optimum use would provide an objective basis upon which to base an evaluation of land management decisions. This criterion would be different than the evaluations of performance to date because nearly anything can be justified on the basis of multiple use--it just depends upon ones interpretation of the term. Furthermore, it would be subject to objective analysis and could be reviewed by affected parties. It may not be able to solve all the problems that would exist, but it would provide a basis upon which an objective evaluation could be made. Furthermore, there would be a need to establish some review mechanism whereby decisions could be reviewed by some one (group) outside the executive agencies. This review mechanism could help eliminate some of the "third party" issues for which there are presently few, if any, available means of recourse[420/] and help evaluate the actions of federal land administrators which have been given broad discretionary power that can be used to promote ends which need not necessarily be in the public interest.

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419/ Ciriacy-Wantrup, 1938. Op. Cit. p. 666.

420/ _____ 1970. The conservationists and public lands: administrative and judicial remedies relating to the use and disposition of the public lands administered by the Department of Interior. Michigan Law Review 68(6):1200-1254.

## A proposed multiple-optimum use model

The problems of developing an adequate model or criterion upon which to base land management decisions has plagued professional and agency personnel for a number of years. Several suggestions have been made and the Bureau of Land Management is currently developing criterion as part of their Management Framework Analysis. The model proposed below should not be viewed as the final word in this area, but as a synthesis of the state of the art and as an indication of the problems involved.

### Production

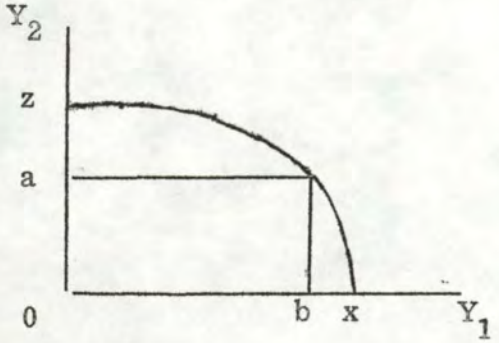
When a land manager is faced with the problem of producing more than one product in the same area (i.e., acre, forest, watershed), the theory of joint production is directly applicable. This can perhaps be most easily visualized mathematically. Let $Y_1$ and $Y_2$ be 2 products (i.e., cattle and deer) and let $x_1, \ldots . x_n$ be the factors (inputs or resources) used to produce these products (i.e., forage, water, salt, cover). Then the production of each may be expressed in the following manner:

$$Y_1 = f_1 (x_i, \ldots ., x_n, y_2)$$

$$Y_2 = f_2 (x_i, \ldots ., x_n, y_1)$$

Thus, the production of one product ($Y_1$) is some function of the inputs or resources ($x_i$) and the production of the other product $Y_2$. If a given bundle of resources ($x_i$) is available the production of the 2 products can be illustrated in the following manner.

Figure 5.

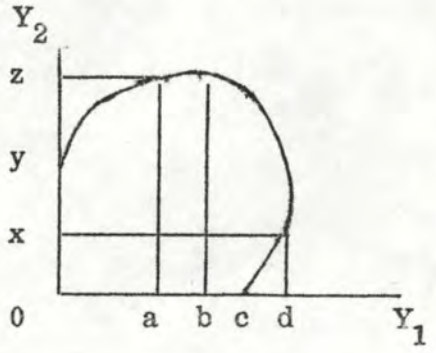


Thus, if the given resources are all devoted to the production of $Y_1$, then 0z could be produced or in any similar manner, many combinations of $Y_1$ and $Y_2$ could also be produced (i.e., 0b of $Y_1$ and 0a of $Y_2$). 421/

Several problems arise when any of the above is altered. For example, if the bundle of inputs ($x_1$) is changed in either amount and/or composition, the production of each of the outputs ($Y_1$, $Y_2$) is affected. This change is especially crucial when investments such as range improvements are made to change such things as habitat or water availability. This change may, as indicated in Chapter , benefit one of the outputs relative to the other. Furthermore, changes in the input mix may not change one of the outputs, but may alter the production of the other significantly.

One other change that may affect the curve is how the changes in the production of one product, given a fixed bundle of inputs, will affect the production of the second product. Heady and several other writers have classified the possible cases as being competitive, complimentary, or supplementary. These cases are illustrated in figure 422/ below.

Figure 6.




421/ See any of the following references for a discussion of these principles:

Heady, Earl O. 1952. Economics of agricultural production and resource use. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 850 pp.

Carlson, Sune. 1956. A study on the pure theory of production. Kelly and Millman, Inc., New York. 128 pp.

Frisch, Ragnar. 1965. Theory of production. Rand McNally & Co., Chicago. 370 pp.

422/ It should be noted that this figure does not agree with the mathematical definitions, as contended by Heady. It does, however, provide a simple means of visualizing the relationships.

The complimentary stage is illustrated by production between 0 and a of $Y_1$ and y to z of $Y_2$, i. e., as the production $Y_1$ increases from 0 up to a, the amount of $Y_2$ increases from y to z. As the amount of $Y_1$ is increased from a to b, the amount of $Y_2$ produced remains at z and is referred to as the supplementary area of production. If the production of $Y_1$ is expanded beyond b to c, the production of $Y_2$ declines and is illustrative of the competative area of production. This is also the rational area to produce (in the supplementary and/or complementary areas more production of one product either yields more of the other product or the same amount is produced). The area between 0x and $Y_2$ and cd of $Y_1$ is likewise a complimentary area of production. The optimum level from an economic point of view would be found where the slope of the transformation function between $Y_1$ and $Y_2$ is equal to the inverse of the price ratio between products $Y_1$ and $Y_2$. 423/ Determining this optimum position is very difficult for many products produced on rangelands, however. The reasons why this is such a thorny problem is that a price does not exist for many of these products.

Demand

The price system is often used as the system to allocate the use of inputs in the production of alternative products. In the production of most natural resources, however, no price exists for the product and the mechanism breaks down. The theoretical concepts of the system do provide a framework upon which to base allocation models, however.

Economic theory indicated that the demand schedule for most goods and services has a negative slope, i. e., as the quantity available increases, it commands a lower price in the market. The theory also indicated that increasing amounts of a good or service will generally be supplied only at a higher price. This forms what has been called the "Marshallian Cross," as illustrated in figure , where S represents the

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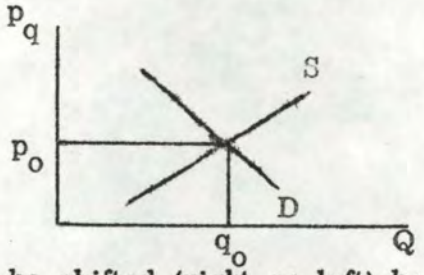
423/ For a discussion of this position see: Heady, 1952; Frish, 1965; Carlson, 1956; or Gregory, 1972.

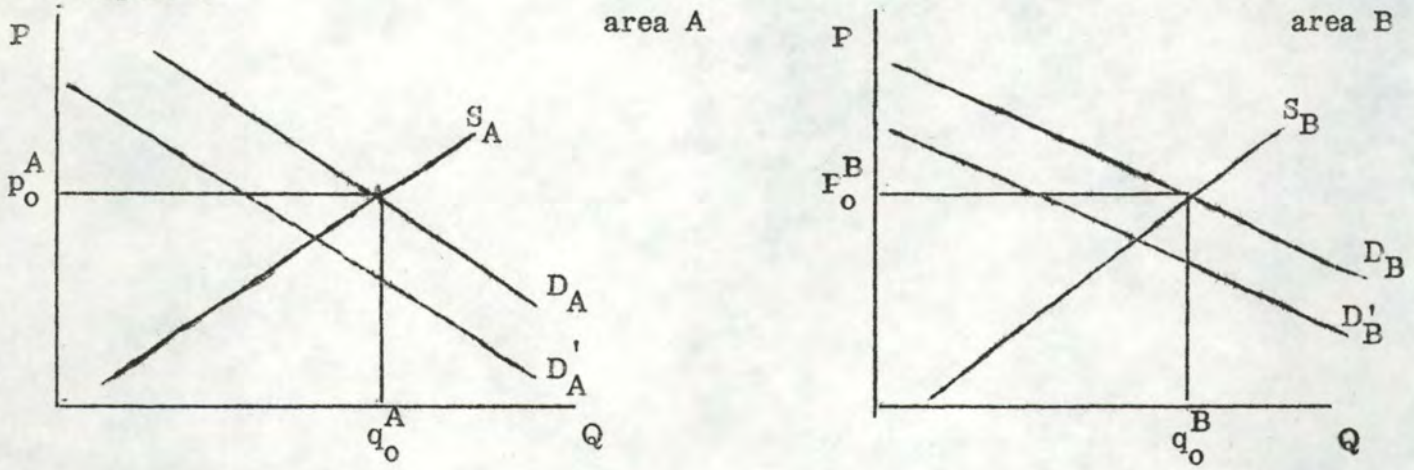
supply schedule and D represents the demand schedule for the good or service being considered. The equilibrium level supplied and demanded would then be $q_o$ at a price of $p_o$. The demand D can be shifted (right or left) by changes in the price of substitute or complimentary goods as well as factors such as income or tastes and preferences. Thus, if the price of a substitute good should fall, then a new demand schedule could be derived that would lie to the left of the original function D. Similar shifts would take place for changes in other factors. Ths positive slope of the supply function is dictated by the principles of production sketched above. Thus, if more of the product in question is to be produced, it generally must bid factors from the production of an alternative good or more inputs must be supplied (used) to produce this additional output if the amount of all other outputs remain constant.

Figure 7.




The application of these principles may be illustrated by examining how the supply and demand would be affected by some change in the production of the same good that is produces in 2 areas, A & B as illustrated in figure . If both markets are initially

Figure 8



in equilibrium so that $q_o$ is being supplied and taken in area A and $q_o^B$ in area B. Now suppose that the demand in area B declines for some reason to $D'_B$. This, assuming the good produced in area A is competative to the good (i.e., recreation) in area B, would cause the demand in area A to decline $D'_A$ which would lead to further changes in both areas until a new equilibrium is reached. Thus, the demand for recreation in one area, for example, depends not only on the total demand for recreation (all areas) but upon the demand and supply conditions in complementary and/or supplementary areas. These relationships would, therefore, have to be determined for each product that could be produced in an area before an optimum allocation of resources or level of production from the area could be determined.

Additional problems are raised when it is realized that the demand for hunting in an area is some function of the number of deer there are in the area. 424/ The problems of production then become intermingled with the demand of the area. It should also be noted that the production side may involve ecological and/or legal constraints that would not allow an economic optimum to be achieved.

Summary

This brief section has provided a tentative skeleton upon which large amounts of constructive research must be completed before acceptable criterion can be developed. Many research organizations are presently working on this thorny problem, but the problem has not been satisfactorily solved.

In the past land management allocation decisions have been governed by a principle termed the "squeeking wheel." Under this method, larger allocations are made to those groups that "make the most noise" and exert the most political pressure. This method is subject to considerable criticism. First, some groups can exert more pressure than

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424/ Hall, Op. Cit.

others just because they are better organized than opposing groups. This may be particularly true where "third party" or external effects are important and where large numbers of people are affected but each is harmed (benefitted) a small amount. These circumstances can lead to the lack of countervailing power such that a decision is not opposed just because no organized group or organization is able to rally the affected parties into an effective group. Second, the "squeeking wheel" principle may not allow sufficient specilization in some area that economics can be achieved. If numerous uses are allowed in 2 areas, less may be produced in total than if each area was able to specialize and eliminate some uses in each area. This criterion has made federal administrators aware of the diverse demands that are exerted for use of public and has eliminated some of the criticism that was leveled at the agencies before other uses were recognized.

