

RANGELAND RESOURCES OF IDAHO

A Basis for Development and Improvement

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Idaho Rangeland Committee
Miscellaneous Publication No. 6
September 1978

College of Forestry, Wildlife
and Range Sciences



University of Idaho
Moscow, Idaho 83843

JOHN V. EVANS
GOVERNOR



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Dear Friends of Idaho's Range Resources:

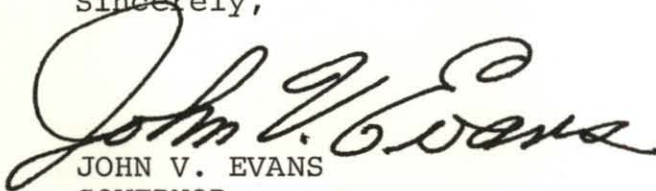
I take pleasure in presenting for your information and use the publication Rangeland Resources of Idaho. This document represents the most comprehensive description of range resources ever made in the State of Idaho. It is the culmination of two years work by the Idaho Rangeland Committee.

Resources for the project were provided through a grant from the Pacific Northwest Regional Commission. The Commission is composed of the Governors of Idaho, Washington and Oregon under the provisions of Title V of the Public Works and Economic Development Act of 1965 as Amended. The Commission, under the direction of the Governors, fosters projects which will aid the economic development of the three member states.

Special thanks are due Mr. L.N. (Bud) Purdy, Chairman of the Idaho Rangeland Committee and Dr. Lee Sharp and Dr. Kenneth Sanders of the Range Resource Department of the College of Forestry, Wildlife and Range Science at the University of Idaho for their many hours of dedicated work.

It is my firm belief that the way of life we cherish so much in Idaho is intrinsically related to the land. How we use that land as a resource is indeed the key to our future and that of our children. This study presents a valuable first step towards the maintenance of our land and the future of Idaho.

Sincerely,


JOHN V. EVANS
GOVERNOR



RANGELAND RESOURCES OF IDAHO

A Basis for Development and Improvement

by

LEE A. SHARP, Project Director

and

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THE IDAHO RANGELAND COMMITTEE

AND

COLLEGE OF FORESTRY, WILDLIFE AND RANGE SCIENCES
UNIVERSITY OF IDAHO

Research and Compilation Supported by the
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PREFACE

The Idaho Rangeland Committee and the University of Idaho through contracts with the Pacific Northwest Regional Commission have undertaken a program of rangeland development, management and research for Idaho. Contract number 645 contributed to the gathering and assembling of information about the physical and biological features of the state, land ownership and use, and identification of major problems of range use and management in Idaho. Contract 751 provided the means to make the information available through this publication.

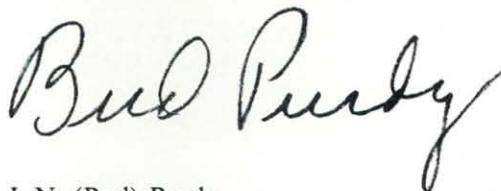
It is anticipated that the information contained in this report will be of assistance to all those involved in natural resource planning and decision making.

Special thanks are due Governor John V. Evans for his enthusiastic support of the Idaho Rangeland Committee's activities and the effort required to compile the information contained in this publication. Without the assistance of Patricia Hawley, administrative assistant, and Frank Lundburg, legislative assistant to Governor Evans and member of the Idaho Rangeland Committee, this publication could not have been completed. The Idaho Rangeland Committee is especially grateful to the efforts of these individuals.

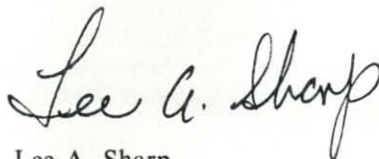
Individual members of the Idaho Rangeland Committee have contributed in many and various ways to this report. Information has been readily supplied when requested. Discussions and comments on rangeland problems and issues in meetings of the full committee, meetings of various subcommittees and with individuals have provided a broader perspective than would otherwise be possible.

The U.S. Forest Service, the Bureau of Land Management, the Idaho Department of Lands, the Idaho Fish and Game Department and the Idaho Division of Budget, Policy Planning and Coordination made information available and were cooperative and helpful in verifying and checking statistical tabulations.

Thanks are due Dr. Alan A. Delucia and Mr. Gibb Johnson of the University of Idaho cartographic laboratory for permission to use the relief map showing the physiography and physiographic provinces of Idaho. Appreciation is also expressed to Mrs. Trudi Peek for assistance and preparation of other graphical material.



L.N. (Bud) Purdy
Chairman, Idaho Rangeland Committee



Lee A. Sharp
Executive Secretary and Project Director

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INTRODUCTION

Largely neglected and underrated in importance, the rangelands of the world occupy about 47 percent of the 34 billion acres of global land area (Lewis 1969). Within the conterminous 48 United States, approximately the same percent of the total land area (46.5 percent) falls under the category of range and pasture land. About 67 percent of the 17-western states and 70 percent of the 11-western states is so designated.

These rangelands provide habitat for countless wild species of plants and animals; minerals for a variety of uses necessary to maintain and enhance the nation's productive capacity and quality of life; forage for domestic livestock and wild game species; and open space for a wide range of outdoor recreational activities.

The variety of wild species of plants and animals that remain in the United States is due, in part, to the expansive area unsuited for cropland agriculture that classifies as range and forest land. In part, it is also due to the ability of the American farmer to provide food in ample amounts from the area suited for intensive agriculture.

Water is perhaps the most important product derived from the forest and rangelands of the state. Precipitation falling on the mountainous areas provides water for irrigation, culinary and recreational uses. The Idaho Water Resources Board (1972) reports over 16,000 miles of streams and more than 2,000 natural lakes in Idaho.

Gold, silver, copper, phosphate, coal, oil, and numerous other non-renewable resources are derived from the rangelands of this country. Energy, an increasingly critical factor in determining the nature and extent of activities possible in our society, relates strongly to the rangeland resources. Large amounts of fossil fuel energy in the form of coal, oil, and natural gas exist below the surface of rangeland areas.

Rangelands offer great opportunities to increase food production with a minimum use of fossil fuel energy compared to other forms of food production. In a theoretical discussion of the importance of public

rangelands in the western states, Cook (1971) indicates that the solar energy captured by forage plants on public lands has the potential to produce 55 percent of the beef that is presently produced in the United States.

The western range and pasture lands in the continental United States account for more than half of the national production of livestock (Love 1970). This is estimated to total \$4 to \$10 billion a year compared with \$14 billion for all other crops including forest products. Between World War II and the present time, food grains (in surplus until recently) added substantially to red meat production. Production of red meat through the feeding of cereal grains that can be used in human consumption will decline as populations grow. The ruminant animal has great utility in converting material not suitable for human consumption to human food. Full exploitation of this characteristic will be required as attempts are made to meet the food and fiber requirements of an increasing number of people.

The desire for those values that contribute to life quality; i.e., open space, outdoor recreation, wilderness, parks, hunting and fishing; add greatly to the importance of the rangeland resources. In 1860 the population of the 11 contiguous western states, at less than one million people, accorded an average of 1,218 acres per person (Stoddart 1965). A little more than a century later (1975) the average area per person in the 11 western states was 20.5 acres for a population of 36.7 million (U.S. Dept. of Commerce, Bureau of Census 1977 and U.S. Dept. of Interior, Bureau of Land Management 1977). People of Idaho attach significant importance to low population density, outdoor recreation, environmental quality and scenery as advantages to living and working in the state (Knight and Hornocker 1970).

In a report to Governor Evans, the Idaho Rangeland Committee recommended that a healthy economy and a quality environment should be the goal of rangeland use and management. It is hoped that the information contained herein will be useful in achieving this goal.



Figure 1. A variety of products and values are derived from Idaho rangelands including (clockwise from upper left) lamb, wool, water, minerals, hunting and fishing, timber and camping, scenic beauty, and beef.



Figure 2. Abundant wildlife enhances the quality of life experienced by Idaho residents. A few of the many species found on rangelands are (clockwise from upper left) bighorn sheep, antelope, horned toads, butterflies, badgers, and sage grouse.

PHYSICAL AND VEGETATION FEATURES OF IDAHO

Physical characteristics marked by variable climates and extremes in topographic features produce many kinds of environments for plants, animals and human habitation in Idaho. These features have a profound influence on the environmental quality and economic status of the state's citizens.

PHYSICAL FEATURES

The area encompassed by the state of Idaho includes portions of four physiographic provinces (Figure 3). These are: (1) the Northern Rocky Mountain province; (2) the Middle Rocky Mountain province; (3) the Basin and Range province; and (4) the Columbia Intermontane or the Columbia Plateau province (Ross and Savage 1967).

Northern Rocky Mountain Province

The central and northern mountainous areas that extend over a major part of northern and central Idaho belong to the Northern Rocky Mountain province. High massive mountains and deep intermontane valleys characterize this province. Elevations of the mountain peaks range from 7,000 to over 12,000 feet.

The central Idaho mountain country, known as the Idaho Batholith, is the largest granitic intrusion in the United States. It underlies an area of about 16,000 square miles (approximately 1/3 of Idaho). The massive Salmon River Mountains and the well known spectacular Sawtooth Mountains, found in this portion of the province, are known for their scenic attractiveness.

The Northern Rocky Mountain province receives more precipitation than any of the other parts of Idaho. Precipitation averages 40 to 50 inches annually in parts of the province (Idaho Water Resources Board 1976). The climate, however, is less extreme than would be expected at the latitudes where the province occurs. Lying west of the continental divide the area is protected from the severe cold spells of the plains region. Pacific winds reach the interior and temper the cold of winter and heat of summer. This area stores much of the snowpack on which Idaho's water resources depend. Numerous lakes occur throughout the area.

The major forested area of the state is found in the Northern Rocky Mountain province. Major mineral deposits of the state occur in these mountains. Herds of deer, elk and a variety of upland game birds are important natural resources. Some cropland agriculture is carried on in the lower valleys. Summer grazing of sheep and cattle is of importance, particularly in the central portion.

Middle Rocky Mountain Province

The Middle Rocky Mountain province occurs in the southeastern corner of the state and consists of the Yellowstone Plateau of volcanic origin and folded and

faulted ranges of sedimentary rocks. Peaks of the mountains vary in elevation from 7,000 to 9,000 feet and most of the valleys have elevations in excess of 5,000 feet (Ross and Savage 1967). This province includes the Snake River Mountains, and the Caribou, Aspen and Bear River Ranges. Unlike the northern Rocky Mountains these ranges are separate, distinct and tend to have parallel orientation. Sedimentary rocks predominate in the mountain material. The valleys are relatively broad, open and easily accessible. Glaciation has played an important role in shaping the uplands.

About two-thirds of the precipitation occurring in this province falls as snow. Annual precipitation varies from 14 to 50 inches and is strongly related to elevation.

Forests occur on the higher plateau and mountain ranges. Various woody-herbaceous communities dominate at lower elevations. Both dryland and irrigated cropland enterprises are important agricultural pursuits. Large phosphate deposits occur in portions of the area, particularly in the vicinity of Soda Springs.

Livestock grazing is an important use of the natural resources. Wildlife species include deer, elk, bear and several kinds of birds. Important nesting and rearing grounds for the sandhill crane occur through parts of the province.

Basin and Range Province

South of the Snake River and extending east from Goose Creek to the western border of the Middle Rocky Mountain province is a kind of landscape known as the Great Basin section of the Basin and Range province (Figure 3). Most of Nevada and the western part of Utah have similar kinds of topography.

The Cottrell Range in the west, the Deep Creek Mountains and the Sublett Range in the central portion, and the Bannock, Portneuf and Wasatch Ranges on the eastern side are included in this province. Sub-parallel, block-faulted mountains 50 to 70 miles long are separated by valleys 20 to 30 miles wide (Ross and Savage 1967).

The mountain ranges are composed of predominately sedimentary rocks and the basins are filled with alluvial material eroded from the bordering ranges. Alluvial fans with graded alluvial material are common features at the intersection of valley edge and mountain base. Individual mountain peaks, which may exceed 9,000 feet, rise above the valley floors with an elevation of approximately 4,500 feet.

Internal drainage is a common characteristic of the basins in the Great Basin section occurring in Nevada and Utah. Most of the basins of this province in Idaho, however, drain northward to the Snake River and its tributaries.

Precipitation varies from 9 to 15 inches in the valleys to approximately 30 inches on the higher mountain areas. The distribution of precipitation is such that

Physiography and Physiographic Provinces of Idaho

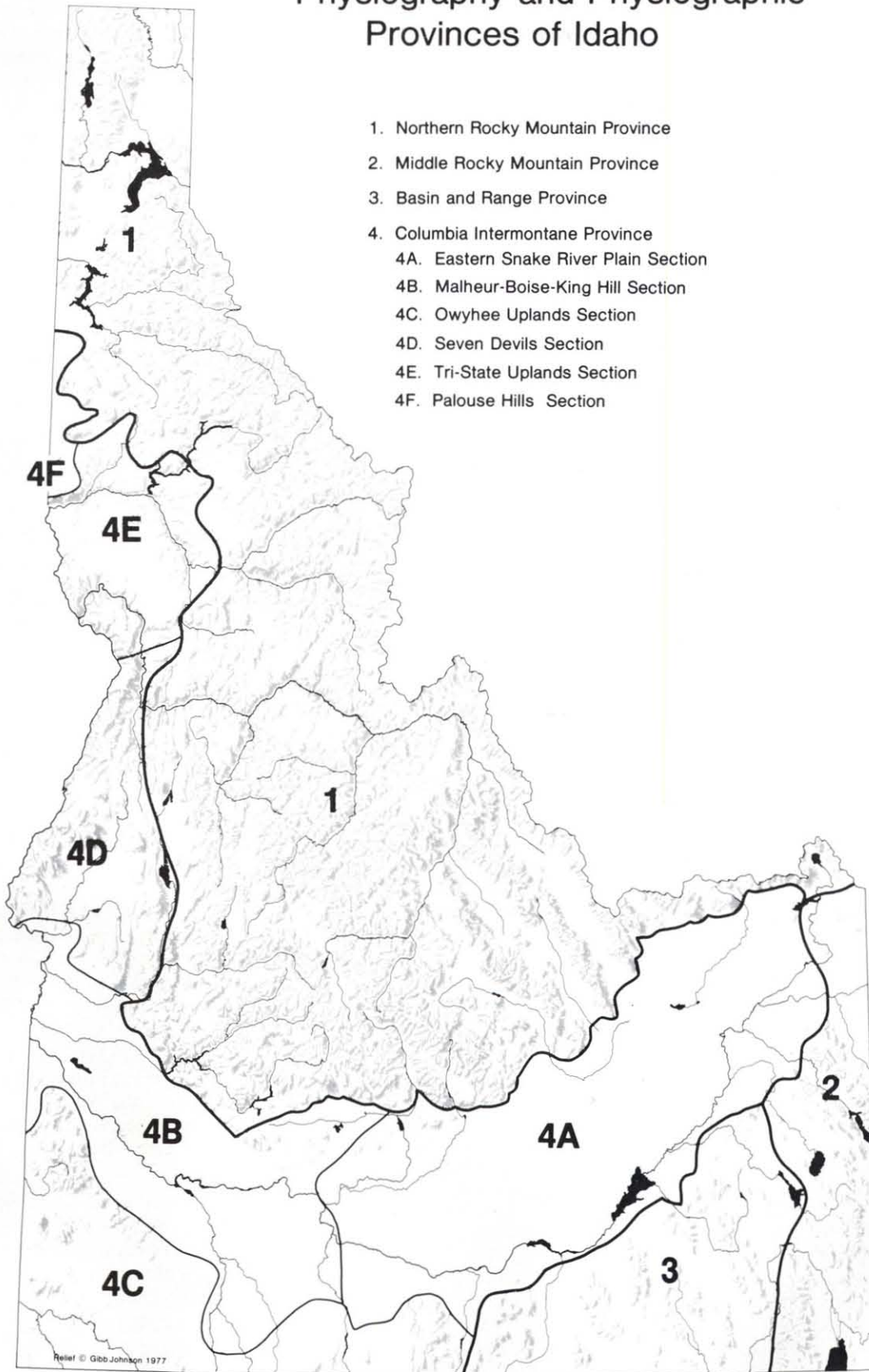


Figure 3. Physiography and physiographic provinces of Idaho. From Ross and Savage (1967).

about 30 to 40 percent falls during April, May and June when plant growth is most active.

Irrigated agriculture is common in the valley bottoms and some of the more level bench areas of the mountain slopes. Winter, spring and fall grazing for livestock enterprises is extensive on rangeland and crop aftermath in the valleys. The mountain areas provide the summer grazing to complete the year-long operations of the livestock industry important in this province.

Columbia Plateau Province

In Idaho, the Columbia Intermontane (Ross and Savage 1967) or the Columbia Plateau (Fenneman 1931) province borders and follows the Snake River along its course across southern and west central Idaho. Portions, however, extend north to about the vicinity of Coeur d'Alene (Figure 3).

Nearly horizontal sheets of basalt built up by a series of lava flows, occurring from late Oligocene or mid-Miocene through Pliocene to Recent geologic time, characterize most of this province in Idaho. Complex structured and block-faulted mountains are included in the province (Ross and Savage 1967). Often interbedded with the basalts are lake and stream sediments that include volcanic ash, silts, sands and gravel.

Modification of the landscape created by the lava flows has been through the process of stream erosion, wind deposition and volcanism. Faulting, warping and dissection of river canyons in recent times have caused great variability in the landscape features observed. Because of this, Ross and Savage (1967) divide the province into six sections that lie partially or wholly within Idaho.

EASTERN SNAKE RIVER PLAIN SECTION. Between the Snake River and the Northern Rocky Mountain province and extending east and northeast from Bliss is the Eastern Snake River Plain section, a youthful lava plateau with essentially a flat surface. Elevations vary from about 3,000 feet in the west to 6,000 in the east. Recent volcanic features are exhibited in the Craters of the Moon National Monument which falls within the section.

Much of the 8 to 9 million acres of this section receives less than 10 inches of precipitation annually. Irrigated agriculture occurs where soils, terrain and available water permit. Potatoes, wheat, sugar beets and alfalfa are the principal crops. Abundant and diverse wildlife populations are found throughout the section. The area is used extensively for grazing of domestic livestock.

MALHEUR-BOISE-KING HILL SECTION. Lowlands on both sides of the Snake River extending westward from Bliss to about Weiser fall within the Malheur-Boise-King Hill section of the province. Elevations drop from 3,500 feet on the eastern edge of the section to 2,500 feet near the Idaho-Oregon border. Thick lacustrine and fluvial sediments are extensively interbedded with the basalt flows. The lower portions of the Boise and Payette River basins along with much of the Bruneau River basin fall within this section.

Annual precipitation over much of the area is less than 12 inches. However, the more level portions of the section have been placed under irrigation. The most intensively developed agricultural lands, many of the industrial operations and the largest concentration of population in Idaho occur in this section.

OWYHEE UPLANDS SECTION. The high plateau south of the Malheur-Boise-King Hill section in Owyhee county is designated as the Owyhee Uplands. Surface levels of 4,000 to 5,000 feet rise to 8,000 feet or more at the tops of the mountain masses.

The lavas of this section are older than those previously described. Granite rocks form the core of the Owyhee mountains and the section is essentially an uplifted area.

Lower elevations of the uplands receive less than 12 inches while the mountainous areas receive 24 to 30 inches of precipitation in an average year.

The area is sparsely populated because of inaccessibility and limited water for irrigation. Sage grouse, deer and antelope are common wildlife species. The extraction of minerals was of importance in the past. Most of the present economic activity is related to range livestock production.

WALLOWA-SEVEN DEVILS SECTION. An elevated mountain mass with deep canyons cut by the Snake and Salmon Rivers provides steep, rugged topography that portrays the character of the Wallowa-Seven Devils section. The topography of this section, between the Blue Mountains of Oregon and the Northern Rocky Mountain province in Idaho, reflects block-faulting and glacial erosion processes. The northern portion is more deeply dissected than the younger mountains in the southern portion.

Precipitation varies from about 12 inches at lower elevations to 40 or 50 inches on the higher mountains. Intensive cropland agriculture is limited because of the steep terrain. Timber production and livestock grazing are the principal economic activities in the area. Because of the scenic attractiveness, recreation is a growing activity. Numerous wildlife species occur because of the variety of habitats available and the sparse human population of the area.

TRI-STATE UPLANDS SECTION. A gently undulating plateau with elevations ranging from 3,000 to 5,000 feet extends north from the Wallowa-Seven Devils section to the Clearwater River. Isolated hills, such as Cottonwood Butte and Mason Butte near Winchester, project through the lava surface.

Precipitation varies from 12 to 24 inches annually over most of the section. Some of the higher hills and border areas receive more precipitation because of their elevation. Dryland grains along with cattle are the most important products of the area.

PALOUSE HILLS SECTION. The term Palouse is believed to have been derived from the French *pelouse*, meaning lawn or greensward (Daubenmire 1942). The section extends north from Lewiston to Coeur d'Alene at widths ranging from one to 20 miles.

The topography is one of rolling asymmetrical hills that rise 20 to 80 feet above the surrounding surface. These hills are dunes of loess (wind blown material) that have been shaped by wind, snow and mass wasting, and then dissected by runoff.

Precipitation varies from 14 to 30 inches. Because of the favorable climatic and soil conditions, the area is used extensively for dryland agriculture. Wheat, peas, barley and lentils are important agricultural crops.

Range livestock grazing is not an important activity within the section. Some farmers raise cattle as a sideline to their dryland crop operations. Upland game birds and white tail deer are the principal forms of wildlife harvested by hunters.

VEGETATION

The wide range of physical features described briefly in the foregoing section create a variety of habitats for different kinds of plant and animal communities. Diversity in the expression of these communities results not only from the physical factors presented but also from the activities of man since settlement of the state.

In spite of all the work of the state and federal agencies, university researchers and others in studying and classifying vegetation of the state, no highly detailed vegetational map has been developed. This results in part from a lack of a unified concensus for the classification categories or units to be used, the different purposes for which vegetational data were obtained and the state of knowledge about kinds of plant communities that occur or may occur.

The U.S. Forest Service began mapping range types soon after 1911 as procedures were developed for inventorying the range resources. During this early period, ten different types were recognized and placed on maps for reference (Jardine and Anderson 1919). The types designated were: (1) grassland other than meadow, (2) meadow, (3) weed range, (4) sagebrush, (5) browse, (6) conifer, (7) waste, (8) barren, rock slides, cliffs and denuded areas, (9) woodland, pinyon and juniper and (10) aspen. Subsequently, meadows were classified as wet or dry.

In 1924, a map showing the natural vegetation of the United States was published in the Atlas of American Agriculture (Shantz and Zon 1924). The groupings were broad but the map was useful in relating general climate, topography and soils to vegetation. Vegetation units mapped for Idaho included sagebrush, bunchgrass, spruce-fir, cedar-hemlock, lodgepole pine, yellow pine-Douglas fir, and pinyon juniper.

As the unreserved and unappropriated public domain came under administration following passage of the Taylor Grazing Act in 1934, substantial effort was expended to inventory the forage resources so that carrying capacities could be determined. Other agencies such as the Bureau of Indian Affairs, Soil Conservation Service and the Resettlement Administration were actively inventorying and mapping their lands. These agencies along with the U.S. Forest Service and the Grazing Service met in the late 1930's to standardize the

inventory (survey) procedures and mapping units. As a consequence, 18 forage types were designated to cover the western range region (Interagency Range Survey Committee 1937). The types designated were: (1) short grass or tall grass, (2) meadows separated as wet or dry, (3) perennial forbs or weeds, (4) sagebrush, (5) browse-shrub, (6) conifer, (7) waste, (8) barren, (9) pinyon-juniper, (10) broad leaf trees, (11) creosote bush, (12) mesquite, (13) saltbush, (14) greasewood, (15) winterfat, (16) desert shrub, (17) half shrub and (18) annuals.

In 1937-39 an interagency group from Idaho, Oregon and Washington compiled a vegetation map of the three states using basically the type designations mentioned above.

The types so designated are a hodge-podge of classification units. For example salt-desert and arid southern desert shrub vegetation are partially divided into smaller units such as greasewood, winterfat, mesquite, etc. Sagebrush and coniferous forests are not divided whatsoever. There is no consistent basis, ecologically or otherwise, for the types designated.