The management of the complementary and competative relationships outlined above will involve wildlife range, soil, watershed and other similar sciences. These relationships will have to be established before the problems on the demand side can be used. Studies in both areas have been conducted, but more remains to be done. These relationships are not easily measured, however, as illustrated in the following section.

## The relation of livestock grazing to other uses of rangelands

Complementary and competative relationships exist between the various users of rangelands. Particular emphasis will be placed in this section on the role of these users and livestock grazing. Relations between each of the other users outlined below could also be outlined but these are beyond the scope of this study.

### Watershed

Whenever a discussion of watershed occurs, 2 elements become confused. The first is the yield of water and the second is sedimentation. These aspects need to be separated in any discussion.

The importance of grazing to water and sediment production was perhaps best summarized in the following way. 425/

> "Forage and its utilization in relation to water is probably the most important single aspect of multiple use of western wildlands. This is because, first, forage is economically produced and harvested on most of the important water yielding lands; and second, forage utilization by grazing has probably adversely influenced the useability of western watersheds more than any other use."

This would seem to indicate that grazing can have a significant impact on sedimentation as well as yield.

Whenever rangelands are heavily grazed, the protective canopy is diminished and susceptibility of soil erosion is increased. Areas that are heavily grazed for a number of years often contain gullies and areas where water has washed away much of the protective topsoil. Areas that are not grazed as heavily however, are not susceptible to soil erosion. The key to sedimentation therefore is commonly two-fold. First, areas that are grazed should be grazed in a manner that some protective cover is left for sufficient percolation and to arrest heavy and rapid runoff. Second, areas that are steep and/or have shallow soils have to be grazed carefully, if at all, as these types of areas are very susceptible to erosion.

The U. S. Forest Service outlines 5 considerations when evaluating the adaptability of grazing in important watershed areas. These include the following:

1) Watershed areas may be closed to livestock grazing when necessary to prevent accelerated erosion, floods or the diminution of usable-yield or pollution of the water supply;

2) Areas suitable to grazing will not be used if it requires moving livestock over watersheds which will be damaged by livestock use;

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425/ Connaughton, Charles A. 1943. Yield of water as an element in multiple use of the wildland. Journal of Forestry 41(9):641-643.

3) Grazing use will be planned to prevent trampling damage to watercourses, alpine meadows and snowbank areas;

4) Water pollution resulting from livestock grazing will be prevented;

5) Watershed protection and improvement will be considered in all range improvement projects.

These criterion as well as similar ones outlined by the Bureau of Land Management have lead to the exclusion of livestock grazing on more than 4 million acres of public rangelands between 1947 and 1966. Most of these areas are on national forest lands which receive more precipitation, in general, than do Bureau of Land Management lands.

Most exclusions of livestock grazing are made to prevent soil erosion. It is generally recognized that grazing does not adversely affect water yield and in general will help increase yields by diminishing the consumptive use of water by plants. 426/ It is also recognized that the judicious use of cattle to improve stands can help increase percolation and provide more cover that can help arrest soil erosion. If grazing is "properly" managed therefore, water yields may increase and sedimentation can be diminished. In some crucial areas however, grazing may lead to unnecessary sedimentation, pollution and/or decreased water yield that grazing may be excluded.

Livestock user groups

The competition between the different types of livestock has been captured by history and emphasized beyond reality by western movies. The sheepman and cattleman are often pictured as arch rivals. The existence of animosities between the 2 groups did exist and there still does exist some resentment between the 2 groups to the present day, but not to the extent that has been popularly portrayed. These differences arose

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426/ Sharp, A. L. et.al. 1964. Runoff as affected by intensity of grazing. Journal of Soil and Water Conservation 19(3):103-106.

when rangelands were generally "over-used" and competition was to get to the grass first.

On "properly" grazed rangelands the competition for forage by cattle and sheep may not be severe and some evidence suggests that it is more profitable to graze both species than to exclude one of the groups. 427/ Some experiments in Texas have also recently indicated that these same types of relationships exist for the use of rangeland by goats with sheep and/or cattle. The competition in heavily used areas, however, can be severe.

Recreation

Recreational use of rangelands and grazing of cattle by livestock will probably continue to be an increasingly important area of conflict. More people are generally spending more time in remote, inaccessible areas than in any period of American history. It has been estimated that recreational use of public lands more than doubled in the 1960's with further increases being predicted in the future. The amount of conflict between recreational use and grazing varies considerably between types of use, however.

Campgrounds, national parks, picnic areas and other similar forms of intensive recreational use are often incompatible with grazing. This has led the federal agencies to exclude grazing from these areas. Grazing is also commonly excluded from areas containing important archeological or historical sites and resort areas. Natural or wilderness areas also represent an area where domestic livestock grazing, except grazing by pack animals, has been excluded and represent the major acreage where grazing is not permitted.

One area of conflict between ranchers and recreation use that is often very troublesome to the rancher is off-road vehicles. Vehicles such as jeeps, motor bikes

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427/ Cook, C. Wayne. 1954. Common use of summer range by sheep and cattle. Journal of Range Management 7(1):10-14.

Hopkin, 1954. Op. Cit.

and snowmobiles provide great pleasure for their operators but they can also be used to haze cattle, scare horses and kill or maim young animals. These harrassment tactics can also scatter a herd, separate calves or lambs from their mothers, and keep cattle from bedgrounds, salt licks and water holes. Ranchers have often indicated that these are some of the most troublesome aspects of recreational use and have often caused ranchers to exclude all recreational use on private lands.

Recreationalists who litter an area can also lead to severe problems for ranchers when cattle step on glass bottles, tin cans or consume spoiled food. Gates are often opened and left down or fences cut by various recreational users, which can lead to severe problems and considerable bother.

In addition to the competitive or complementary aspects of producing livestock and various forms of wildlife or rangelands, hunters and/or fishermen can cause many of the problems outlined above. In addition livestock are often shot for "deer". The recent development of all terrain vehicles has led to the development of a new form of rustling whereby an animal is shot and "field dressed" within a matter of minutes.

Ranchers have also expressed considerable concern about the attitude of some recreationists who feel that livestock have no place on public lands. This animosity has lead to problems that have precipitated to a general lack of cooperation. Some recreationists may, however, place considerable value in being able to "relive part of the old west" by being able to see livestock grazing and/or handled.

Wildlife

The degree of competition between livestock grazing and wildlife is difficult to ascertain because the relationships vary between species and from area to area. Research conducted in various areas has indicated some general trends, however.

The competition between sheep and various forms of wildlife is commonly more severe than is cattle use. The major reason is that cattle primarily consume grasses

and consume small amounts of forbs and/or brouse, whereas sheep prefer a larger percent of these desirable wildlife species. The competition of domestic with bighorn sheep may be especially severe. Sheep can also effectively compete with deer on many rangelands, especially on summer range. 428/ There is some indication that competition between sheep and pronghorn antelope may not be great. 429/ Competition between sheep and other wildlife species is likewise probably not great, but little is known about these relationships.

Considerable amounts of research have been conducted concerning the competition between cattle and various wildlife species. There seems to be considerable evidence that, given a range that is not heavily grazed, competition between cattle and deer is not great. 430/ There is also evidence that the competition between cattle and moose is not great. 431/ The competition between elk and cattle is generally not great,

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428/ Smith, Justin and Odell Julander. 1953. Deer and sheep competition in Utah. Journal of Wildlife Management 17(1):101-117.

Julander, Odell. 1958. Techniques in studying competition between big game and livestock. Journal of Range Management 11(1):18-22.

429/ Severson, K. E. and M. May. 1967. Food preferences of antelope and deer in Wyoming's Red Desert. Journal of Range Management 20(1):21-25.

430/ Julander, Odell. 1962. Range management in relation to mule deer habitat and herd productivity in Utah. Journal of Range Management 15(5):278-281.

Kimball, Thomas L. 1957. The economic aspects of livestock--big game relationships as viewed by a game administrator. Journal of Range Management 10(2):67-71.

Hall, John M. 1955. Livestock and big game relationships. Journal of Range Management 8(1):4-7.

Thilenius, John and K. Hungeford. 1967. Browse use by deer and cattle in northern Idaho. Journal of Wildlife Management 31(1):141-145.

Kease, W. Gordon. 1967. Big game harvest and land use in Wyoming. Wyoming Agricultural Experiment Station Bulletin No. 467, Laramie, Wyoming. 20 pp.

Smith, Arthur D. And Dean D. Doell. 1968. Guides to allocating forage between cattle and big game on big game winter range. Utah Fish and Game Department. Publication No. 68-11. 32 pp.

431/ Dorn, Robert D. 1970. Moose and cattle food habits in southwest Montana. Journal of Wildlife Management 34(3):559-564.

but it can become severe on areas where elk winter.[432/] Other wildlife species have been studied, but no general conclusions have been reached. One study on peccary [433/] indicated that competition exists only in rare cases and this conclusion is probably indicative of most wildlife species that are discussed above.

Smith provided a summary of the state of the Act in 1961 with respect to wildlife-livestock competition. [434/]

> "Given a well vegetated range with animal populations in balance with forage, the natural tendency for deer to use areas inaccessable to livestock, together with the normally different dietary habits, combine to make competition between deer and livestock of little concern. Moreover, the production from the range is greater with both animals present than with one."

In balance, therefore, competition becomes severe only when grazing is heavy and the "capacity" of the forage resources has been reached and is being challenged.

There has recently been building evidence that suggests that livestock grazing can be very beneficial to wildlife. [435/] This is especially true on areas where browse plants, such as bitterbrush, have been stripped by big game until they are no longer productive. When this occurs, cattle can be used to top the brush and make it become bushy and more productive.

One thing that has brought the possible competition between livestock and wildlife into focus has been the large increase in big game numbers on public lands. The forage study for the PLLRC indicated that big game use on national forest lands increased from 1.2 million AUM's in 1923 to 7.2 million AUM's in 1964. Big game use on

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[432/] Stevens, David R. 1966. Range relation of elk and livestock, Crow Creek drainage, Montana. Journal of Wildlife Management 30(2):349-363.

Hoskins, Leonard and Paul Dalke. 1955. Winter browse on Pocatello big game range in southeastern Idaho. Journal of Wildlife Management 19: 215-225.

[433/] Eddy, Thomas. 1961. Foods and feeding patterns of the collared peccary in southern Arizona. Journal of Wildlife Management 25(3):248-257.

[434/] Smith, A. D. 1961. Competition for forage by game and livestock. Farm and Home Science 22(1):8-9. Utah State University, Logan, Utah.

[435/] Smith, A. D. 1968. Guides for allocating forage between cattle and big game on big game winter range. Utah State Division of Fish & Game. Publication No.68-11. 32 pp

Bureau of Land Management lands more than doubled (1.2 million AUM's to 2.6 million) from 1947 to 1967. This has led to an outcry by ranchers - especially given the physica relationships outlined above. The federal agencies cannot be blamed for all of this increase, however, because they are responsible, in cooperation with the state agencies, for the habitat, whereas the states have jurisdiction over game management and numbers. Furthermore, there are some wildlife managers who, off the record, have expressed the opinion that heavy livestock grazing has changed many rangelands from grass type to brush type areas which are able to support larger numbers of wildlife.