Over the years since settlement of Idaho various individuals and groups have studied the vegetation of particular locations for one reason or another. In some cases rather detailed information about the vegetation exists for specific locations. Only a limited attempt has been made to develop a detailed state-wide vegetation map, although such an effort would be of extreme value for planning the use of the natural resources.

Recently Kuchler (1964) compiled a map showing the potential natural vegetation of the conterminous (48-states) United States. The map was developed through intensive consultation with personnel well acquainted with particular units of vegetation at universities, colleges and research stations throughout the country. The map shows the kind of vegetation "that would exist today if man were removed from the scene and if the resulting vegetation were telescoped into a single moment." The vegetation units occurring in Idaho are: (1) western ponderosa forest, (2) Douglas fir forest, (3) cedar-hemlock-pine forest, (4) grand fir-Douglas fir forest, (5) western spruce-fir forest, (6) juniper-pinyon woodland, (7) juniper steppe woodland, (8) saltbush-greasewood, (9) desert with vegetation largely absent, (10) festuca-wheatgrass, (11) wheatgrass-bluegrass and (12) sagebrush steppe. Although an excellent map for the scale at which the units are portrayed, much more detail would be useful to resource planners, managers and decision makers.

One of the serious deficiencies for making decisions concerning the use of rangelands is the fragmentary or unreliable data on acreage and vegetation make-up of various kinds of rangelands (Thomas and Ronnigen 1965). Fortunately efforts are being made to correct some of these deficiencies. The U.S. Forest Service through the Intermountain Forest and Range Experiment Station began reconnaissance sampling of central Idaho forest habitat types in 1970 (Steele et al. 1975). This work continues and is expanding. The University of Idaho, College of Forestry, Wildlife and Range Sciences, under a cooperative agreement with the U.S.

Potential Vegetation of Idaho

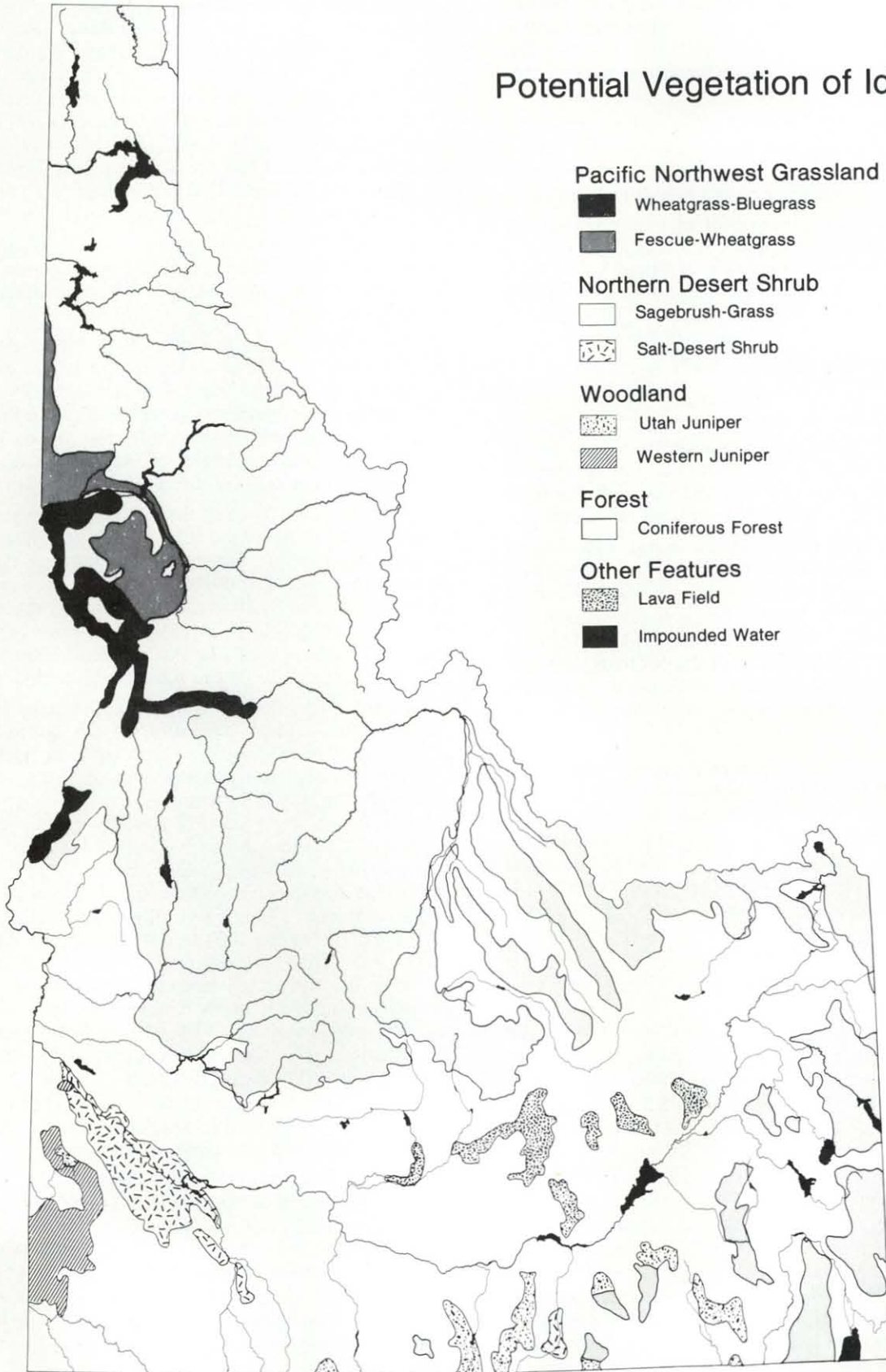


Figure 4. Potential vegetation of Idaho. From Tisdale et al. (1969).

Forest Service Intermountain Forest and Range Experiment Station, is developing a habitat type classification for grasslands and shrublands in southern Idaho (Hironaka and Fosberg 1978). Daubenmire and Daubenmire (1968) described and classified the forest vegetation of northern Idaho and eastern Washington. An earlier ecological study by Daubenmire (1942) described the nonforest vegetation of southeastern Washington and adjacent Idaho.

The classification of vegetation on the basis of climax conditions offers the best basis for obtaining uniformity in classification. Such a system also provides a solid base on which to accumulate information about potential productivity, reaction to various treatments and limitations to various land use activities.

Climax vegetation is the assemblage of plants capable of perpetuation under prevailing climatic and edaphic conditions (Range Term Glossary Committee 1964). Any assemblage of plants is called a plant community while the term "association" is applied only to climax communities. Plant communities created by disruption of the climax vegetation are termed seral communities. The *habitat type* used in many of the vegetation classification systems today is the collective area which an "association" occupies or will come to occupy as succession advances (Daubenmire 1952).

Presentation and discussion of the vegetation of Idaho that follows has been taken from a large number of sources. The map shown in Figure 4 was developed by Tisdale, Hironaka and Fosberg (1969) from the map and data presented by Kuchler (1964). Although the presentation is the best available, much better information is needed to effectively manage the natural resources of the state.

Forest Vegetation

Approximately 22 million acres or 41 percent of the total land area in Idaho has a forest type of vegetation (Figure 5 and Appendix Table A-1). The forest area includes both the very productive commercial timber stands (15.9 million acres) and open, poor quality tree stands without commercial value under present forest utilization technology.

Inventories of forest types for timber supply estimates are based on classification of forest land with respect to the kind of live trees presently occurring on the area (Green and Setzer 1974). Such a classification does not necessarily represent the potential vegetation of the site so classified. For example, after logging, burning or other disturbance, ponderosa pine may dominate, for a time, areas that have a Douglas fir forest climax vegetation. The valuable white pine in northern Idaho is a successional species on sites that have climax vegetation of fir or cedar-hemlock (Daubenmire and Daubenmire 1968).

Classification based on live-tree stocking is useful for assessing timber supplies but it has limitations for assessing suitability and capabilities for other uses.

Recent investigations (Daubenmire 1952; Daubenmire and Daubenmire 1968; Steele et al. 1975) are

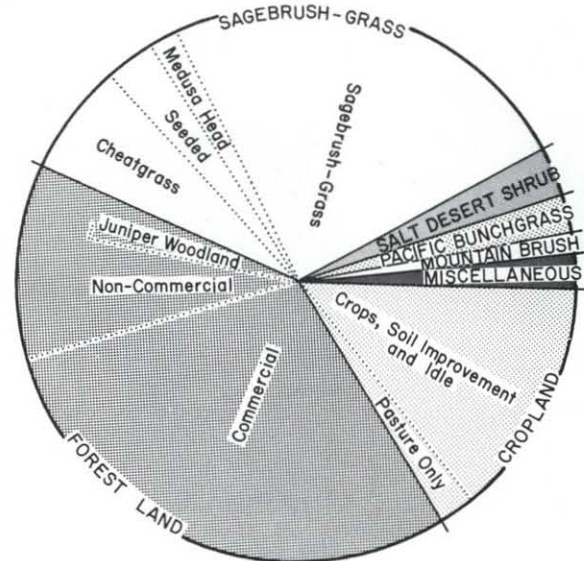


Figure 5. Area of vegetation types, cropland and miscellaneous land uses in Idaho.

directed at classifying forest areas on the basis of potential (habitat types) rather than existing vegetation. Unfortunately classification is not complete for Idaho and consequently acreages by habitat type are not available.

Diverse environments for vegetation growth occur because of elevational gradient, aspect, and stage of maturity of soils. Because of these factors, climax vegetation tends to be arranged in belts or zones. The forest types of Idaho can be divided into five or more zones. Each of the zones may be further divided into habitat types.

JUNIPER WOODLAND ZONE. The 1.6 million acres of juniper woodland is elevationally the lowest forest zone and occurs principally in the southern portion of the state (Figure 4). It is a type of vegetation that is much more extensive to the south of Idaho in Utah and Nevada.

Two species of juniper predominate in this forest zone. Western juniper (*Juniperus occidentalis*) is largely confined to the Owyhee Uplands section of the Columbia Plateau province. The lower slopes of the Owyhee Mountains and the higher plateau areas of the section support stands of western juniper which grade to Douglas fir above and sagebrush grass below (Burkhardt 1967). Although western juniper occurs as climax vegetation it has also invaded sagebrush-grass vegetation occurring below the climax stands.

Utah juniper (*Juniperus osteosperma*) is found in the south central and eastern part of the state and occurs primarily within the northern portion of the Great Basin section of the Basin and Range province.



Figure 6. Western juniper (top) in Idaho is largely confined to the southwestern part of the state while Utah juniper (middle) occurs in the south central and eastern part. Juniper may invade the adjacent sagebrush-grass range (bottom).

Stands of juniper may be open or dense depending on site and past land use activities. Utah juniper is a climax plant community in much of the area where it occurs. Like western juniper, however, it invades the adjacent sagebrush-grass range.

Pinyon pine (*Pinus monophylla*) enters the state in the Goose Creek drainage and the Raft River drainage south of Burley. This is the only known area in the state where the pine is found with juniper woodland.

Although not intensively studied in Idaho, climax juniper vegetation appears to occur on sites with limited soil development. The invasion of juniper, however, occurs on more productive soils found in the sagebrush areas below.

Forage resources in the juniper zone vary with tree density. Limited herbaceous and browse production occurs in stands with a dense canopy and thus forage resource values are limited. These woodlands provide habitat for game animals, particularly mule deer, and a variety of birds. Watershed values are fairly high. Recreation other than hunting is presently of limited importance.

PONDEROSA PINE ZONE. The ponderosa pine zone in Idaho occurs in the Northern Rocky Mountains north of the Snake River. For reasons not clearly understood, ponderosa pine does not occur as a zone in the Middle Rocky Mountain province. Where ponderosa pine occurs, it abuts against the grassland steppe or, in some cases, sagebrush-grass vegetation.

Studies by Daubenmire and Daubenmire (1968) describe six habitat types for the ponderosa pine zone in the northern end of the state. These are:

- Pinus ponderosa* - *Purshia tridentata*
- Pinus ponderosa* - *Stipa comata*
- Pinus ponderosa* - *Agropyron spicatum*
- Pinus ponderosa* - *Festuca idahoensis*
- Pinus ponderosa* - *Physocarpus malvaceus*
- Pinus ponderosa* - *Symphoricarpos albus*

This arrangement of the habitat types generally follows an order of increasing moisture, soil development and tree density and decreasing temperatures.