One other area of concern to western livestock operators is the discrepancy in pricing policies between livestock and wildlife use. Wildlife are able to use the public lands free of charge because hunters and other users pay no direct funds for their support, whereas livestockmen have paid a fee for grazing privileges. This "free hunting" on public lands has also had a negative affect on the development of private hunting areas in the western states. If ranchers in the western states were able to sell hunting privileges, they might be able to increase their incomes as ranchers in Texas (where little public lands exists) have been able to do. 436/ Given the political desirability of free access to public lands, however, it is not likely that wildlife will be equally charged for use in the near future.

Mining

The degree and extent of competition between mining and grazing varies from area to area and by type of operation. Most mining activities do not involve large acreages of land. Even strip mining areas, such as some phosphate areas in southern Idaho, do not involve large acreages. Furthermore, areas where minerals have been extracted are commonly revegitated and often to more productive species of forage than existed previously.

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436/ Ramsey, Charles. 1965. Potential economic returns from deer as compared to livestock in the Edwards Plateau Region of Texas. Journal of Range Management 18(5):247-

Hicks, Vernon M. 1972. Managing the ecosystem for greatest economic returns from wildlife and livestock in Texas. Paper presented at the 25th annual meeting of the Society of Range Management, Washington, D. C. February 7-11.

The major area of conflict between grazing and mining is apparently the transportation of the extracted material to processing plants. Pipelines and/or road systems commonly use more surface area than does the mining operation. These acreages are generally not sizeable, but the travel of trucks, pickups and other vehicles near grazing animals can lead to occasional deaths, harassment and/or fencing that may limit access to forage in areas that had been grazed before the road and fences were established.

Other areas of conflict also arise. These include exploration where blasting or scraping by bulldozers may be particularly bothersome. These, as well as most mining activities are generally localized, and may lead to considerable conflict in rather small areas, but the conflict between grazing and mining, in total, is relatively insignificant.

Timber

Timber production can have a significant impact on the availability of forage and thus livestock grazing. As the canopy of most coniferous forests become more dense, the amount of understory vegetation declines. In old stands, it is not uncommon to find little forage upon which livestock and/or game can feed. Logging operation, therefore, often have a beneficial affect on the availability of forage by opening up the canopy and allowing the understory to grow.

Livestock often have a detrimental impact on timber production, however, when the regeneration of forests is being attempted. This has led the U. S. Forest Service to make the following recommendation: 437/

> "The following management techniques should be considered where livestock use may damage timber stand regeneration
> a. Providing regeneration protection by fencing which is part of a total management plan.
> b. Protecting regeneration areas through temporary modification of the range management plan, such as closing areas in rotation or change in kind of livestock."

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437/ University of Idaho and Pacific Consultants, Inc., 1970. Cp. Cit. p. IV-125.

The above indicates that the amount of competition between grazing and timber is a function of the age, composition and type of tree being grown. The amount of competition will thus depend upon the general goals of the land manager and the effective demand that exists in the area for the two products. The amount of competition between grazing and timber production is not great in most areas, however.

Summary

The amount of competition between livestock grazing and other uses of rangelands varies between the uses and areas considered but does not appear to be great. Perhaps the most important area of competition in the future will be between grazing and recreation. The importance of watershed considerations (sedimentation and flow) will continue to be important but as Secretary of the Forest Service, Edward P. Cliff has said, 438/

> ". . .watershed values are inherent on all national forest lands, and because basic policy requires that all national forest activities be managed to maintain or improve watershed values, current policy states that it takes more than two uses to constitute multiple use--watershed use and at least two others."

It is unlikely that grazing has a large impact (positive or negative) on stream flows but heavy use by cattle can lead to severe erosion problems.

Most studies have shown that grazing is not competative with most other uses, but one reason why this may be true is because the areas considered have not been intensively managed. As the demands for use of the public lands continue to grow, the productive capability of these lands will probably increase. Uses that are not competitive to some degree are probably not being used as intensively as they are capable and society may therefore be forgoing products that could be produced with little extra effort or expense.

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438/ Cliff, Edward P. 1962. Multiple-use planning national forest planning. In: Amoss, Harold L. and Roma K. McNickle. Land and Water: Planning for economic growth. University of Colorado Press, Boulder, Colorado 219 pp.

The role and importance of livestock grazing on many western rangelands can and should not be slighted. "Experience under the Taylor Grazing Act has demonstrated what was believed before, i. e., that little public land remained which was suitable for agricultural or other uses superior to grazing." 439/ Grazing is probably the superior, if not the only, use of many western rangelands. If grazing was eliminated no other use would be made of these areas. The critical role of grazing in these areas have led some people to advocate their disposal to private operators.

## Public ownership and multiple use

The issue of whether public domain lands, U.S. Forest Service lands or lands managed by the other public agencies should be transferred to the states and/or private ownership has been an issue since the late 1800's. The reason why lands that were available for disposal were not transferred and the criterion for public ownership has not been discussed as freely as have the emotional arguments for retention.

### Criterion for public ownership

In 1958, Ciriacy-Wantrup 440/ outlined the major criteria for public ownership of rangelands. The 2 major arguments are: (1) the social benefits of range resources, and (2) conservation of range resources.

Social benefits:

As outlined previously, rangelands produce several products and often jointly. Many of the products, such as water, wildlife and outdoor recreation are not marketed, and therefore do not have prices that allow evaluation. Furthermore, many of these uses (i. e., water) are of benefit to people who do not directly use rangelands. To

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439/ Davis, Clarence. 1955. Cp. Cit. p. 498.

440/ Ciriacy-Wantrup, S. V. 1958. Criteria and conditions for public and private ownership of range resources. Journal of Range Management 11(1):10-14.

the extent that private rangeland owners do not or will not take these benefits into account in management decisions, a reason is provided for public ownership and administration. The rational for this provision is commonly referred to in economic literature as an externality 441/ and may occur whenever the actions of one person affects the satisfaction of another person, or when the actions of one firm technically affects the production of a second firm and these indirect affects are not taken into account by the first person or firm. Several examples of these types of actions may occur in rangeland use. For example, a range operator may overgraze an area to the extent that a significant amount of erosion occurs and destroys the habitat of a fishery resource. 442/ These considerations provide one of the strongest arguments for continued public ownership.

To the extent that there is not significant difference in the social benefits if owned and managed by private operators as opposed to public ownership, however, it may be more rational, given the private property philosophy of American capitalism, to dispose of public lands to private ownership. This may be especially true for scattered parcels of public lands, such as section 15 lands administered by the Bureau of Land Management which have high administrative costs if publically retained and whose management would not significantly change if transferred to private ownership.

Perhaps the most vocal reason given for public retention that can involve public benefits is the production of wildlife and the use of lands for recreation. There is considerable doubt as to the validity of this argument. It has been estimated that

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441/ Buchanan, James M. and Wm. Craig Stubbleline. 1962. Externality. Economica 29:271-384.

442/ This example is indicative of the negative effects that may occur, but there may also be positive effects. Other reasons, such as overgrazing in early rangeland history, stem from the "common property" aspect of rangelands before federal management was instituted.

approximately ". . . 80 percent of all hunting time in the United States takes place on private land." [443] The major reason why this estimate may be quite indicative is that most hunting occurs in the eastern states, which contain relatively small acreages of public lands. Livestock operators, lumbermen and miners are some of the strongest advocates of large wildlife populations, and it is unlikely that they would significantly decrease populations if public lands were transferred to them (they would likely acquire most lands that would be transferred). There is a very strong possibility that hunters, fishermen and other forms of recreation would have to pay more for access to lands that might be transferred to private ownership, however.

Conservation:

The second major reason why lands should be retained is conservation. Wantrup lists 3 reasons why private operators may not practice the socially optimum amount of conservation. [444] The first reason is the private owners [445]

> ". . . are not sufficiently informed about appropriate practices or are not able for economic reasons able to adopt them; [446] and second, that these factors cannot be changed more effectively through education, land-use regulations, zoning, subsidies and other public tools than through public ownership."

The third reason given by Wantrup relates to the relatively short-run objectives of private operators versus the long-range objectives of private ownership. Thus, under private ownership, use rates could be at a level that was higher than would be socially optimal.

Wantrup summarizes the use of the above criterion by indicating that [447]

> "The argument in favor of public ownership may be strong according to the conservation criterion, or vice versa. As a matter of geographical fact, there is a tendency for the two criteria to operate in opposite directions when applied jointly."

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[443] See chapter for the definition of conservation used by Wantrup.

[444] There is some indication that private operators have invested more heavily in range improvement practices than have the federal agencies (see Godfrey, 1972. Op. Cit.) To the extent that this is generally true, it would infer that conservation has been practiced by private operators to a greater degree than have the federal agencies.

[445] Ciriacy-Wantrup, 1958. Op. Cit. p. 12.

[446] Ibid.

Politically, the social benefit aspects of public ownership has been the most commonly used argument, but these arguments are commonly not backed with sufficient information to provide an objective evaluation of the consequences of disposal or retention. Kelso has summarized the basis of these political debates when he indicated that "multiple use" is the most common reason given for public retention. 447/ These arguments using multiple use generally follow the public benefits criterion outlined above. The ambiguous definition of multiple use, however, may have led to some irrational decisions as both sides may have argued for multiple use with basis for their contention. Other criterion:

People who argue for the retention of public lands are often viewed as the only groups that argue from emotions, but ranchers have also been guilty of emotion laid arguments. Many ranchers feel that they have a right to possess these lands because they or their predecessors subdued the elements and eliminated the threat of Indian raids. They therefore feel that they have earned the right of possession and that the federal government should deed them "their" land.

Some of the reasons given for public retention are leveled directly at users of public lands. Early writers that addressed the issue of retention or disposal often emphasized the role of "cattle barons" and the use of public lands for private gain. They therefore argued that the public domain lands should be retained so they would not be passed to a small number of very large users. This sentiment led to the acreage limitations for desert lands and homestead entries which effectively prevented livestock operators from attaining an economical sized unit. Other inadequacies in the law also prevented disposal and resulted in retention by default.

The demand to own land today is not just a private consideration, however. Programs and advertisements by the federal agencies have emphasized the importance of

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447/ Kelso, Maurice. 1952. Economic analysis of land use on western ranges. American Academy of Political and Social Sciences 28(5):135-145.

public lands being 'your lands". This has led to almost a fever that has caused some people to view owning land as an end instead of a means. Some people also view public ownership of land as an end with no concept of what use they might be to society if owned by the public in general. If the managment of public lands is not carefully evaluated, we could easily be trapped by the "common property" mistakes of yesteryear whereby everyone tries to use "his (public) land" prior to the use by another person.

Consequences of public ownership

The criterion or reasons why lands are publically owned are not the only important matters of interst when retention is considered. "Our concern with public lands must be not only their protection, and the preservation of their productive capacity; increasingly we must be concerned with their use, the values it creates, who gets those values, and who pays the costs." 448/ The existance of public lands does raise a number of significant questions as a result of their administration and development generally being paid by some users as well as from federal tax revenues.

Distributional aspects:

One of the most cumbersome problems of public ownership concerns whether public lands should pay taxes. The tax base of local or regional units of government is erroded when large portions of land are in public ownership and when property taxes represent a major portion of the revenues collected. This has led the federal government to reimburse or otherwise distribute monies to these units of government for taxes lost as a result of lands being held in public ownership. The forms that these funds are made available are as "in-lieu" payments, "revenue sharing", highway subsidy payments, as well as various other means of lifting the burden of local governments resulting from heavy public land ownership.

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448/ Clawson, Marion. 1965. A public land review. Reprint from American Forests, March-April. part VI.

Recent studies [449] have raised some question concerning the burden of federal lands on local units of government, however, the study done by EBS Management Consultants Inc. for the PLLRC indicated that existing payment systems afford smaller revenues than would property taxes if applied to federal lands in most of the case study counties that were considered. It was also found that: [450]

> "The other element of burden measured in the study concerned the relationship between current payments by the federal government to counties, including shared revenues, payments in lieu of taxes and other direct contributions on the one hand and expenditures by local government because of federal lands on the other. These expenditures typically involve payments for maintenance of federal roads and highways, and law enforcement on federal lands. In this instance, a majority of the counties was found to have a net benefit although this did not consider the revenues lost because of tax-immune lands."

The conclusions vary markedly from the study done by Barron and Jansma. They studied the impact of public land on 3 counties in northwestern Pennsylvania and concluded that "the results of this study fail to support the contention that local governments are economically harmed by large areas of public land." [451] The results by Barron and Jansma may not have as wide an application as the PLLRC study, but both studies indicate that significant differences in burden can and often do exist from area to area.

In addition to the differences in burden that may exist between areas, Clawson raises 3 other objectives to public revenue sharing from the viewpoint of local governments. First, the demand or need for revenues by the local governments may vary

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[449] EBS Management Consultants Inc. 1968. Revenue sharing and payments in lieu of taxes on the public lands. Report submitted to the Public Land Law Review Commission. National Technical Information Service, Springfield, Va.

Clawson, 1965. Op. Cit.

Barron, James C. and J. Dean Jansma. 1969. The impact public land programs on local government taxation and expenditure policy in Pennsylvania. Ag. Exp. Sta. Bulletin 758. University Park, Penn.

[450] Seastone, Don. 1971. Revenue sharing or payments in lieu of taxes on federal lands. Land Economics 47(4):373-382. P. 374.

[451] Barron and Jansma, 1969. Op. Cit. p. 46.

significantly from the revenues thay receive from the federal government. Thus, some areas may have high needs and small revenues, whereas other areas may have small needs and high federal revenues. The second objection is similar to the first, but emphasized the fact that when revenues are received may not coincide with the time the revenues are needed. The third objection is that the revenues have no relation to the services that are provided by federal agencies that would have to be provided by the local government if the agency was not involved. Some examples of these federally provided services include road maintenance and fire control.

In addition to the above problems, some areas have such low productivity that they are currently not being used for any purpose and it is unlikely that they will ever be used. Many of these areas are remote and receive little precipitation. If these areas were not retained by the federal government, the burden of management would fall on the applical owner, which would receive little or no revenue from them. These areas represent burden areas which may best be retained by the federal government for bombing sites, AEC sites or other types of extensive land uses. The amount of money spent for land management would be justifiably small.

Furthermore, 452/

> "Once the public lands are thrown open to State or private acquirement, those portions bearing the most valuable resources will be seized upon at once and those unadapted to profitable private ownership will be left in the hands of the Government. There are millions of acres of such lands as evidenced by the large area of unreserved public domain which has been open to entry under existing public laws for many years and is today sometimes referred to as 'land nobody wants'."

As has been pointed out in Chapter , nobody wants these lands under the present legal methods of obtaining them, whereby only relatively small acreages can be obtained. If it were legally possible to obtain larger acreages so an economically sized ranch unit could be "put together", many of these previously unwanted lands would be patented.

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452/ Commission on Organization of the Executive Branch of Government. 1949. Task Force Report on Natural Resources, Appendix 8, p. 186.

It is unlikely, however, that the federal government would go out of the "land management business" because much of the public domain is either "too poor" or remote to justify private ownership.

These distributional aspects have led Clawson [453/] and others to advocate levying of taxes on federal land. This would represent a departure from past policy and may not be politically feasable. There would be a number of advantages to this proposal, however. If taxes were levied, the first major impact would be that they would be levied on net instead of gross revenues, and would lead users to undertake investments and other conservation measures that would normally not be undertaken if taxed on gross revenues. This could also lead to increased management efficiency and more intensive management. This would also make the various local units of government independent of federal ownership by allowing them to tax public lands at the same rate as comparable private lands. The proposal is not without its disadvantages, however. First, it is likely that the "tax returns" to local government would be larger, which could inhibit federal programs that may have a higher social return. Second, the possibility of "unreasonable" local levies would be possible. Third, the costs of changing to and administering the new program may be prohibative. Furthermore, the problems of timing of tax payments and returns would be shifted from the local unit of government to the federal agency. Thus, the local unit may institute large levies during a period that the federal lands are returning minimal amounts of revenues and vice versa.

Development and stability aspects:

It is not known how local, regional, or national development or stability would be affected by the transfer of public lands to private ownership. The transfer would enhance the tenure of livestock operators, lumbermen and other direct users, but may

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453/ Clawson, 1965. Op. Cit. p.

decrease the availability of lands for recreational use. To the extent, however, that private operators tenure is increased, they would likely invest at higher rates in various land improvement--conservation projects that may have been too risky under federal management. This could concievably increase the productivity of many rangelands.

The overall management of land resources may decline significantly under such an arrangement if some method of land use planning was not instituted. Lands may be used for purposes that yield short run gain that may not be in the public interest. This could lead to problems of erosion, abandonment of these lands and their eventual transfer back to government in a less productive state. The possibility of these types of consequences are real, but their probability is unknown. Thus, the institutional arrangements under which federal lands might be transferred is crucial to the prediction of what might happen to the use of these lands.

It is recognized, however, that under the present land laws, lands can be transferred to private ownership and used for purposes other than those in which the original patent was made. The present mining laws are particularly open to question on this point. Associate Director of the Bureau of Land Management Hochmuth best described the situation when he said that: 454/

> ". . .there is a different type of mining claimant today. To this claimant the minerals in the ground represent nothing more than a fortuitous circumstance which will enable him to acquire free simple title to the land. He has no interest in the development of the minerals beyond that necessary to establish a discovery; he wants to make a killing in real estate.

Retention or disposal?

There are justifiable reasons why the federal government should retain and/or acquire rangelands. The reasons given for their retention are commonly emotional

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454/ Hochmuth, H. R. 1965. Government administration and attitudes in contests and patent proceedings. 10 Rocky Mountain Mineral Law Institute:473-490.

and do not represent a critical or objective analysis of how or why society would be harmed if transferred. This is not to say that emotions should not play a part in these decisions, but they should not be allowed to be the over-riding criterion. As Kelso has said: 455/

> ". . .it is significant that practically no voices are raised urging public ownership of pasture and crop lands to protect them from abuses by private firms or to enhance investment in their increased productivity. But many voices are raised relative to western grazing land. It would seem that, except where there are clear reasons to the contrary, western grazing lands--which are a form of agricultural pasture land--should be privately owned in harmony with out cultural ideas."

These voices have been so strong that it has led Clawson and Held to make the following statement that summarizes the present possibility of federal disposal, retention and acquisition of rangelands. 456/

> "We recognize there is a body of opinion favoring large-scale disposal of federal lands, especially of the remaining public domain. We also recognize the argument that in some respects the present policy is irrational: other means of attaining these goals may be equally or more effective. We doubt, however, if those who hold these views will have much success in changing the attitude of the supporters of federal ownership. The vigor with which proposals interpreted as disposing of federal lands or weakening control in their management have been fought is a convincing expression of popular will. The issue has been deceided, and further discussion is fruitless so long as this attitude remains. The minority opinion, however, may well prevent substantial increases to federally owned land. Popular support for additional land is vastly less than for retention of the land now owned.
>
> Thus in our opinion the real problem for the future is development and management of substantially the existing area of federal lands, rather than a consideration of large--scale disposal or acquisition.

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455/ Kelso, 1952. Op. Cit. p. 142.

456/ Clawson, Held, 1957. Op. Cit. p. 7

## EMERGING OBJECTIVES

In the previous parts of this section the analysis has been confined to the stated policy objectives of the Congress and the public land agencies with respect to forage. In this part we will analyze the emerging objectives, those goals which will probably become more important in the future.

These emerging objectives as we see them are: (1) flexibility in programs to permit the agencies to meet the changing needs and wants of future generations; (2) increasing proprietary interest in the federal lands by the general public, induced by a change in attitude on the part of the land agencies with respect to the public land from that of custodian to one of proprietorship; (3) because of growing concern over rural poverty, both on the farm and in the rural communities, action by the federal government to alleviate such conditions relating to the public land it administers; (4) a more consistent integration of public land policy with general agricultural policies with respect to agricultural surplus and production control; and (5) greater emphasis upon economic efficiency in resource allocation and management.

### Flexibility

When the forest and timber reserves were withdrawn from the public domain and later turned over to the U. S. Forest Service for administration, the public interest was confined largely to the preservation and conservation of rapidly diminishing resources. At the time the Taylor Grazing Act was passed, the concern was chiefly to prevent deterioration of the rangelands. The Taylor Grazing Act did not require the permanent withdrawal of land from private use. It merely recognized that its use for crops was limited and that care of it was required to prevent its deterioration until it could finally be disposed of for higher uses. This was a policy of retention for disposal.

Since the passage of these acts, multiple uses have become more important. The public generally is looking upon resources for utilities other than economic and commercial use. Watershed protection, wildlife preservation, fishing, hunting, scenic beauty, and other recreation have caused a greater public interest in these lands. Powerful groups representing interests other than commercial uses are creating policies which tend to push the collective non-market values at the expense of economic values. With the rise of atomic weapons and missiles, lands removed from congested areas have importance for national defense and security. Furthermore, as population increases and the urban areas become more concentrated and congested, the relative importance of the various wants will change. These changes introduce an element of uncertainty as to what will be the future wants and needs of society with respect to the public lands.

Were it not for the uncertainty over the nature of future requirements for these resources, disposal of the public lands would provide a reasonable alternative to retention. The public land could be classified as to its best uses for now and for all time to come. The lands could then be disposed of for their best commercial use. Those lands having no commercial use would be retained for public collective uses. Once uncertainty is introduced, however, no reliance can be placed on the current determination of what future wants will be. Land disposed of through present priority classifications cannot be used for another purpose in the future without incurring a much greater cost in repossessing the land. The ability of society to reconsider and re-evaluate uses will be greatly restricted. Flexibility will be sacrificed. Regard for flexibility, therefore, would tend to justify the retention of land in government hands.

Consideration of flexibility also conflicts with security of tenure. The more secure a permittee is in use of grazing lands, other things being equal, the less

flexibility the government possesses in diverting these lands to other uses. To retain the advantages of both flexibility and security, compromises must be made. The federal agencies must be prepared to make financial sacrifices to secure flexibility, such as paying compensation for investments made by the user and for the loss of the use of the land or privileges. Another alternative would be to vary the length of time in which changes in uses could be made. For example, long term agreements could be entered into with the user, in such matters as agreements relating to management programs. During the period of the agreement the use of the land would not be changed without compensation to the permittee. Once the period of the agreement had expired, the land agency would be free to re-evaluate the land for priorities in use.