A designation of the forest habitat types for central Idaho (Steele et al. 1975) indicates similar types as those mentioned above. Exceptions include *Pinus ponderosa*-*Stipa occidentalis* and *Pinus ponderosa*-*Symphoricarpos oreophilus* habitat types. The former habitat type occurs along the South Fork of the Payette and the South and Middle Forks of the Boise River. The latter habitat type is of limited distribution and, apparently, occurs only in the Wallowa-Seven Devils section of the Columbia Intermontane province and the southern portions of the Northern Rocky Mountain province.

Ponderosa pine habitat types with bluebunch wheatgrass, Idaho fescue, needle and threadgrass, or bitterbrush are important forage areas for grazing animals. Although important, ponderosa pine sites with ninebark and snowberry offer less forage for cattle than the previously mentioned ponderosa pine habitat types

but are important for sheep and game animals. As a consequence of fire or logging disturbance, aspen stands are frequently found in this forest zone.

DOUGLAS FIR ZONE. Wherever the ponderosa pine zone occurs in Idaho the upper edge is in contact with the Douglas fir (*Pseudotsuga menziesii*) zone (Daubenmire 1952). However, in the Central Rocky Mountain physiographic province that occurs in Idaho, Douglas fir borders the sagebrush-grass zone below and the ponderosa pine zone is absent.

Daubenmire and Daubenmire (1968) describe three habitat types in northern Idaho for this zone (Table 1). The *Pseudotsuga-Calamagrostis* h.t., although highest in elevation of the three habitat types, is the least diverse in richness of species. Pine grass (*Calamagrostis rubescens*) is the dominant understory plant and elk sedge (*Carex geyeri*), a valuable forage plant, is a common associate. The *Pseudotsuga-Physocarpus* h.t. is floristically the most diverse in the series and the *Pseudotsuga-Symphoricarpos* h.t. is intermediate between this and the *Pseudotsuga-Calamagrostis* h.t. Ponderosa pine may act as a successional species after fire or logging in all three habitat types of the zone. Larch (*Larix occidentalis*) also assumes this role. Lodgepole pine (*Pinus contorta*) does not occur in the *Pseudotsuga-Physocarpus* h.t. but is successional in the other two habitat types.

Steele et al. (1975) list a greater number of habitat types in the Douglas fir zone than those listed for northern Idaho (Table 1). The greater number of habitat types in the central areas of the state may be due to greater diversity in topography and thus more diverse environments for plant growth than occur in northern Idaho.

Much of the forage value of this zone is derived from open parks and increased herbaceous growth that develops when the tree canopy is opened by logging or fire.

CEDAR-HEMLOCK ZONE. A strong coastal influence is exerted on the climate of the region that lies north of the divide between the Salmon and Clearwater Rivers. Winter temperatures are milder and precipitation, at similar elevations, is greater than to the south of this divide. The zone above the Douglas fir in northern Idaho is dominated by western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*) and grand fir (*Abies grandis*). Habitat types designated by Daubenmire and Daubenmire (1968) are:

- Abies grandis*/*Pachistima myrsinites*
- Thuja plicata*/*Pachistima myrsinites*
- Tsuga heterophylla*/*Pachistima myrsinites*
- Thuja plicata*/*Athyrium filix-foemina*
- Thuja plicata*/*Oplopanax horridum*

These associations grade from good to poor soil drainage and, from warmest and driest to coolest and wettest in the order listed.

The cedar-hemlock zone is of substantial importance in the production of timber, particularly white pine (*Pinus monticola*) and western red cedar. The white pine is a successional species in all habitat types of this zone



Figure 7. Forest habitat types in Idaho include (clockwise from upper left) *Pinus ponderosa*-*Agropyron spicatum*, *Pinus ponderosa*-*Purshia tridentata*, *Pseudotsuga menziesii*-*Physocarpus malvaceus* and *Pseudotsuga menziesii*-*Calamagrostis rubescens*.

Table 1. Habitat types designated for the Douglas fir zone in northern and central Idaho.

Northern Idaho ^a	Central Idaho ^b
<i>Pseudotsuga menziesii/Calamagrostis rubescens</i> a. <i>Calamagrostis rubescens</i> phase b. <i>Arctostaphylos uva-ursi</i> phase <i>Pseudotsuga menziesii/Symphoricarpos albus</i> <i>Pseudotsuga menziesii/Physocarpus malvaceus</i>	<i>Pseudotsuga menziesii/Agropyron spicatum</i> <i>Pseudotsuga menziesii/Symphoricarpos oreophilus</i> a. <i>Symphoricarpos oreophilus</i> phase b. <i>Prunus virginiana</i> phase <i>Pseudotsuga menziesii/Festuca idahoensis</i> <i>Pseudotsuga menziesii/Cercocarpus ledifolius</i> <i>Pseudotsuga menziesii/Arnica cordifolia</i> <i>Pseudotsuga menziesii/Osmorhiza chilensis</i> <i>Pseudotsuga menziesii/Juniperus communis</i> <i>Pseudotsuga menziesii/Carex geeyeri</i> a. <i>Carex geeyeri</i> phase b. <i>Symphoricarpos oreophilus</i> phase c. <i>Artemisia tridentata</i> phase <i>Pseudotsuga menziesii/Calamagrostis rubescens</i> a. <i>Calamagrostis rubescens</i> phase b. <i>Arctostaphylos uva-ursi</i> phase <i>Pseudotsuga menziesii/Spiraea betulifolia</i> a. <i>Spiraea betulifolia</i> phase b. <i>Calamagrostis rubescens</i> phase c. <i>Carex geeyeri</i> phase <i>Pseudotsuga menziesii/Symphoricarpos albus</i> a. <i>Symphoricarpos albus</i> phase b. <i>Arctostaphylos uva-ursi</i> phase <i>Pseudotsuga menziesii/Physocarpus malvaceus</i> a. <i>Physocarpus malvaceus</i> phase b. <i>Acer glabrum</i> phase c. <i>Calamagrostis rubescens</i> phase <i>Pseudotsuga menziesii/Vaccinium globulare</i> <i>Pseudotsuga menziesii/Acer glabrum</i> <i>Pseudotsuga menziesii/Xerophyllum tenax</i>

^a Daubenmire, R. and J. B. Daubenmire. 1968. Forest vegetation of eastern Washington and northern Idaho. Wash. Agric. Exp. Sta. Tech. Bull. 60. Pullman, Washington. 104 p.

^b Steele, R., R. D. Pfister, R. A. Ricker and J. A. Kittams. 1975. Forest habitat types of central Idaho. USDA, Forest Service, Intermountain Forest and Range Exp. Sta. and Intermountain Region, Processed. 191 p.

and management is directed to its perpetuation. The principal grazing value is derived from natural openings or from those created by logging activities.

The *Abies grandis* vegetation extends southward into the central Idaho forests. It occurs primarily in the western portion of the area but may be found sporadically eastward on the Salmon River uplands (Steele et al. 1975). Seven habitat types were designated in the *Abies grandis* series:

- Abies grandis/Spiraea betulifolia*
- Abies grandis/Vaccinium globulare*
- Abies grandis/Xerophyllum tenax*
- Abies grandis/Acer glabrum*
- Abies grandis/Linnaea borealis*
 - a. *Vaccinium globulare* phase
 - b. *Linnaea borealis* phase
- Abies grandis/Coptis occidentalis*
- Abies grandis/Clintonia uniflora*

These habitat types are primarily important for timber production and have limited value as a grazing resource.

ALPINE FIR ZONE. Situated above the cedar-hemlock zone in northern Idaho and the Douglas fir zone of central and southern Idaho, the alpine fir zone occupies a belt of about 2,000 feet elevation (Daubenmire 1943). This vegetation occurs at higher elevations in the southern portions of Idaho than in the northern part of the state. Elevations may be too low in places for the zone to be expressed and cedar-hemlock or Douglas fir forests extend to the upper limits of the mountain elevations.

In northern Idaho, Daubenmire and Daubenmire (1968) recognize seven habitat types (Table 2). Because of a wider range of environmental conditions that occur in the mountains of central Idaho, a greater number of habitat types are described by Steele et al. (1975) for this forest zone (Table 2). Steeper topography, higher elevations and greater extremes in the climatic and soil factors of central Idaho compared to the northern Idaho mountains cause more environmental diversity for plant growth and expression.

The zone, in general, has a short growing season and is more suitable for grazing by sheep than by cattle.



Figure 8. Much of the cedar-hemlock forest is managed for white pine (top). Because of the paucity of understory vegetation in climax cedar-hemlock communities (middle), grazing is restricted to natural openings or logged and burned areas (bottom).

Table 2. Habitat types of the alpine fir zone in the northern and central portions of Idaho.

Northern ^a	Central ^b
<i>Abies lasiocarpa/Pachistima myrsinites</i>	<i>Abies lasiocarpa/Caltha biflora</i>
<i>Abies lasiocarpa/Xerophyllum tenax</i>	<i>Abies lasiocarpa/Clintonia uniflora</i>
<i>Tsuga mertensiana/Xerophyllum tenax</i>	<i>Abies lasiocarpa/Menziesia ferruginea</i>
<i>Abies lasiocarpa/Menziesia ferruginea</i>	<i>Abies lasiocarpa/Vaccinium caespitosum</i>
<i>Tsuga mertensiana/Menziesia ferruginea</i>	a. <i>Vaccinium caespitosum</i> phase
<i>Abies lasiocarpa/Vaccinium scoparium</i>	b. <i>Calamagrostis canadensis</i> phase
<i>Pinus albicaulis/Abies lasiocarpa</i>	<i>Abies lasiocarpa/Calamagrostis canadensis</i>
	a. <i>Calamagrostis canadensis</i> phase
	b. <i>Ligusticum canbyi</i> phase
	<i>Abies lasiocarpa/Streptopus amplexifolius</i>
	<i>Abies lasiocarpa/Linnaea borealis</i>
	a. <i>Linnaea borealis</i> phase
	b. <i>Vaccinium scoparium</i> phase
	<i>Abies lasiocarpa/Ledum glandulosum</i>
	<i>Abies lasiocarpa/Acer glabrum</i>
	<i>Abies lasiocarpa/Xerophyllum tenax</i>
	a. <i>Xerophyllum tenax</i> phase
	b. <i>Vaccinium globulare</i> phase
	<i>Abies lasiocarpa/Vaccinium globulare</i>
	<i>Abies lasiocarpa/Spiraea betulifolia</i>
	<i>Abies lasiocarpa/Luzula hitchcockii</i>
	a. <i>Luzula hitchcockii</i> phase
	b. <i>Vaccinium scoparium</i> phase
	<i>Abies lasiocarpa/Vaccinium scoparium</i>
	a. <i>Vaccinium scoparium</i> phase
	b. <i>Calamagrostis rubescens</i> phase
	<i>Abies lasiocarpa/Calamagrostis rubescens</i>
	<i>Abies lasiocarpa/Carex geyeri</i>
	a. <i>Carex geyeri</i> phase
	b. <i>Artemisia tridentata</i> phase
	<i>Abies lasiocarpa/Juniperus communis</i>
	<i>Abies lasiocarpa/Ribes montigenum</i>
	<i>Abies lasiocarpa/Arnica cordifolia</i>
	<i>Pinus albicaulis/Abies lasiocarpa</i>
	<i>Pinus albicaulis</i>

^aDaubenmire, R. and J. B. Daubenmire. 1968. Forest vegetation of eastern Washington and northern Idaho. Wash. Agric. Exp. Sta. Tech. Bull. 60. Pullman, Washington. 104 p.

^bSteele, R., R. D. Pfister, R. A. Ricker and J. A. Kittams. 1975. Forest habitat types of central Idaho. USDA, Forest Service, Intermountain Forest and Range Exp. Sta., and Intermountain Region. Processed. 191 p.

Most of the grazing value stems from the "parks" or open areas that occur. During the late summer and early fall periods backpackers, hunters and fishermen find enjoyment in use of the recreation resources of this zone.