A similar conflict would tend to arise between flexibility and stability of the range livestock industry and of the local community. If stability of the livestock firm is the main objective, flexibility will be sacrificed. In a previous section a question was raised as to the relevance of the stability criteria, such as commensurability and security in tenure, to the stability of the livestock industry. The small farm is economically inefficient. Strict adherence to commensurability requirements can also induce inefficiency. Even transferability of permits among users through competitive bidding or through appraisal would probably have little effect on the stability of the industry. There appears to be little difficulty arising from the stability of the livestock operations when private land such as railroad land is rented, or in the Bureau of Indian Affairs or the Department of Defense where much of the land is allocated on the basis of competitive bids. Security of tenure is probably necessary to induce best care of the rangelands, but the criteria for stability of the family farm and of the farm community have questionable relevance for the present day.

Flexibility may be attained through a combination of long term leasing or tenure arrangements by which permittees may enter into such agreements with the public land agencies concerning the use and management of the range. At the same time, the federal land agencies may vary the maturity dates of the agreements in such a manner that a certain percentage of the agreements may terminate each year. This will allow the agencies to evaluate continuously each portion of the rangeland as the agreements terminate. Thus, over a period of years, all the land can be reassigned to its current or to different uses to maintain flexibility. This suggestion will be discussed further in the section on alternatives.

Increase in proprietary interest in public grazing lands

In addition to the growing interest of the public in the federally owned lands as a national heritage, a trend is developing on the part both of Congress and of the agencies themselves toward a position of proprietorship rather than custodianship. It was pointed out in a previous section that the attitude of the agencies, especially of the U. S. Forest Service, has been changing over the years. Whereas during the early years of its activities the U. S. Forest Service was primarily concerned with care of the land, with fairness to users, and with stability, in more recent years it has shown more concern over justification of its allocation policies and its pricing practices to non-users and to the public at large.

Coincident with the change of attitude on the part of the public and of the agencies, Congress has indicated a concern over the tendency to use public commodities and services as a means of benefiting the few at the expense of the public generally. This has manifested itself in the Independent Offices Appropriation Act of 1952, in which Congress directed all agencies to place all charges and fees on the same basis. The statement of policy in 1951, which directed the agencies to fix charges and fees at a rate high enough to cover the costs of service is another example.

In setting forth these policies, Congress was prompted by several considerations. First, there was recognition that many of the fees and charges were set at rates which in fact subsidized certain activities, such as agriculture and public power. These actions were taken during the period of the depression, when there was a need by various economic groups for assistance. With the return of prosperity during the post war era, such subsidies were no longer needed. Congress felt that if such economic groups were ever to become self-sufficient, then was the time to start. Second, during the early fifties, there was a strong movement to get the government out of business. One way to start was to stop subsidizing federal commercial activities. Finally, there was the desire to place more of the federal activities on a market basis. The policy statement of 1951 made it clear that Congress recognized non-economic objectives of federal agencies, but the policy statement required that these non-economic objectives be justified.

Should the public land agencies move to a position of landlord, this would involve changed relationships between the agency and the user and between the agency and the land resource.

With respect to the user, the position will change from one of a benevolent custodian conferring upon him a privilege, to that of an owner securing the full market value for the resource. There will have to be more specific agreements between the agency and the user. The government will probably find the user less receptive to management suggestions that cost him time or money. Nor will he view with favor any suggestion of co-operative improvements for which he will not be assured of receiving the full income return during his occupancy. As the termination date of the agreement approaches, the user will become particularly recalcitrant about assisting in maintenance and development practices.

It will be necessary for the agencies to assume the main burden of improving the land, especially for long-term improvements. If they are to optimize their

returns, they must make improvements to the point where marginal costs equal marginal returns. When the agencies are compelled to go to Congress for appropriations to accomplish this, they may find them difficult to obtain. The agencies will encounter greater difficulties also in renegotiating an agreement after the expiration of the previous one. They must re-evaluate not only the use to which the land is to be put, but also the rental value to be derived from the land. They must also select the new users. Under situations when only a few users can profitably use the resource or when all users are operating with a co-operative grazing agreement, the number of potential users may be greatly limited. When a monetary favor is being bestowed upon the user, the agencies will find a large number vying for the privileges. When the full market value is charged, the agency may discover that the market situation has changed from a sellers' to a buyers' market. It is most likely that the buyer for the most part will be either the large operator who is expanding to secure the economies of scale, or the outsider who is interested in securing the capital gains which may accrue to his private land holdings.

The new fee structure represents a significant movement of the government towards a proprietorship position. For purposes of analysis, the basis for determining the fees to be charged in the future is the difference in the cost of using private rangelands on which lease costs were included and public lands on which no fees were included. The difference between the 2 costs is considered the user cost differential. This differential is assumed to be the value to the user of the public land for the privilege of using these lands.

The use of a cost differential in determining the value of the public land to the permittees has certain advantages over a mere difference in rental values. Cost differentials will take into account all the factors which make grazing on public land more or less costly than grazing on private lands of approximately equal qual-

ity. Cost factors also tend to be more stable than other pricing items in ranch and farm enterprises.

The value of forage land would tend to change more rapidly as the price of meat varies than would the costs of producing the meat. This is probably why the formula for setting fees used in the past by the U. S. Forest Service and by the Bureau of Land Management, which were based upon the price of beef and lamb, did not reflect the full value of the rangelands. During periods of rising meat prices, profits will rise more rapidly than the prices. The reverse is true during declining prices. Probably the best measure of the value of grazing to the ranchers is the price of stocker, feeder, and breeding stock, since these are the principal production agents in producing beef. Prices of stocker, feeder, and breeding stock are more variable than the prices of slaughter beef. During the sharp decline in cattle prices in 1951-53, the cost of feeder steers dropped nearly 50 percent, whereas slaughter stock dropped only about one-third. Similarly, during the rise in prices following the upturn in the cattle cycle in 1958, slaughter prices rose 14 to 20 percent, whereas the prices of feeder steers rose 50 percent. During both periods costs other than livestock and forage remained comparatively stable. 457/

Large variations in prices and income of cattle ranchers would in all probability reflect themselves in the lease or rental prices of private lands. It would make a difference whether private rentals were surveyed during the rising or the declining phases of the livestock cycle. When cattle prices are rising, ranchers tend to expand their herds by purchasing breeding and stocker animals, by feeding steers to heavier weights, and by holding heifers for breeding purposes. 458/

> "The retention of some breeding stock reduces market receipts and this reduction in slaughter raises prices further. This continues until the

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457/ William, Willard F. and Thomas J. Stout. 1964. Economics of the livestock meat industry. MacMillan Co., New York. pp. 574-575.

458/ Shepherd, Geffrey S. and Gene A. Futrell. 19 . Marketing farm products. Iowa State University Press. 5th edition. p. 124.

> build-up on farms and ranches begins to approach the limits of carrying capacity, and market receipts from the larger herd become large enough to halt the rise in price or turn it downward."

During the downward phase of the cycle the opposite conditions prevail. During the periods of the build-up in cattle numbers, the lease or rental price of private lands would tend to rise. The opposite is true during the downward phase of the cycle. Rental or lease prices would depend somewhat on the phase of the cycle in which the analysis is taken.

In recent years, however, the pronounced cycles in the size of the herds and in feeder cattle produced seem to become somewhat blurred. In place of large liquidations in herds during the downward phases of the cycle, there seems to be a continuous build-up in herd sizes. Thus, a constant pressure on the capacity of grazing lands is being experienced.

An unpublished study of the number of beef cows in 9 of the 11 western states (California and Colorado were omitted) compiled by Dr. A. A. Araji of the University of Idaho, showed that the build-up in number of cows in herds increased continuously from 1951 to 1955 and 1956, but then dropped off in 1957 and 1958. Following the low in 1958, the number increased rapidly through 1967, the last year for which data are available. Even in the low in 1958, the numbers were larger than in any year before 1953. The fact that there was no tapering off of cow numbers after the severe drop in price in 1962-64 indicates the degree of stability of the cattle industry. We do not find wholesale liquidations following price reverses as occurred previously. The one factor that seems certain is that herds are increasing rapidly. In 1967, the number of beef cows on farms in the 9 western states was 61 percent greater than in 1950. 459/

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459/ Data compiled by Dr. A. A. Araji from U. S. Dept. of Agriculture, Economic Research Service, Livestock and Poultry Inventory. January 1 for respective years.

Table 53. Cows, 2 years and older. [a]

(Thousand Head)

| Year | Montana | Idaho | Wyoming | New Mexico | Arizona | Utah | Nevada | Washington | Oregon | Total cows per year |
|---|---|---|---|---|---|---|---|---|---|---|
| 1950 | 754 | 219 | 431 | 619 | 393 | 194 | 260 | 157 | 328 | 3355 |
| 1951 | 846 | 236 | 471 | 627 | 394 | 211 | 267 | 176 | 347 | 3575 |
| 1952 | 921 | 275 | 533 | 644 | 427 | 233 | 289 | 198 | 404 | 3924 |
| 1953 | 977 | 286 | 529 | 640 | 465 | 256 | 284 | 239 | 431 | 4107 |
| 1954 | 1045 | 327 | 532 | 641 | 430 | 260 | 294 | 253 | 486 | 4268 |
| 1955 | 1106 | 357 | 522 | 639 | 428 | 256 | 300 | 271 | 495 | 4374 |
| 1956 | 1129 | 350 | 509 | 671 | 404 | 248 | 290 | 266 | 495 | 4362 |
| 1957 | 1078 | 372 | 517 | 593 | 375 | 240 | 285 | 247 | 472 | 4179 |
| 1958 | 1078 | 355 | 514 | 581 | 355 | 240 | 264 | 242 | 475 | 4104 |
| 1959 | 1089 | 374 | 536 | 602 | 333 | 243 | 261 | 260 | 519 | 4217 |
| 1960 | 1114 | 384 | 550 | 625 | 343 | 252 | 264 | 283 | 553 | 4368 |
| 1961 | 1131 | 385 | 545 | 631 | 337 | 256 | 272 | 300 | 555 | 4412 |
| 1962 | 1141 | 420 | 551 | 669 | 366 | 272 | 269 | 318 | 572 | 4578 |
| 1963 | 1210 | 440 | 578 | 676 | 373 | 271 | 266 | 338 | 603 | 4755 |
| 1964 | 1287 | 475 | 615 | 696 | 391 | 282 | 280 | 355 | 639 | 5020 |
| 1965 | 1387 | 508 | 629 | 617 | 407 | 301 | 291 | 366 | 665 | 5171 |
| 1966 | 1452 | 521 | 695 | 708 | 361 | 310 | 305 | 366 | 680 | 5398 |
| 1967 | 1481 | 513 | 672 | 696 | 390 | 310 | 305 | 377 | 668 | 5412 |

[a] Source: Livestock and Poultry Inventory, January 1 for respective years.

These data are important for the analysis here because they show that the demand for private and public grazing land is on the increase. While the demand for forage has expanded during the period since 1950, the numbers permitted on the public range have not increased, in fact have decreased somewhat. As a consequence, greater pressure on private rangelands has been experienced. This presumably would increase both the rentals on private lands and the value of the privileged on public lands. The user cost differential measured the difference in value of the public and private rangelands, but a significant proportion of this differential is the cost squeeze affecting ranchers as they attempt to enlarge their herds.

Another factor affecting the lease or rental value of private grazing lands is the need of the rancher for them at a certain time. The questionnaire used in this study showed that private lands with high rental rates were used only intermittently. For the most part private grazing lands were leased by permittees at high rates during fill-in periods to permit flexibility in the on and off dates of public lands and to supplement public grazing lands during seasons of low forage production.

Permit cost in the sense of the capitalized value of the permits represents a number of actual and expected values. During a period of rising land values ranchers anticipate a continuing increase in capital values. These values reflect, therefore, a speculative anticipation of such capital gains. Because the U. S. Forest Service and the Bureau of Land Management have asserted and have frequently exercised the right to decrease the number of privileges issued to a rancher, the value reflects this uncertainty. In addition, ranchers must meet the commensurability requirements and the limitation in numbers of privileges issued to any one rancher on U. S. Forest Service lands. These factors would tend to decrease the value of the permit over the value of comparable private land. On the other hand, economies of scale exist in

ranching firms. Therefore, the permit value should increase because of the competition of ranchers striving to secure more efficient sized operations. There is no information which will enable the analyst to determine what factors are predominant in determining the actual value of a public land privilege.

This problem concerned Gardener in his study of permit values during the 1950's. Gardner found the deflated permit value of 15 transfers in northwestern Colorado on Bureau of Land Management land to be $10.92 and on U. S. Forest Service land $16.45, whereas the "expected value" based upon capitalized values of cost differentials would be $44.33 for Bureau of Land Management land and $23.19 for U. S. Forest Service lands. Gardner explains the differences between actual and expected values on the basis of the uncertainty surrounding the allocation criteria of the land agencie

The Interdepartmental Grazing Fee Study showed a considerably less user cost differential in the U. S. Forest Service lands than did Gardner. After deducting the appropriate fees, the Gardner study showed a net value of $2.66, [461] whereas the U. S. Forest Service study showed a net user value of $1.06. [462] On the other hand, the U. S. Forest Service showed a cost of permit value of $25.35 for cattle and $19.45 for sheep. In connection with these permit values, the U. S. Forest Service stated: [463]

> "The capitalized difference between the total non-fee cost of operating on comparable private land equals the permit value at 4.3 percent on cattle permits and 4.7 percent on sheep permits. Use of permit value at any summarization below the survey wide level, however, proved to be unreliable because of lack of adequate observations. These observations consist of actual transfers during a five year period, 1961 through 1965."

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460/ Gardner, 1962. Op. Cit. pp. 59-61.

461/ Ibid. p. 59.

462/ U. S. Dept. of Agriculture, Forest Service, 19 . Op. Cit. Appendix 1 Table A. (The value used was $1.57, full value of use less average fee .51).

463/ U. S. Department of Agriculture, Forest Service, 1967. Op. Cit. p. 8.

The significant difference between the cost of permits observed by Gardner during the 1950's and the U.S. Forest Service Survey in the early 1960's are difficult to appraise. The fact that Gardner suggested a capitalization rate of 6 percent, whereas the actual rate was less than 5 percent, accounts for only a minor part of the variation. A considerable portion of the difference must be explained by a change in anticipations of capital gains in permit value during the 8 year period between the 2 studies. These variations in permit value emphasize the difficulty in attributing too much of land values and prices to the earning capability of the land resource. It is difficult to determine exactly what land value the permit values actually represent.

Another consideration of importance in the new fee structure is its effect on allocation of the range resources. It was pointed out in a previous section that under practices in effect before January, 1969, the tendency would be for the market to reallocate the rangeland after the original users waived their privileges, unless such criteria as a commensurability and limitations of numbers exercised a constraint upon the market operations. It was also pointed out that the rancher who already possessed land and was seeking an efficient-sized unit would be able to out bid for the public land privileges ranchers who had no land (Section , page ).

The change in fee structure now in effect should not change that tendency in rangeland allocations. If a full market value is paid for the privileges, at the time of transfer, it makes no difference to the purchaser whether he pays the full market value to the federal government or to the rancher. The rancher who has acquired the privileges through their purchase from other ranchers will lose that portion of the capital value represented by the user cost differential at the time of his purchase, but he cannot recoup his loss by passing it on to the next purchaser. The trend towards more efficient allocation of range resources will not be affected by the change in methods of charging fees.

Another question which arises is whether or not the new fee structure will capture the full market value of the grazing privileges when they are transferred. The U.S. Forest Service has suggested that the fees could be adjusted in the future to the index of grazing land values, using the USDA Economic Research Service series Farm Real Estate Market Developments, which gives the "index of average value of farm real estate per acre for grazing land in the 11 western states." It was pointed out above that land values reflect factors other than the economic value of the resources to the user. We have witnessed during the past 2 decades the paradox of rapidly rising land value and declining returns to agricultural operators. From the evidence presented in the previous paragraphs it would seem that the value of privileg are equally subject to erratic movements. 464/

Another proposal was to relatethe fee to an index such as private lease rates. Since the private lease rate explains most of the difference between the public and private land use differentials, the trend in the lease rate should reflect these movements quite accurately. In such a situation, however, there would be no assurance that a market value would not accrue again. Individuals concerned with speculative investments or ranchers striving to secure the advantages of economies of scale may still be willing to pay more than the capitalized fee rates for the privileges. Possibly the only certain way in which the rise of a capital value can be prevented would be to have the federal agencies reclaim the land at the time of each transfer, require either open bidding or an appraisal, and transfer it to users of its own choice for a specified period of time.

The cost of service as a criterion for fee changes

In the policy statement of Congress in1951 cited above (5 USC 140 (1964)), all agencies were urged to charge such fees for services rendered as would make the

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464/ U.S. Dept. of Agriculture, Forest Service, 1967. Op. Cit. p. 19.

agencies self-sustaining, "taking into consideration direct and indirect costs to the government, value to the recipient, public policy or interest served, or other pertinent facts." Through the application of this principle, the taxpayer would be relieved of the cost of providing services from which only a few individuals derived benefits. Such a policy could be an alternative to the charging of the full user cost differential.

That the receipts of the public land agencies from the sale of services are substantial is revealed by Tables and (Section ). In 1965, the U.S. Forest Service had receipts of $142,200,000 and the Bureau of Land Management $234,361,000.

Receipts from grazing on the public domain in 1939 reached its highest percentage to total receipts of 12.6 percent. From that point, grazing receipts as a percentage of receipts on the public domain declined to 1.8 percent in 1965. During that year the receipts from grazing reached $4,251,000. The decline in the relative importance of grazing reflects the great increase in value of lumber and minerals.

No reliable data exist for comparing receipts from fees with total costs of services rendered. An analysis was prepared in 1963 by the Bureau of Land Management for the Sub-Committee on Public Lands of the Committee on Interior and Insular Affairs of the Senate. This analysis applied to the Bureau lands only. The fee receipts are considerably less than the total received for all the public domain (see Tables and ; Section ). The figures are for the 10 year period from 1954 to 1963 (see Table ). The data show that after 1955 a continuous decline occurred in the percentage of costs of services recovered by grazing fees. In 1955, 52.9 percent of the costs of services were recovered, whereas in 1963 only 22.4 percent were recovered. The most important reason for the decline was the large increase in expenditures on soil and moisture conservation programs. This item

increased from $1,700,000 in 1955 to $10,132,000 in 1963. Other costs also rose precipitously. Administrative costs, which amounted to $1,450,000 in 1955, rose to $4,535,000 in 1963, although the percentage administrative costs bore to total costs declined from 34.2 percent of total costs to 26.3 percent during those years. If the figures presented by the Bureau of Land Management are typical, grazing fees would have to be increased substantially if total costs are to be recovered.

The policy of requiring agencies which provide services and commodities for sale to become self-supporting works out very well where the costs of services are readily allocated to the commodities and services performed. Under such circumstances the difficult tasks of allocating administrative and joint production costs are relatively simple. Electric energy generated on government property, for example, can be priced and the cost of its administration can be allocated to the production and sale of this commodity.

The basic difference in public lands is their emphasis on multiple use. This invariably raises the question as to how much of the cost of administering public grazing lands should be allocated to grazing, how much to lumber, how much to recreatio how much to wildlife, and how much to watershed protection. To a degree the example of electricity is appropriate for comparison. On the other hand, electricity is produced by private utilities as well as by publicly owned ones. Electricity also competes with other energy resources. Administration costs, therefore, are generally carefully watched by the federal agency involved in order to make their comparisons with private utility costs favorable, and the service must be priced to compete with other energy resources. It is more difficult to allocate costs in a multiple use land situation. For one thing, most of the allocative uses have no market price at all. There would be a tendency, therefore, for public land agencies to load all the costs of administration of the multiple uses on grazing, lumber, and other revenue producing resources, and not on the uses which provide no revenue.

On the other hand, ranchers would tend to protest the costs which they would have to pay for the administration of uses for which they derive no benefits. The land agencies have already found it difficult to get ranchers to participate in improvements which benefit wildlife and watershed protection more than grazing. As long as multiple use is an important objective of public land policy, cost of service becomes a weak objective on which to justify any fee base.

Comparison of fees collected with expenditures, described above, does not provide a good basis for determining the extent to which the fees collected cover costs. In fact, no reliable figures of that type are available. Marion Clawson attempted, but with little success, to estimate a financial statement for the public lands as a whole for the year 1963 as an indication of the type of information needed by the Bureau of the Budget to evaluate the efficiency of operation of these agencies. He concluded this phase of his analysis with the following statement: 465/

> "The present programs of most agencies seem to contemplate continued relatively large cash deficits. Without accurate data of the type shown in Table 12a, one cannot be sure whether in fact such cash deficits are true deficits when all items have been properly taken into account. One line of analysis would be to show what level of charges, or of value estimates, would be necessary for some of the nearly free items--particularly recreation--in order to balance a true account. If a full accounting of all income and expenditure items revealed a deficit on some proposed line of land management, questions might well be raised as to the wisdom of the latter. If all reasonable values and costs have been included, what social or national gain is there from a method of land management which leaves a deficit? Admittedly, estimation of the value of some intangibles would be difficult, but not impossible. If they were to be estimated and included, there would be little public gain from a management program which cost more than it yielded. This type of thinking has been foreign to most federal land managers in the past, but changing national programs and needs may put far more emphasis upon it in the future. It need not be inimical to 'conservation' management; on the contrary, full accounting and balancing might well lead to more intensive and better financed land management than would otherwise be possible."

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From the information made available by the land agencies, it is impossible to determine whether the fees are sufficiently high to cover federal investment costs plus administration costs properly allocable to grazing. Probably fees would have to be raised significantly if all costs were to be covered. On the other hand, long-term investments cannot logically be included with current costs. The question immediately rises: To what extent should ranchers bear the costs of such activities as recreation, hunting, vacationing, camping, and the wide variety of other uses of the public domain which do not contribute to the upkeep of the wildlife and other facilities supplied by the agencies and the ranchers? These factors, which could be classified as collective wants, will probably continue to be supplied free by the government simply because no easy way of charging and collecting is discernible. The critical issue, therefore, from the standpoint of fairness to all concerned, is the extent to which products of the public domain should bear their full costs, whereas the items of collective goods are supplied to the users relatively free of charge.

To the present time there is little information on the complementary and competitive relationships among uses on the public land. No data exist which will indicate at what point multiple uses cease to be complementary and start to become competitive, or at what point the marginal application of one use decreases another use more than its marginal value product would justify.