Other Forest Types

Additional forest habitat types of limited extent in Idaho include:

- Pinus flexilis/Festuca idahoensis*
- Picea englemanni/Carex disperma*
- Pinus contorta/Festuca idahoensis*

Mountain Brush Vegetation

Infrequent and often discontinuous, a type of vegetation with a shrubby aspect may occur naturally below the forested area. Similar vegetation may appear within the forest area as a consequence of fire or logging in certain forest habitat types. Estimated to occupy a

half million acres in Idaho, a variety of woody species may determine the aspect of the communities that occur. One or a few woody species, such as mountain mahogany (*Cercocarpus ledifolius*), may impart aspect. In other cases numerous woody species, such as bitterbrush (*Purshia tridentata*), choke-cherry (*Prunus virginiana*), bitter cherry (*Prunus emarginata*), snowberry (*Symphoricarpos* spp.), nine bark (*Physocarpus malvaceus*), ocean spray (*Holodiscus discolor*) and others comprise the type. Grazing value per unit of area is commonly high but because of limited extent, this zone has a limited forage resource value. Certain wildlife species show high dependence on the mountain brush zone for both cover and forage.

Mountain brush vegetation in Idaho has not been studied to any extent. On this account, little is known about the climax communities with respect to vegetation structure and habitat types.



Figure 9. The alpine fir zone of Idaho is characterized by (clockwise from upper left) open parks, summer grazing by sheep, beargrass (*Xerophyllum tenax*) and high altitude lakes, such as Goose Lake near McCall.



Figure 10. The grazing value of mountain brush vegetation varies from high in open stands, such as the mountain mahogany-serviceberry community (upper left), to low in dense stands (upper right). Fire created mountain brush vegetation in northern Idaho (lower photos) is maintained for elk habitat.

Sagebrush-Grass Vegetation

Next in size to the forest zone is the sagebrush-grass zone with an estimated 18.5 million acres in Idaho. This vegetation is concentrated in the southern portion of the state (Figure 4) and does not occur, to any extent in Idaho, north of the Salmon River. It occurs on a wide variety of soils, over a wide range of elevations and, consequently, it is extremely variable in appearance.

Most of the southern Idaho farm land was developed from areas having sagebrush-grass vegetation. That portion of the sagebrush-grass zone in public ownership is largely administered by the Bureau of Land Management.

Lack of regulation of use along with strong competition for the free open range prior to passage of the Taylor Grazing Act in 1934 caused major alterations of

the climax plant communities. Grazing in excess of capacity occurred and burning was used extensively to reduce the dense stands of sagebrush that developed.

Only recently has intensive work on classification of the plant associations and habitat types of this vegetation been started, although preliminary work has been underway for several years.¹

¹Personnel in Range Resources of the University of Idaho College of Forestry, Wildlife and Range Sciences have been gathering some information since the 1950's. Dr. Hironaka and his graduate students have been working intensively on a description and classification of the habitat types in the sagebrush-grass zone since 1973.



Figure 11. Much of the sagebrush-grass vegetation in Idaho has been altered by conversion to farmland (top), burning to reduce the density of sagebrush (center), and unrestricted grazing (bottom) which caused the density of sagebrush to increase and perennial grasses to decrease to the left of the fence.

Several species and sub-species of sagebrush (*Artemisia*) contribute to the woody component of the sagebrush-grass communities in Idaho. Following is a tentative list of habitat types that has been developed (Hironaka and Fosberg 1978):

- Artemisia arbuscula*/*Agropyron spicatum* h.t.
- Artemisia arbuscula*/*Festuca idahoensis* h.t.
- Artemisia arbuscula*/*Poa sandbergii* h.t.
- Artemisia longiloba*/*Festuca idahoensis* h.t.
- Artemisia nova*/*Agropyron spicatum* h.t.
- Artemisia nova*/*Festuca idahoensis* h.t.
- Artemisia rigida*/*Poa sandbergii* h.t.
- Artemisia thermopola*/*Festuca idahoensis* h.t.
- Artemisia "spiciformis"*/*Bromus carinatus* h.t.
- Artemisia tridentata*/*Agropyron spicatum* h.t.
- Artemisia tridentata*/*Festuca idahoensis* h.t.
- Artemisia tridentata*/*Stipa comata* h.t.
- Artemisia tripartita*/*Agropyron spicatum* h.t.
- Artemisia tripartita*/*Festuca idahoensis* h.t.
- Artemisia vaseyana*/*Agropyron spicatum* h.t.
- Artemisia vaseyana*/*Festuca idahoensis* h.t.
- Artemisia vaseyana*/*Stipa comata* h.t.

- Artemisia vaseyana*/*Symphoricarpos oreophilus*/*Agropyron spicatum* h.t.
- Artemisia vaseyana*/*Symphoricarpos oreophilus*/*Festuca idahoensis* h.t.
- Artemisia vaseyana*/*Symphoricarpos oreophilus*/*Carex geyeri* h.t.
- Artemisia viscidula*/*Festuca idahoensis* h.t.
- Artemisia wyomingensis*/*Agropyron spicatum* h.t.
- Artemisia wyomingensis*/*Poa sandbergii* h.t.
- Artemisia wyomingensis*/*Sitanion hystrix* h.t.
- Artemisia wyomingensis*/*Stipa comata* h.t.
- Artemisia wyomingensis*/*Stipa thurberiana* h.t.
- Artemisia "xericensis"*/*Agropyron spicatum* h.t.
- Artemisia "xericensis"*/*Festuca idahoensis* h.t.

The *Artemisia tridentata* (big sagebrush) species is the most abundant and widespread of the woody species of sagebrush (Winward and Tisdale 1977). The distribution of the various subspecies of big sagebrush (Figure 12) corresponds closely to the distribution of sagebrush-grass vegetation in Idaho (Figure 4).

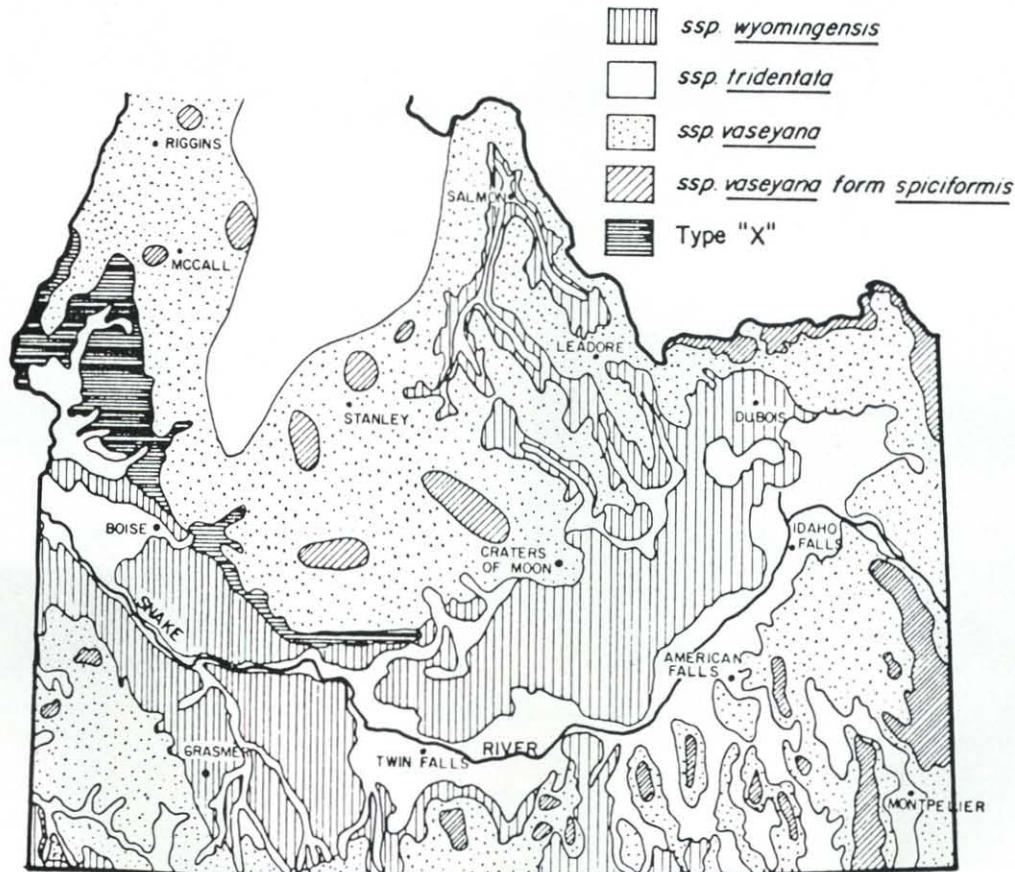


Figure 12. Distribution of the subspecies of *Artemisia tridentata* in Idaho. From Winward and Tisdale (1977).

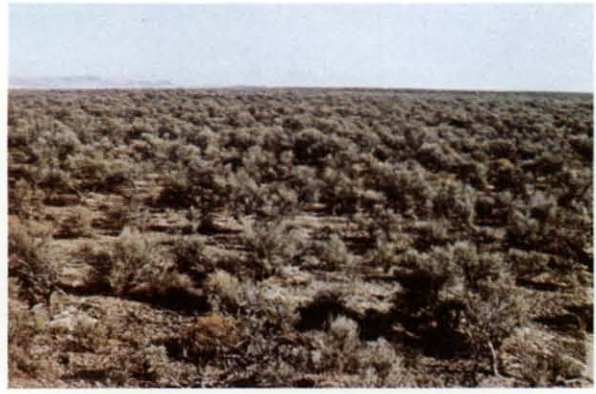


Figure 13. Adapted to a wide range of soils, elevations and climatic factors, the sagebrush-grass vegetation of Idaho is highly variable in appearance.

Soil moisture, temperature and soil development appear to be major factors in the distribution of sagebrush habitat types (Hironaka and Fosberg 1978). It is not possible to establish simple environmental gradients based on these factors as the relationships and interrelationships of these and other factors are extremely complex. As these complex relationships are researched and identified, a much better basis for selecting management alternatives and making decisions should follow.

During the early period of settlement, plant communities in parts of the sagebrush-grass zone were altered because of heavy continuous grazing. Sagebrush thickened as the perennial grass species declined. Burning of the sagebrush permitted the opportunistic annual cheatgrass (*Bromus tectorum*) to fill the space left by the sagebrush and perennial bunchgrasses. The forage resources on approximately 3.3 million acres (Stewart and Hull 1949) of the sagebrush-grass zone consist of this annual grass and other annual plants. Medusahead (*Elymus caput-medusae*) has replaced cheatgrass (Figure 14) to the detriment of forage resource values on about 700 thousand acres in west central Idaho (Torell et al. 1961).

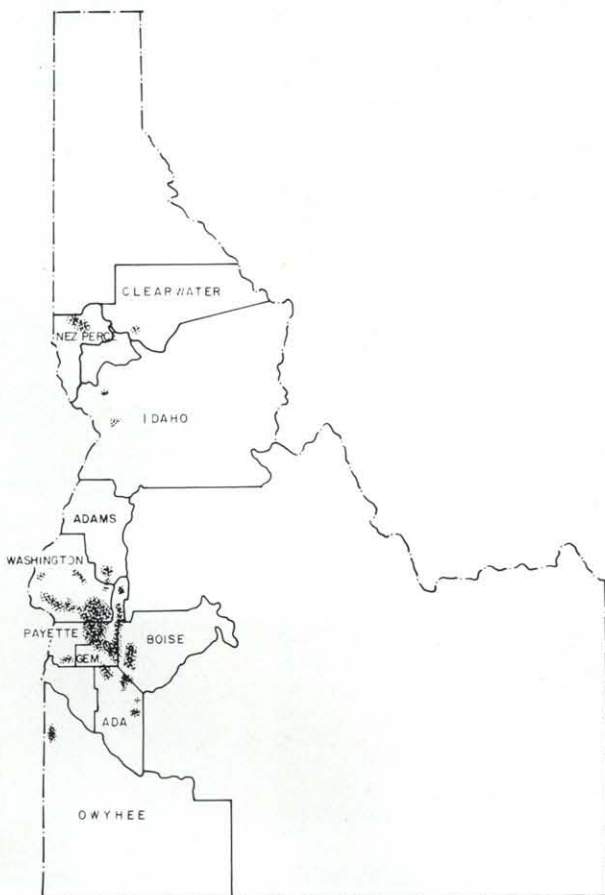


Figure 14. The approximate distribution of medusahead in Idaho. From Dahl and Tisdale (1975).