In the past the agencies did not need this information. As long as they knew they were conveying a privilege of value on the user, they could count on considerable tolerance on his part in the multiple uses because he could not afford to give up his privileges. This situation may change as the government moves to either a proprietorship or a cost of service position. The cost of service and the user cost differential are computed with a given mix of multiple uses occurring on the public

lands. Will the full user cost differential change as these uses change? If so, to what extent will they change?

These questions will have to be answered by the agencies when the full market value of the range is attained. The rancher may insist that any increase in multiple use is adversely affecting his ranching operations and that these multiple uses were not taken into account when the user cost survey was made. As a consequence, the agencies will be compelled either to provide some information on competitive uses or else to set priorities on land uses and be prepared to restrict the competitive uses. An important question is raised at this point. Is multiple use consistent with the full market value of fees charged on public lands?

Rural poverty, rural community welfare, and public land management

Much of the policy of allocation and stability has decided welfare overtones. The family farm, protection against monopoly, commensurability, stability of the rural community, all are concepts which represent the desire to provide for the growth and welfare of the small ranch and of the local community. This procedure was relevant to the welfare situations of the 19th and early 20th centuries. It was through the preservation of the small family farm that the growth and development of the west occurred.

While this policy may have been appropriate in the 19th century, it is questionable that it is appropriate today. Family-sized farms and ranches are still economic units, but a good efficient family-sized ranch or farm is much larger today than a generation ago. Thus attempts to preserve ranches of less than 200 animal units are forcing ranchers into operations too small to make an adequate living for them. The allocative policy in the past has tended to encourage uneconomically small units. Through the transfer policy these units have been fragmented even more. To

prevent the spread of poverty within the range livestock industry, therefore, a policy of encouraging efficient-sized range livestock units should be adopted.

The federal land agencies should cease encouraging the very small unit. Even more important, they should take positive steps to encourage the establishment of larger units. If, at the time of transfer of privileges, the agencies would re-allocate the privileges in such a manner as to develop larger units, a more healthy range livestock economy would develop.

Another procedure would be to encourage the establishment of co-operative livestock associations. These associations could combine a number of smaller units into efficient operations and free the small rancher to devote his time to other farm enterprises or to take employment off the farm.

The problem of poverty among non-white cattle and sheep ranchers is especially acute. This is true particularly of the Indians and the Spanish Americans. At the present time the Indians in New Mexico are given free use of the land in proportion to the number in the families. This function will probably have to continue. But the poverty problem cannot be solved by allocation of grazing privileges alone. Attempts should be made to enlist the services of other welfare agencies to assist in working on the poverty problem of these groups.

It should be pointed out that the free market can assist in bringing about an adjustment in the case of the very small range livestock enterprises. By permitting the free purchase and sale of grazing privileges as in the past, the small rancher could secure a capital value for his base property and for his grazing privileges. This enables him to sell his holdings for a substantial price and to use the proceeds in reestablishing himself in an off ranch business or to assist him to sustain himself in employment in which the wages are very small. In this respect the attempt to secure the full market value of the grazing privileges through an increase in the fees would tend to impede adjustments on the part of the small ranch operator.

Attempts to stabilize the farm community are of even more questionable value as far as federal land policies are concerned. As farms and ranches become larger, the number of farms will decrease. In turn, the small rural communities will tend to become smaller or to disappear completely. At the same time, the functional community will become larger. Many of the farm communities will no longer be large enough to provide the essential community services, such as hospitals and medical care, schools, churches, police protection, and shopping and other service facilities. This will present a difficult problem in the future. As communities become fewer and farther apart, many rural areas will be left without adequate community facilities. The cure, however, will not be found in land policies which will maintain and spread poverty among the ranchers. Instead, solutions will have to be found outside the federal land policies.

Rural poverty has become a critical national issue. It will become an increasing one in years to come. The problems of rural poverty are not within the power of land policies to handle. The federal land agencies can best serve the cause of rural poverty by pursuing policies which will assure a healthy and prosperous livestock industry. Such an industry can thrive only on efficient sized ranch units. The poverty problem both on the ranch and in the rural community will have to be handled by other agencies.

Production management and the public lands

The most critical problem facing agriculture today is that of over-capacity in crop production. The National Advisory Commission on Food and Fiber in its report in July, 1967, stated the problem in the following manner: 466/

> "U. S. farmers have the capacity to produce more than their commercial markets will absorb at prevailing prices. This 'excess capacity' is

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466/ National Advisory Commission on Food and Fiber. 1967. Food and fiber for the future. p. 11.

> primarily the result of technology and capital flowing into agriculture faster than the manpower and land they replace have been flowing out. . . This excess manpower and excess crop acres are the heart of the U. S. agricultural adjustment problem."

The public land agencies have become involved in the problem of surplus lands and hence surplus crops in several respects:

1. They possess land which is still subject to disposal under the various land laws. Much of this land can go directly and indirectly into the production of crops which are in surplus supply.

2. During the depression years, land was withdrawn from crop production through the land adjustment and land utilization purchase program of the Agricultural Adjustment Administration, the Resettlement Administration and the Farm Security Administration. Much of this land is now being administered by the U.S. Forest Service as national grasslands, and by the Bureau of Land Management (see Chapter Section ). These lands, in many cases, are capable of growing crops. They have, in fact, the same capabilities as some of the land now in cultivation. If they were allowed to be put in private ownership again, they would probably be planted to wheat and feed grains which are crops now in excess supply.

3. Land can be withdrawn by the Bureau of Reclamation to be irrigated and later homesteaded and put into crop production.

4. In addition, while this did not directly affect the public lands, some 30 million acres of land were retired under the Conservation Reserve of the Soil Bank in the Agricultural Act of 1956 which may either be retained, added to, or released for agricultural use within the next few years.

Both the National Advisory Commission on Food and Fiber and the President's National Advisory Commission on Rural Poverty took cognizance of this in their policy recommendations. The Food and Fiber Commission stated:[466a/]

> "Reclamation and land development projects paid for by public investment have significantly increased farm production in the past three decades

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466a/ National Advisory Commission on Food and Fiber, 1967. Op. Cit. p. 21.

during which agriculture was plagued with overproduction and surpluses. Clearly, it is unsound policy to invest public funds in new farm capacity at a time when the overriding problem is too much capacity.

The Commission recommends that public lands for agricultural reclamation, irrigation, drainage and development projects should be justified on the basis of whether they represent the cheapest means of getting additional farm production--if needed."

This Commission made further recommendations relating to land retirement for the purpose of production control. It pointed out that land now in crops is low yielding and subject to wind and water erosion. Whole farms and, in some cases, whole areas should be taken from crops and put into grass or forests. The Commission recommended: 467/

"To provide the incentive for land use shifts and to indemnify the affected persons, communities, and regions for their losses, the Commission recommends a program patterned after the present Great Plains Conservation Program and the Cropland Adjustment Program. The program should be expanded over all marginal cropland of the country."

In a similar manner, the President's National Advisory Commission on Rural Poverty pointed out that reclamation and soil developing programs have been competitive with the crops produced by low income rural families. 468/

"Federal reclamation projects in the western states, up to about 1955, have been responsible for displacing 5 percent of the farm workers in the southeast, the area with the largest concentration of rural poverty. Cotton and vegetables produced on newly developed lands in the west compete directly with production of these crops in the southeast."

The Rural Poverty Commission recommended: 469/

"That land developing programs of the Bureau of Reclamation, the Soil Conservation Service, and other Federal Agencies be discontinued and that no more public money be invested in developing privately owned farmland until the nation needs more land for producing the desired

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467/ National Advisory Commission on Food and Fiber, 1967. Op. Cit. p. 28.

468/ The President's National Advisory Commission on Rural Poverty. 1967. The people left behind. p.

469/ Ibid. p. 137-138.

output of food and fiber products. Exceptions should be made where the development offers the only feasible escape from poverty for Indians and other specific groups of rural poor people."

The Farm Bureau Federation has recommended land retirement as a means of production control. This organization has recently reiterated its position, and it is advocating a program similar to that proposed by the Food and Fiber Commission. The Farm Bureau suggests that the government phase out the cotton, wheat, and feed grain programs over a period of five years. A gradual decrease in crop payments over a period of years would be accompanied by a Cropland Adjustment Program. At least 10 million acres per year would be retired between 1971 and 1975. This program would be operated on a bid basis and an emphasis would be placed on the retirement of whole farms.

Along with the land retirement program,the Farm Bureau proposes a special aid program to low income farmers. Those farmers with less than $5,000 in annual gross sales and with off farm incomes of less than $2,000 would be eligible to receive retraining grants for a period of two years in addition to the land retirement payments under the Cropland Adjustment Program. They would also be eligible for other payments under the agricultural programs. 470/

With the growing emphasis upon land retirement and upon the curtailment of land development programs it would be logical that public land policy reflect these trends. Should a land retirement program materialize, the present public land agencies would probably be expected to administer these lands just as they are now administering the land utilization project areas. In a similar manner, it will probably be the policy of the land agencies not to permit withdrawal from the public domain of lands which would be expected to be used as cropland and would add directly

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470/ Doan's agricultural report. April 2, 1969.

or indirectly to agricultural surpluses or contribute further to rural poverty.

As it has been pointed out previously, the demand for beef, veal, and lamb is expected to expand significantly over the next generation. It would be to the best public interest to retain the present lands in forage and to add whatever land retirement acreages that may accrue to the grazing land and forests of the public domain, not, of course, to what would be required for recreation and other non-surplus producing purposes. In this manner, the public land programs will be coordinated with the national programs designed to prevent the accumulation of agricultural surpluses.

Economic efficiency and the public land policies with respect to forage

There is no evidence that in the past economic efficiency has been a principal criterion in public forage land managment. As a consequence, the use of the efficiency criterion as a measurement of the success or failure of the public land agencies is inappropriate. Evaluations cannot be made in a vacuum, however. There must be some standard of comparison. It is meaningless to state that one policy is superior to another policy unless there is some standard of measurement. A policy must be poorer or better than something specific. To provide such a standard, economists have developed the competitive model, which later was expanded into the efficiency model when applied to public programs and policies. This model was used in several sections of this analysis for evaluation purposes.

The efficiency model has its limitations, especially in the evaluation of non-market, non-price phenomena, but in the absence of other better measurements, it is the best model available. Even with this limitation in mind, it should be recognized, as Kenneth Boulding has pointed out, that the efficiency model can be expanded to include moral as well as exchange phenomena. We may ask ourselves how much scenic

beauty we wish to preserve unmarred at the expense of roads, camps, and motels which would make that scenic beauty available to thousands of persons. 471/

Regardless of our evaluation of the efficiency model as a criterion for public policy, its use in government is spreading rapidly. The development of the cost benefit analysis for water resources development has been broadened into the Program Planning and Budgeting System for defense program analysis, for space exploration evaluation, and it is now being used to analyze programs of the Department of Agriculture, the U. S. Forest Service, and even state governments and state universities. There is a high probability, therefore, that in the future it will be necessary to consider public land policies more and more in regard to costs and benefits. The recent move to charge permittees the full market value of the privilege of grazing livestock on the public domain is another manifestation of the significance of this emerging policy issue. As a final summary of the evaluation of forage policies and practices, therefore, they will be cast in the framework of their contribution to or detraction from efficient resource use.

Efficiency and maintenance and development of public lands

In Section of this analysis, the efficiency model was used to derive a theoretical basis for evaluation of the maintenance and development practices of the public land agencies with respect to forage land. The general conclusion derived from an analysis of rangeland policies and from statistics gathered from the public land agencies was that most of the management efforts until recently were concentrated on prevention of deterioration and/or maintenance of the rangeland. In This respect there is no evidence that the agencies have not done about as effective work as could be expected. They have developed management practices which have

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471/ Boulding, Kenneth E. 1969. Economics as a moral science. American Economic Review LIX(1):1-12.

prevented further deterioration of the rangeland. They have used their power to control grazing to restrict use on critical areas, such as watersheds and overgrazed areas. Probably many of their policies relating to allocation were worked out to make their efforts in rangeland maintenance easier to enforce. By allocating the land resources to individuals who were most likely to be stable and permanent users of the range, they selected by this choice those who has the greatest interest in the maintenance of the rangelands. By recognizing the stability of the local community as having a stake in rangeland maintenance they could count on support from the local communities in their endeavors to concern themselves with the maintenance of range quality.

It is in the area of range development that questions arise as to the efficiency of the forage policies. In this area conflicts of policies and guidelines are least perceptible. If the government assumes a proprietorship role, its course would be to expand investments to the point where the marginal efficiency of capital equals the marginal costs. Although government investments in range improvements have increased during the past ten years, they have not been made with a full recognition of this principle.

Even if efficient investment were to become a principal criterion of range maintenance and development, there are several constraints under which the land agencies operate. First, the level of investment depends upon the amount of appropriations for that purpose by the Congress. It is doubtful that the Congress is guided by such economic principles in its appropriations. Second, research into the economics of rangeland improvements has not been carried to the point for a considerable portion of the land where the marginal efficiency of investments is known. Finally, a proprietorship position would require considerably more management of the rangelands than the agencies are now prepared to provide.

The alternative approach used by the agencies has been to seek user co-operation in range improvement investments. This approach has also run into difficulties in attaining the investment optimum of the lands. (1) When the users invest their own funds they expect to remain on the land until they have reaped the full benefits of their investments. Although the agencies have the power to compensate users for investments if their privileges are withdrawn, they can do this only if they have the necessary funds. Consequently, the policy to encourage the users to make permanent improvements conflicts with the flexibility criterion in allocation and use of rangelands. (2) If improvements result in considerably increased carrying capacity of the rangelands, the user will expect to be able to increase his units of grazing. This principle runs counter to the criteria of allocative justice used by the agencies. Consequently, the agencies have wanted to pay for the development investments themselves. For this reason, rapid expansion of development investments by users has been discouraged. (3) The criterion of multiple use has discouraged private investments in range improvements because the permittees usually do not wish to invest a large portion of their own funds and labor in improvements which will benefit users other than domestic livestock ranchers.

The current move towards charging the full market value for grazing privileges will discourage the users from investing their own funds in range improvements, because they will receive no benefit which will encourage such an investment. They will have less funds to invest, and will consider such investments the full responsibility of the government. The charge of the full user cost differential may even encourage the mining of the resources. The development of the Allotment Management Plan and variations on it does seem to be moving in the direction of encouraging user investment in public lands.

## Efficient allocation of resources and the allocative policies of the federal land agencies

From the standpoint of efficient resource allocation the allocative procedures of the federal land agencies in selecting the initial permittees has led to a misallocation of the range resources. The initial permittees were not necessarily the most efficient ranchers and their ranches were not of the most efficient size. However, as it was shown in a previous section (Section ) efficient resource allocation was not the objective of the land agencies.

Once the original allocation was made, however, the policies of the agencies to provide continuous tenure and to permit the transfer of the privileges to individuals designated by the permittees have led to a market allocation of the range resources. Permits are now purchased at a market price and the economics of pricing will tend to place them in the hands of the most efficient users and of the ones having the most efficient size of operation. There are, however, certain procedures still remaining which tend to prevent the market price from effectively performing its function of efficient resource allocation. The continuation of commensurability requirements and the limitation on permit size by the U.S. Forest Service tend to prevent efficient allocation.

The matter of the allocation of income between the users and the government is a question of allocative justice but not one of efficient resource allocation. This issue does not concern us at this point.

The new method of assessing fees which is being put into effect since January, 1969, will probably have little influence upon the allocation of the range resources. Should the government continue to permit the present users to designate the recipients of the privileges after they relinquish them, the value of permits will be reduced by the capitalized value of the additional fees charged. There will continue to be

a capital value, however, because of the differential values of permits resulting from economies of scale, from different expectations of future values of rangeland, from different values placed upon ranching as a way of life, and from differences in short-term expectations in price changes for beef, veal, and lamb. The fee charges, however, will not influence any of these factors. The difference in the capitalized value arising from the fee will be borne by the private users. The government will secure a larger income from the users, and the public generally will be relieved of a portion of the burden of rangeland administration and management. Greater flexibility in use of rangelands by the public may result because a smaller capitalized value is paid for the purchase of privileges, and also because there will be little reason for users to believe that they have attained rights in the ownership of the public land.

Efficiency and the stability of the livestock industry and the basic community

The concern of the public land agencies with stability is centered around the stability of the range livestock industry and that of the local community. It is usually assumed that economic efficiency and stability of an industry are complementary objectives. A firm or an industry that is efficient must also be stable, in the sense that it can withstand minor fluctuations in the industry and that bankruptcies and forced liquidations will not occur. An efficient firm will not over extend either its operations or its credit.

In previous sections it was pointed out that the livestock industry has become less subject to the beef cycles and to large scale liquidations of herds when the price cycle moved adversely to it. It would be rash to attribute much of this stability to the policies of the public land agencies, since the public lands contribute only about 12 percent of the forage requirements of the cattle and sheep in the western states. For this reason, those practices designed to foster stability,

such as commensurability, family-sized units, and dependency, are probably no longer of significant importance. At the same time they may operate to impede efficient resource allocation in other respects.

Stability of the local community cannot be considered an efficiency criterion. Non-farm communities are founded and grow and mature for the purpose of servicing the resource industries located in their vicinity. In the past, agriculture was instrumental in establishing and nurturing local communities. The small family farm tended to induce such growth more than did the large plantations and ranches. It is doubtful that agriculture today can perform such functions. As farms and ranches become more efficient their number will decrease and the farm population will continue to decline. The need for the service of the very small local community will therefore decrease also. The functional local community is also changing. Whereas in the past a functional community could be of the size of 2 thousand to 4 thousand persons, today communities of 100 thousand or more inhabitants are required to provide the complex and expensive services needed by present day society. Such concentrations of population are beyond the power of agriculture and ranching alone to provide. The problem of functional local communities is critical. Its solution will probably require economic complexes comprised of more than one basic resource.

The new fee structure will not assist in providing greater stability to the ranch firm. The small ranch operations are already earning less than adequate returns. An additional fee will add to their economic difficulties. If the fee is graduated in such a manner as to place the burden on the larger operations, this will impede the process of adjustment of ranch sizes to the more efficient levels because the larger firms will be comparatively poorer off.

In one respect the process of adjustment may be speeded up through a changing fee structure. By making the small ranchers poorer off, they may be either forced

or induced to leave the ranch business, thus encouraging more efficient resource allocation. The effectiveness of this procedure must be balanced against the fact that the assets of the small rancher in the form of capital value will be reduced. As a consequence, his ability to adjust to non-ranching activities may likewise be diminished.

Finally, it may be pointed out that small ranch enterprises may be much more stable through a policy of encouraging co-operative grazing associations, either of the type already established on some of the rangeland, or through the Farmers' Home Administration type of organization. Such organizations, while they can be helpful, have, nevertheless, experienced a large number of failures. Their success will depend upon the economic efficiency with which they are established.

Economic efficiency and its impact upon multiple uses and conflicts among uses

Multiple use is complementary to efficiency to a certain point, but the two principles may become highly competitive. The complementary aspects of multiple use involve the uses of forage lands in which the varying uses are not competitive in the main and all the uses can be expanded to a point where the total value of the resource reaches a maximum. At the point where multiple uses become competitive, however, policy decisions must be made as to the extent to which one use can be further expanded at the expense of other uses.

It was pointed out previously that not all uses have a market value or a price, and consequently that their marginal value products cannot be objectively determined. In the case of the forage rangelands, however, we do not have even the physical data upon which costs can be determined. We do not know, for example, how much one hundred man days of recreation will decrease grazing in terms of animal unit months, or how an additional one hundred AUM's of wildlife grazing will restrict the number

of AUM's of domestic livestock grazing. It cannot be expected that such calculations can be made to the fineness assumed by economic theory, but analysis can be made within broad margins of error.

Once such calculations are made further studies can be conducted to determine how much of one multiple use can or should be expanded at the expense of other uses. Some form of cost benefit analysis can and should be made in which values can be placed upon the non-market values to be obtained from the range resource. It has been suggested by some authorities that a concept of social marginal product be developed in which non-market values and welfare considerations may be included along with market values and price in deciding on alternative uses. 472/ Marglin has suggested that welfare and non-market benefits be given weights such that the optimization of total benefits can be treated as though they all have a market value. 473/ An approach similar to this has also been suggested by Kenneth E. Boulding in his Presidential address before the American Economic Association in December, 1968. 474/

Until the management agencies secure some tools for the measurement of the various multiple uses, decisions relating to competitive uses will be based upon subjective valuations and upon the relative strength of the various pressure groups. Such a situation makes for inefficiency in administration and waste in natural resource allocation and use.

Economic efficiency and other land use policies and issues

Flexibility in the sense of mobility of resources between uses and users is an essential element in economic efficiency. Optimum allocation of resources cannot

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472/ Kahn, A. E. 1951. Investment criteria in development programs. Quarterly Journal of Economics. pp. 38-61; Chenery, H.B. 1953. The application of investment criteria. Quarterly Journal of Economics. pp. 76-96.

473/ Marglin, 19 . Quarlerly Journal of Economics

474/ Boulding, 1969. Op. Cit. p. 9.

be secured unless production factors can be moved from one use to another. On the other hand, complete flexibility will create uncertainty and insecurity in tenure of the public lands. Uncertainty usually encourages inefficiency in operations. The central issue between efficiency and flexibility, therefore, is one of securing the best compromise between security and stability of tenure and mobility of resources to meet the demands of the future for changing uses of the rangelands.

Production control generally is in conflict with efficient resource use. Since the decision to institute production control was decided by political and welfare considerations rather than by purely economic ones, greater efficiency of land use will be attained if all branches of the government cooperate in the attainment of the same goals.

Rural poverty and its alleviation is not an economic efficiency issue. Neither can it become an issue of the public land agencies alone. Any program aimed at the elimination of rural poverty will involve activities by the public land agencies, but it must be a coordinated program involving many activities and many agencies. The land agencies cannot be expected to solve these problems alone.

The problems of economic efficiency as they relate to the public land policies and issues are many and are interrelated. One of the greatest obstacles to the attainment of a high degree of economic efficiency is the lack of basic data on which to base analyses. In general agriculture, much basic information was secured through experimentation and research which could be used to contrast meaningful production functions. Such information is lacking in rangeland uses and benefits. The information that exists is of a physical character. By expanding our knowledge of the relationship between physical inputs and outputs we have taken the first step towards a meaningful economic analysis of rangeland uses. This is only the first step. It is also necessary to relate the physical capabilities of the resources

to the demand for them. An inventory of the best uses to which the public forage lands can be applied involves both an analysis of the physical capabilities of these lands and the uses to which the capabilities can be employed. It also requires a knowledge of what quantities of land of these capabilities are needed or demanded by the economy.