Marked improvement in forage resource values on some sagebrush-grass areas has developed because of an active range seeding program (Figure 16) that has been carried on by Federal and State agencies and private land owners. Approximately 1.6 million acres have been planted to adapted species, principally crested and desert wheatgrasses (*Agropyron cristatum* and *A. desertorum*). These grasses are more tolerant of spring grazing than the native species and afford livestock operations a greater flexibility in grazing programs than the native bluebunch wheatgrass.

Because of elevational position, sagebrush-grass vegetation is principally a spring and fall grazing resource for domestic animals. Some areas may be grazed during the summer as well as in the winter. This type provides substantial winter range for wildlife species and at some elevations year-long grazing may occur. Sagebrush-grass vegetation is important in the life cycle of sage grouse as well as other upland game birds.

Salt-Desert Shrub Vegetation

On the lower, drier and/or saltier areas than where sagebrush-grass vegetation occurs, a number of shrub communities comprise the salt-desert shrub type of vegetation. This kind of vegetation, so extensive in Nevada and western Utah, is limited to about 1.5 million acres in southern Idaho. Description and classification of the salt-desert shrub type was started over 60 years ago, yet there has been no full and comprehensive treatment of the ecological factors of this subdivision of the North American desert.

Salt-desert shrub vegetation generally occurs where annual precipitation is less than 10 inches. Soil salinity and/or alkalinity strongly influence the kind of plant communities expressed.

The plant community of greatest extent in this vegetation zone is shadscale (*Atriplex confertifolia*). It normally occupies a belt across the middle part of the valleys of the Great Basin section of the Basin and Range physiographic province. It is situated elevationally below the sagebrush-grass vegetation and above more salt tolerant plant communities of the valley bottoms.

Variations in soil characteristics within the zone give rise to a number of other plant communities. Winterfat (*Eurotia lanata*) communities appear on sites where the surface layer is largely salt free. Saltsage (*Atriplex nuttallii*) and green molly (*Kochia americana*) are plant communities that tolerate substantial levels of soil salts. Most tolerant of saline or alkaline soils are the greasewood communities which dominate in the lowland areas of the valleys.

Halogeton, an introduced poisonous plant, became widespread in this vegetation zone during the late forties and fifties. Although serious losses occurred to individual livestock producers because of animal poisoning by halogeton, its main value stems from providing the scare that prompted Congress to appropriate money to improve these and the adjacent drier sagebrush rangelands through range seeding.



Figure 15. Cheatgrass (top) and medusahead (center), introduced annual grasses, are found on extensive areas of the sagebrush-grass zone. Medusahead forms a dense cover (bottom) but has limited forage value.



Figure 16. Improved forage values result from seeding low producing sagebrush land to crested wheatgrass (top). Contrast the dense stand of sagebrush in 1955 (center) with the same area in 1965 (bottom) after seeding with crested wheatgrass.

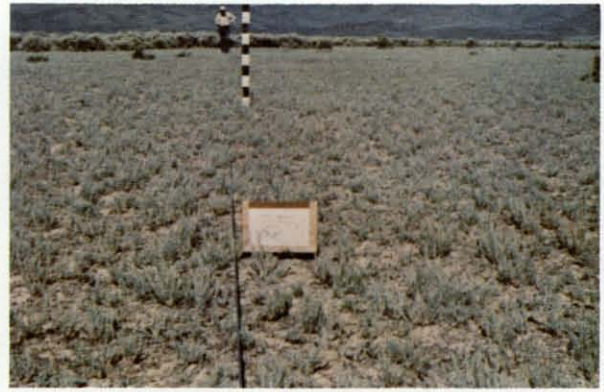


Figure 17. The salt-desert shrub vegetation of Idaho includes (clockwise from upper left) highly salt tolerant greasewood in valley bottoms, less salt tolerant green molly and saltsage on alluvial fans, and winterfat where the surface layer is salt free.

Salt-desert shrub ranges are used principally during the winter months. Game species of wildlife are not abundant but deer and antelope may be found during the winter period. Recreation is of limited importance.

Pacific Bunchgrass Vegetation

Similar in appearance to the more productive parts of the sagebrush-grass zone is a grassland vegetation occurring on about 1.2 million acres in northwestern Idaho. This Pacific bunchgrass vegetation is presently concentrated along the lower Snake, Salmon and Clearwater Rivers. Bunchgrasses were the predominant vegetation on the rich cropland areas of the Palouse and Camas prairies of northern Idaho.

An ecological study of the vegetation of southeastern Washington and adjacent Idaho (Daubenmire 1942) identified an *Agropyron-Poa* and a *Festuca-Agropyron* zone for the grasslands of this area. *Agropyron-Poa* dominates the drier parts of the grassland area and bluebunch wheatgrass (*Agropyron spicatum*) and Sandberg's bluegrass (*Poa sandbergii*) are the principal

plant species. Eastward, as the mountains are approached and moisture increases, Idaho fescue (*Festuca idahoensis*) becomes a dominant along with bluebunch wheatgrass in the *Festuca-Agropyron* zone.

Precipitation ranges from 10 to 20 inches in the *Agropyron-Poa* zone and exceeds 20 inches in the *Festuca-Agropyron* zone. Soils are deep, dark and fertile in the moist parts of the grassland. Organic matter, depth and fertility of the soil decrease as the *Agropyron-Poa* zone is penetrated.

A more recent study by Daubenmire (1970) identifies climax associations and habitat types of the grasslands in eastern Washington. Although the study was made primarily in eastern Washington, many of the habitat types indicated are assumed to occur in northern Idaho. Grassland habitat types identified and listed in order of increasing moisture and soil development are:

- Agropyron spicatum-Poa secunda (sandbergii)*
- Agropyron spicatum-Festuca idahoensis*
- Festuca idahoensis-Symphoricarpos albus*
- Festuca idahoensis-Rosa nutkana*



Figure 18. The Pacific bunchgrass vegetation of northern Idaho is found in the breaks of the Snake and Salmon Rivers (top), lower slopes adjacent to forest zones (lower left) and the rolling hills of the Palouse Prairie (lower right), which has mostly been converted to cropland.

Most of the grasslands described have been converted to farmland where wheat, peas, lentils and barley are grown.

The main body of Pacific bunchgrass that remains occurs in the drainages of the Snake and Salmon Rivers south of Lewiston, Idaho. Although some of the same habitat types that have been described probably occur in this area, it is likely that the steep topography and milder temperatures in part of the area produce different expressions of the vegetation.

A recent study by Tisdale (1978) indicates that the grassland vegetation of the Snake River breaks, like the soils, differs appreciably from that of the Palouse area described by Daubenmire (1970). The grassland vegetation of the Snake and Salmon River drainages has developed on areas of steeper slope, warmer climate and soils that are shallower and often more stony than those found in the Palouse prairie. Tisdale (1978) has proposed the following grassland habitat types for the Snake River Canyon area:

- Agropyron spicatum/Poa sandbergii*
- a. mesic phase
- b. stony phase
- Festuca idahoensis/Koeleria cristata*

The mesic phase of the *Agropyron spicatum/Poa sandbergii* h.t. occurs in less arid areas and has more perennial forbs than the *Agropyron/Poa* h.t. of Daubenmire (1970). Common annual grasses include *Bromus japonicus* and *Bromus brizaeformis*, as well as the more xeric *Bromus tectorum*.

The above communities are described only for the Snake River Canyon which contains roughly half of the existing grasslands of the state. A preliminary study of the steeper grassland areas of both the Snake and Salmon Rivers by Campbell (1962) recognized two grassland plant communities. These two communities, i.e., *Festuca-Agropyron* and *Festuca-Koeleria*, are probably similar to the *Festuca idahoensis/Koeleria cristata* h.t. described by Tisdale (1978).

Both cattle and sheep use the steeper grasslands of the Snake and Salmon Rivers. Due to the mild winter climate, portions of the area provide winter grazing for sheep as well as cattle. The common grass species frequently produce green growth in the fall of the year, consequently, this grassland area serves as an important winter range for deer and elk. The steep slopes and rugged peaks of the mountains produce great scenic attractiveness.

IDAHO LAND OWNERSHIP AND USE

LAND OWNERSHIP

The area encompassed by present day Idaho was part of the Oregon Territory, the ownership of which was in dispute until 1846. Through negotiations with Great Britain, the Oregon Territory officially became a part of the United States after the 1846 Oregon Compromise was signed (Hibbard 1924).

Mountain men came to trap the fur bearing animals, missionaries to civilize the Indians, and travelers to Oregon country crossed the semi-arid plains and mountains prior to the 1846 Compromise.

Settlement of Franklin, Idaho in 1860 by Mormons from Utah (Gibb 1976) started the transfer of land from public to private ownership and set the stage for present day land ownership patterns. Discovery of gold, silver and other minerals at various locations in Idaho during the 1860's and 1870's caused an influx of people and establishment of a number of settlements. Pierce, Florence, Orofino, Idaho City, Silver City, Bonanza City, Custer and many others flourished during this period.

The business of supplying food to miners and those associated with the mining industry attracted individuals engaged in raising livestock. In 1874 an estimated fifty thousand head of cattle grazed within a 75 mile radius of Silver City (Oliphant 1968). The livestock industry expanded south of the Snake River during the 1870's and 1880's. Active settlement of the state was underway with mineral extraction and range livestock production the principle source of income within the area.

The Federal government was greatly interested in promoting occupancy and settlement of the western country following its acquisition through the Louisiana purchase, Oregon compromise, cession from Mexico, Gadsden purchase and the annexation of Texas. The mechanism for accomplishing this goal consisted of free grants of land to those willing to occupy and settle in this part of the United States. Land grants were made to railroads to develop a transportation system that would tie the country together. When statehood was achieved by the western territories, land grants were made to the states in support of schools and other public institutions.

Some of the specific means for transferring land from federal to private ownership were the various Homestead Acts. The original Homestead Act of 1862 granted 160 acres, the Timber Culture Act of 1873 provided 160 acres free but required part of the land be planted to trees, the Desert Land Act of 1877 allowed purchases of up to 640 acres at \$1.25 per acre but required some irrigation development (acreage reduced to 320 acres in 1890), the Enlarged Homestead Act of 1909 permitted entries up to 320 acres, and the Stock-Raising Homestead Act of 1916 allowed 640 acres. The Carey Act of 1894 provided for the donation of land to certain

states for settlement if it could be cultivated and irrigated. Eligible states could apply for one million acres. In 1908 an additional million was granted to Wyoming and two million to Idaho (Hibbard 1924).

The Timber and Stone Act of 1878 provided for the sale of 160 acre tracts at \$2.50 per acre of "unoffered, unappropriated, and unreserved surveyed public lands in California, Oregon, Nevada and Washington Territory, valuable chiefly for timber (or stone) and unfit for homestead and preemption laws" (Gates 1968). Disposal of land under mining and mineral legislation was also used in Idaho to obtain title to federal lands.

Federal land grants to the states for support of public institutions, primarily schools, amounted to 4,254,448 acres in Idaho (U.S. Dept. of Interior, Bureau of Land Management 1977). Sections 16 and 36 of each township were specified as the location of the lands granted for school and other purposes. Where such areas had been previously appropriated, selection of other lands was permitted.

In the late 1800's the growing movement for conservation of our natural resources led to legislation providing for the withdrawal of certain forest lands from alienation under the land disposal laws. Nearly 40 percent of the land area in Idaho was placed in forest reserves between 1905 and 1910.

Federal land unappropriated by the various land disposal acts, not reserved for forest protection or granted to the state for support of public institutions, remained unappropriated and unregulated until 1934. Passage of the Taylor Grazing Act on June 28, 1934 provided for the orderly use, improvement and development of these lands pending final disposal. It was not until October of 1976 that the Congress of the United States declared that it was the policy of the United States that these public lands would be retained in federal ownership (PL 94-579).

The lands referred to as "public lands" or "national resource lands" are presently administered by the Bureau of Land Management. In general these were the least productive and least desirable lands of the state for cropland agriculture and settlement. They were and are used by the livestock industry to complete the year-long livestock production process.

Present land ownership is shown in Table 3. Sixty-four percent of the land area of Idaho remains in federal ownership. Of the 48 contiguous states only Nevada (86.6 percent) and Utah (66.1 percent) have a greater proportion of federal holdings within their boundaries than Idaho (U.S. Dept. of Interior, Bureau of Land Management 1977).

The U.S. Forest Service and the Bureau of Land Management administer 96 percent of all federal land in Idaho and 61 percent of the total land area in the state. The Bureau of Reclamation and the Atomic Energy Commission administer nearly three-fourths of the

Table 3. Land area of Idaho by ownership and percent each ownership is of the total land area.

Ownership Class	Total Acres (1,000 Acres)	Percent of Land Area
Land Area of State	52,913 ^a	100
Federal Agencies	33,741 ^a	64
U.S. Forest Service	20,375 ^b	38
Bureau of Land Management	11,985 ^{a,c}	23
Other Federal Agencies	1,381 ^a	3
State of Idaho	2,621	5
Department of Lands	2,516 ^d	5
Idaho Fish & Game	78 ^e	g
Parks and Recreation Dept.	27 ^f	h
County and Municipal	119 ^f	h
Privately Owned	16,432 ^g	31

^a U.S. Dept. of the Interior, Bureau of Land Management. 1977. Public land statistics, 1976. U.S. Govt. Printing Office, Washington, D.C. p 3.

^b U.S. Dept. of Agric., Forest Service. 1976. National forest system areas as of June 30, 1975. U.S. Govt. Printing Office, Washington, D.C. p 10.

^c Total does not include 26,071 acres of unperfected entries pending.

^d State of Idaho, Dept. of Lands. 1976. Second annual report. State of Idaho, Statehouse, Boise, Idaho. 78 p.

^e Data supplied by Gene deReus of the Idaho Fish and Game Department from compilation of known land interest held by the Idaho Department of Fish and Game as of February 1, 1976.

^f Idaho Division of Budget, Policy Planning and Coordination. 1976. County profiles of Idaho. (Indicators for a development strategy). Bureau of State Planning and Community Affairs, Statehouse, Boise, Idaho.

^g By difference. The difference was reduced by 26 thousand acres of unperfected entries pending on public land.

^h Less than 0.5 percent.

remaining 1.4 million acres of federal land (Appendix Table A-2).

Of the approximately 4.3 million acres granted to Idaho on achieving statehood, 2.5 million acres remain in state ownership. The Idaho Fish and Game and the Parks and Recreation Departments, through purchase and gifts, control use on approximately 105 thousand additional acres. Cities and counties own 119 thousand acres.

Only 31 percent of the land area of Idaho is privately owned. This leaves 69 percent of the state in some form of public ownership - federal, state, county or municipal. Approximately one-half of the land presently in private ownership was transferred from the federal government through the Stock Raising Homestead Act (3.6 million acres), sale of state lands (1.7 million acres), Desert Land² and Carey Acts (approximately

²Only Montana and Wyoming exceeded Idaho in the amount of land transferred to private ownership under the Desert Land Act.

2.2 million acres), and the Timber and Stone Act (1 million acres). The Preemption, Original Homestead, Enlarged Homestead and Timber Culture Acts, along with direct sales, mineral land sales and railroad grants were other means by which land passed to private ownership.

The manner in which land passed from federal to state and private ownership in Idaho created many problems for land use, development and administration. With scattered parcels of state and private land throughout the federal ownerships, a high degree of coordination and integration in land use planning is required to conserve and effectively use these land resources for benefit of the people of the state and the nation.

Support of schools, the public services provided by local units of government, and population densities relate to private land ownership patterns. The kind of land in the different ownerships is also important in this regard.

Private land holdings are concentrated in the non-forested areas of the state (Figure 19 and Appendix Tables A-3, A-4, and A-5). The Snake River and its tributaries provided much of the water that made possible settlement under the various land disposal laws designed to promote cropland agricultural activities. The areas of Lewis, Nez Perce, Latah, Benewah and Clearwater counties that occurred in the Pacific bunchgrass type of vegetation passed readily to private ownership. Counties with substantial amounts of forest land and land distant from water tend to have a high proportion of public land.

LAND USE

Present day land use activities in Idaho are a consequence of the kind of natural resources found in the state, social and political institutions and the desires, wants and attitudes of people.

An abundance of streams and rivers provide water that makes intensive irrigated agriculture possible in the less mountainous portions of the state. Large areas unsuited for irrigated agriculture because of steepness or lack of water provide an environment in which the raising of sheep and cattle are the only practical agricultural pursuits. A major logging and milling industry occurs because of the timber resources available in central and northern Idaho. Rich mineral deposits exist in the varied geologic formations of Idaho's mountains. As a consequence of these resource characteristics, agriculture, mining and the production of wood and wood products provide the basic economic wealth of the state. Lack of certain resources; coal, oil, iron, etc., along with other factors; create conditions unfavorable for heavy industrial enterprises.

Spectacular mountains with numerous lakes and streams make the state an area of major attraction for people seeking outdoor recreational activities. The open

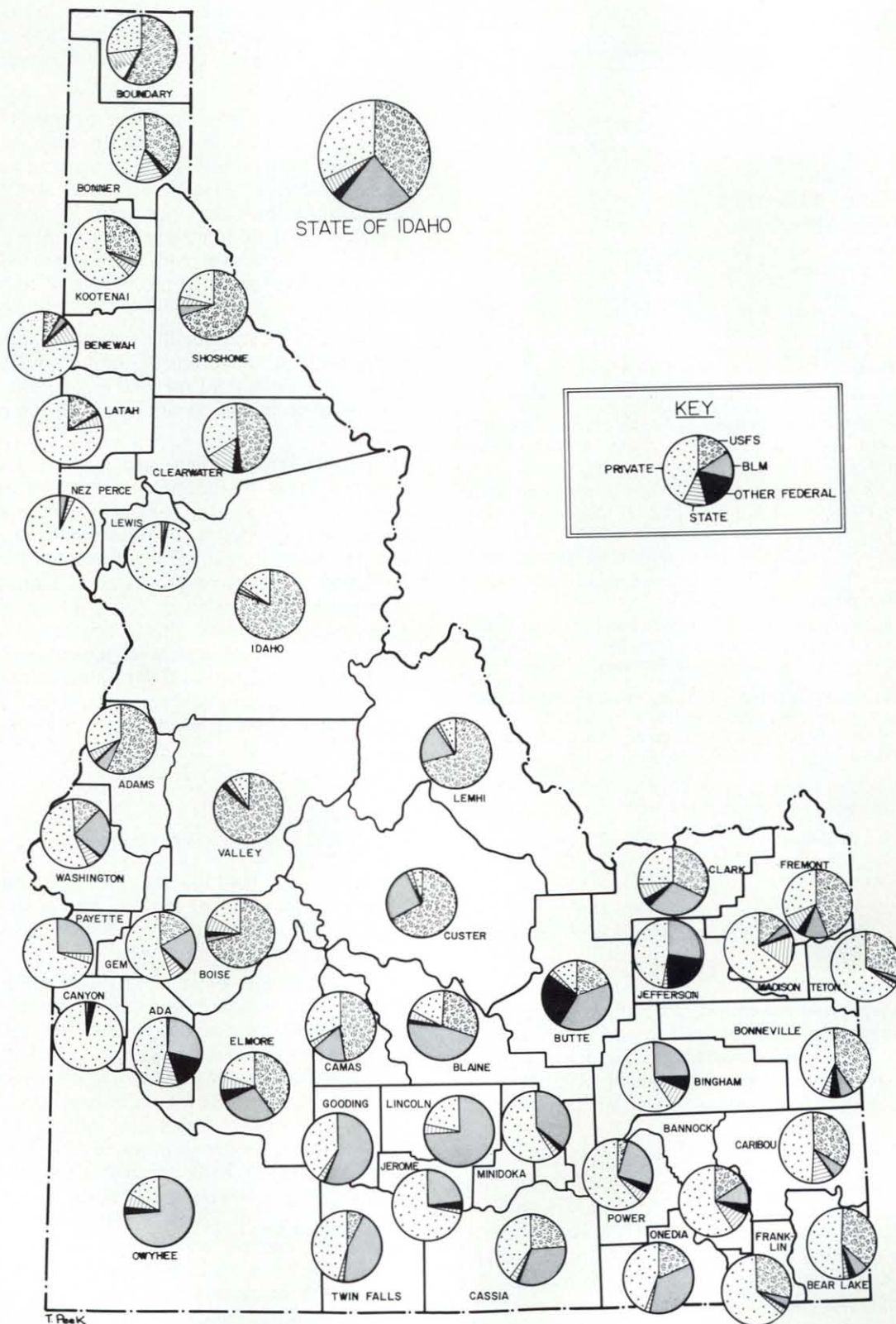


Figure 19. Land ownership by county in Idaho. U.S. Forest Service ownership predominates in the mountainous areas while the Bureau of Land Management land is mostly in the non-mountain areas.

spaces with few people - characteristic of Idaho - are especially attractive to those living in metropolitan and urban areas of the nation. They come in ever increasing numbers to visit, retire or seek a livelihood.

A growing concern about past exploitation of the natural resources has stimulated a desire to preserve portions of these resources in parks, wilderness and other special use categories. Many such areas exist across the Idaho landscape.

Major Uses of Land in Idaho

Approximately 27 percent of all land in Idaho is classified as being in farms (Table 4). This is about 88 percent of all land in private ownership. Of the land in farms, less than one-half (43 percent) is cropland. Grassland pasture (47 percent) exceeds the area devoted to cropland agriculture. Forest land, farmsteads, farm roads and waste land compromise about 10 percent of the total farm land.

Over one-half of the land not in farms (52 percent) is pasture and range. The 12.5 million acres of forest land that are not grazed is the next most extensive use of land and comprises 32 percent of all land not in farms. Major uses of land by county in Idaho are shown in Appendix Table A-6.

Land Used for Livestock Production

Physical features of Idaho create an environment well suited to the production of range livestock. Mountain areas provide ample summer grazing, foothills and plateau lands sustain animals during spring and fall periods and the lower river breaks, deserts and irrigated land furnish feed and forage through the winter months. On account of this, no other land use activity is as extensive as animal grazing. At least 65 percent of the total land area is grazed by domestic livestock (Appendix Table A-7). Of the 33.7 million acres of federal land in the state, 71 percent furnishes forage for livestock. Livestock graze 95 percent of all land administered by the Bureau of Land Management and 58 percent of that under control of the U.S. Forest Service (Figure 21). About 84 percent of the 2.5 million acres of state owned land is leased for grazing. Over 52 percent of the privately owned land supplies forage for livestock when crop aftermath that is grazed is included.

Considering acreages devoted to growing crops used only for livestock feed (hay, oats, corn silage, etc.), approximately 40 percent of all cropland is oriented to the livestock industry (Appendix Table A-8). This does not include the acreages of wheat which may be used for

Table 4. Major uses of land in Idaho, 1969.^a

Use	Area (1000 Acres)	Percent of Land Use
TOTAL LAND AREA		52,913
Land in Farms	14,417	27.2
Cropland	6,166	11.6
Use for crops	4,901	9.3
Soil improvement crops and idle	298	0.6
Used only for pasture	967	1.8
Grassland Pasture	6,758	12.8
Forest Land	972	1.8
Other Land ^b	521	1.0
Farmsteads, farm roads and lanes	102	0.2
Other	419	0.8
Land not in Farms	38,496	72.8
Pasture and Range	19,889	37.6
Forest Land not Grazed	12,484	23.6
Other Land ^c	6,123	11.6
Urban areas	122	0.2
Rural transportation areas	286	0.5
State institutional and miscellaneous uses	18	<i>d</i>
Other	5,697	10.8

^a Source: Frey, H.T. 1973. Major uses of land in the United States: summary for 1969. U.S. Dept. of Agric., Econ. Res. Service, Agric. Econ. Rep. No. 247. 42 p.

^b Includes farmsteads, farm roads and lanes, ditches and miscellaneous areas.

^c Includes various special uses of land and miscellaneous land generally having low value for agriculture purposes.

^d Less than 0.1 percent.



Figure 20. Cropland devoted to growing feed for livestock and cropland aftermath grazed increases the importance of livestock production as a land use activity in Idaho.

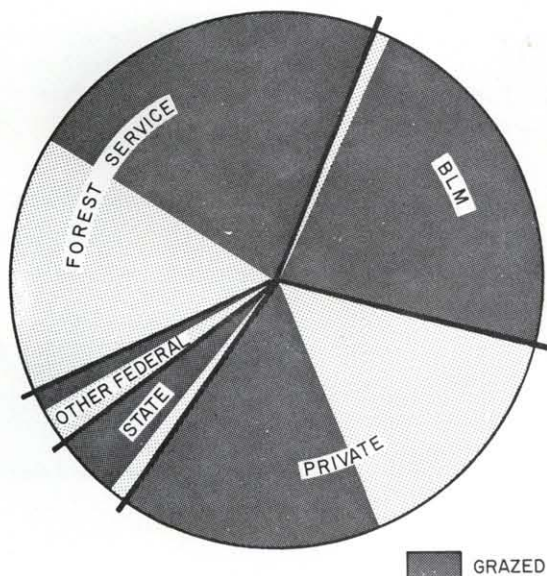


Figure 21. Land area grazed in Idaho by ownership class.

livestock feed. Much of Idaho's economic health is thus tied to the production of livestock and livestock products.

Considering that about three-fourths of the state's land surface is mountainous and thus too rough for intensive cropland agriculture; and that the climate in the more level areas is semi-arid with insufficient precipitation for crop production without irrigation; it is not surprising that the major agricultural activity is range livestock production.

LIVESTOCK NUMBERS. The number of beef cattle in Idaho has increased from 414 thousand in 1940 to 1.8 million in 1975, more than a fourfold increase (Figure 22). While beef cattle numbers have increased, those of stock sheep and lambs have declined. Sheep numbers stood at 1.8 million in 1940 and dropped to 560 thousand in 1975 (Appendix Table A-9).

Many problems have beset the sheep industry over the years. Significant in causing declining numbers are problems of finding labor to tend and herd the sheep, low market value for the wool because of competition from synthetics and foreign markets, and the attitude of recreationists, hunters, wildlife managers, public land officials and the general public.

PUBLIC LAND GRAZING PERMITS. Range livestock production enterprises in Idaho are highly dependent on the use of public lands administered by the U.S. Forest Service and the Bureau of Land Management to complete the year-long production cycle.

Private lands acquired during the settlement period through the various Homestead Acts were often insufficient to support a livestock enterprise if the sale of

animals was the only source of income. Considering that a requirement of 5 acres of rangeland to support an animal unit month (AUM) ranks as better than average, then a 160 acre Homestead would provide for 2.7, an Enlarged Homestead 5.3 and a Stock Raising Homestead for 10.6 animal units³ year-long. An individual could obtain land under more than one land alienation act but even this did not provide sufficient carrying capacity for a viable ranching enterprise in the semi-arid and arid regions of the country. Consequently, the lands taken up under the Homestead Acts were the more productive areas along streams or where water was available to irrigate crops that could be used to feed livestock during the winter period. Public rangelands were largely used during the spring, summer and fall to complete the year-long animal production process. This interrelationship of private and public lands is illustrated on the cover.

Grazing permits for use of the national forests were first issued in the late 1890's when the forest reserves were administered by the Department of Interior. The U.S. Forest Service continued this practice when the reserves were transferred to the Department of Agriculture in 1905.

The land that came under jurisdiction of first the Grazing Service and later the Bureau of Land Management was grazed without restriction until passage of the Taylor Grazing Act in 1934. The Grazing Service adopted a permit system similar to that of the Forest Service in regulating the use of lands they administered for grazing.

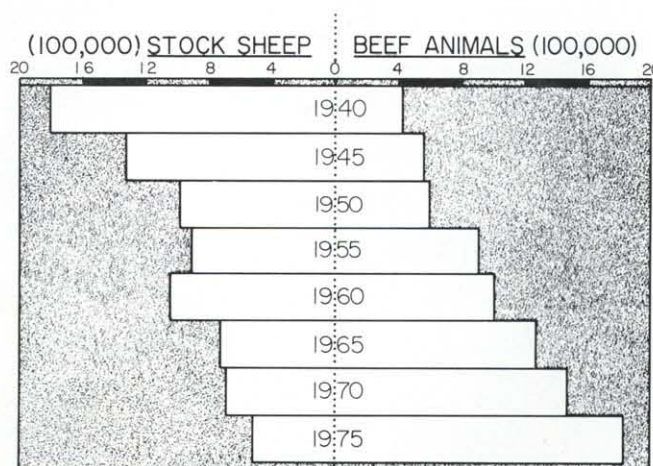


Figure 22. Total number of beef animals and stock sheep in Idaho from 1940 to 1975.

³The forage or feed required to support the equivalent of a 1,000 pound animal.

Since 1947, the number of cattle and horses grazing both U.S. Forest Service and Bureau of Land Management administered lands have increased (Figure 23). Sheep numbers, however, have declined steadily during the same period. The increased cattle numbers are largely a result of converting sheep allotments to cattle allotments and acquisition of additional area by the Forest Service.

Total livestock use of an area is more accurately reflected by animal unit months (AUM's) permitted than numbers of livestock. This value puts sheep and cattle on the same basis (five sheep equal one cow which equals one animal unit) and considers length of grazing season as well as numbers of animals. Animal unit months of grazing in total has decreased 12 percent on BLM lands and 19 percent on U.S.F.S. lands from that permitted in 1947 (Figure 23 and also Appendix Table A-10).

The increase in numbers would have been less and the reduction in AUM's greater except for the addition of 48 thousand acres of the Curlew National Grassland to the national forest system lands in 1960. The number of cattle permitted on this area was 3,351 for a total use of 19,306 AUM's in 1975.

In the late 1800's and early 1900's livestock grazing was the predominant or, in many cases, the only economic use of the public forage resources. However, an increasing national population and greater individual wealth of the people, coupled with a high level of mobility has created demands for uses other than livestock grazing on the rangeland resources of Idaho and the nation.

Statistics, compiled by the Public Land Law Review Commission and supplied to the University of Idaho (1970), for 1966 show that livestock grazing had been excluded from about one million acres of public land administered by the Bureau of Land Management and U.S. Forest Service (Table 5) for watershed protection, recreation, wildlife use and because of loss due to alienation under various land laws.

Table 5. Number of acres withdrawn from livestock grazing in Idaho by the U.S. Forest Service and the Bureau of Land Management as of 1966.^a

(1000 acres)			
Use	USFS	BLM	Total
Watershed	912	10	922
Recreation	72	2	74
Land Laws	0	3	3
Wildlife	61	0	61
Total	1045	15	1060

^aData from information supplied to the University of Idaho by the Public Land Law Review Commission.

Although the Bureau of Land Management did not exclude livestock from land important for wildlife, adjustments in number of livestock permitted have been made (Table 6). These actions explain in part reasons for decreases in permitted use of the public lands.

Table 6. Summary of forage allocations for animals used incident to recreational use and big game for Idaho, 1966.^a

Administrative Agency and Class of Land	Pack Stock	Big Game	Total
(1,000 AUM's)			
Forest Service	10	21	31
Bureau of Land Management	0	156	156
Total	10	177	187

^aData from information supplied to the University of Idaho by the Public Land Law Review Commission.

SEASONAL USE OF IDAHO'S RANGELANDS. Range livestock enterprises in Idaho are mainly cow-calf operations and thus require a source of feed for animals throughout the year. Because of this requirement, such enterprises are highly dependent on public lands administered by the U.S. Forest Service and the Bureau of Land Management. Public lands administered by the BLM supply predominately spring-fall and spring-summer grazing areas (Table 7). Lands administered by the U.S. Forest Service are used principally for summer grazing.

Private and state leased rangelands generally are the type that contribute to the spring-fall grazing capacity of the ranch operation. Much of the privately owned land produces forage crops used to maintain the breeding herd during the winter months.

Although the privately owned lands supply a greater portion of the year-long feed requirements than the public lands, the public lands are crucial in maintaining the integrity of the ranch ecosystem.

QUALITY OF RANGELANDS IN IDAHO. The carrying capacity of rangelands in Idaho is extremely variable as would be expected in an area with such diverse physical features. A classification of grazing capacity of the lands administered by the U.S. Forest Service and the Bureau of Land Management indicates that only 14 percent requires less than 5 acres to support an animal unit month (Table 8).

The national forest system lands, because they occur at higher elevations and receive greater amounts of precipitation, are generally more productive than those administered by the Bureau of Land Management.

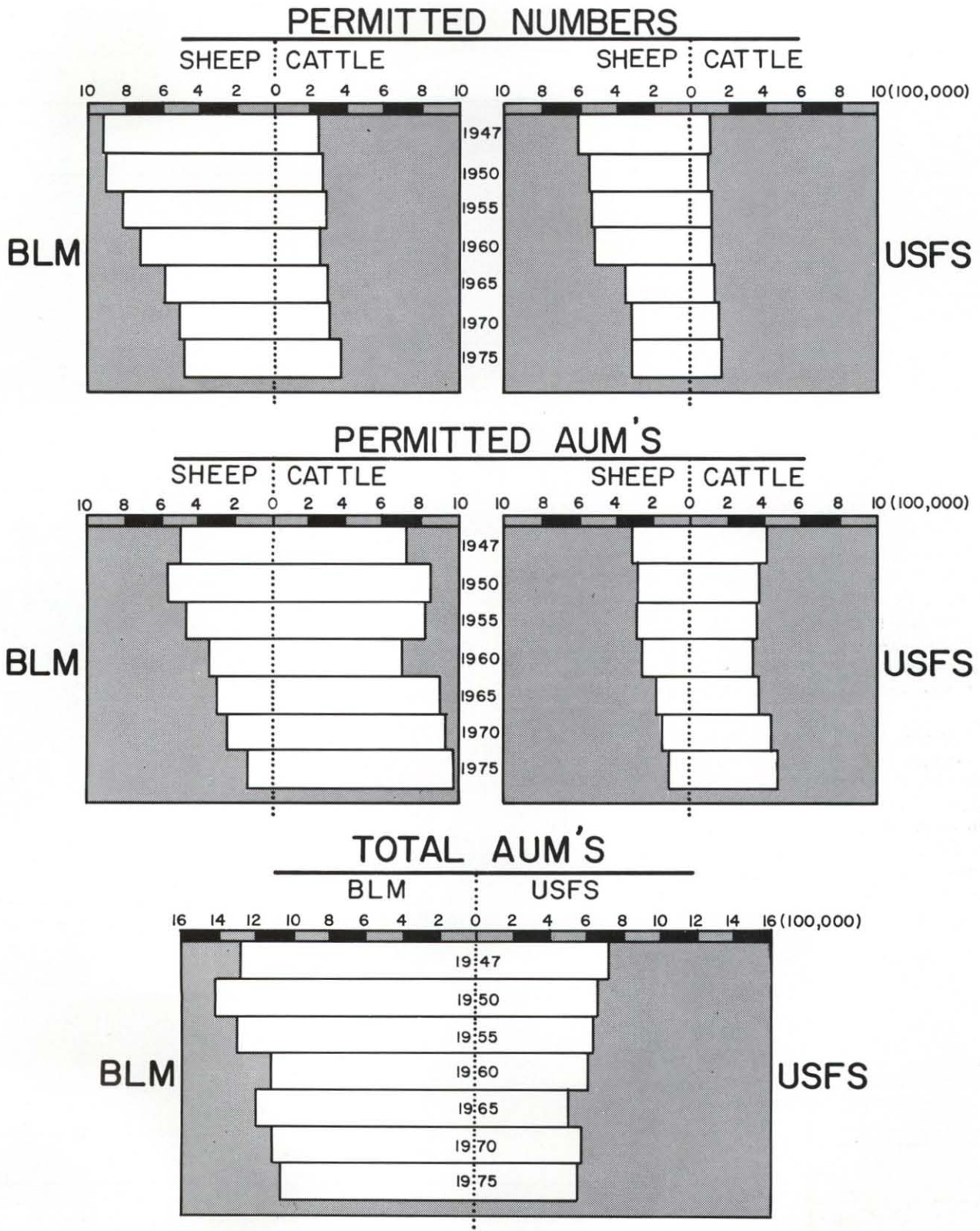


Figure 23. Permitted numbers and AUM's of use on U.S. Forest Service and Bureau of Land Management administered land in Idaho from 1947 to 1975.

Table 7. Percentage of land allocated for grazing by the U.S. Forest Service and the Bureau of Land Management that was grazed in the different seasons of the year, 1966.^a

Agency	Season of Permitted Grazing					Total
	Spring Fall	Spring Summer	Summer	Winter	Year Long	
U.S. Forest Service	2.4	3.7	92.1	1.5	0.3	100.0
Bureau of Land Management	53.3	33.2	7.7	5.3	0.5	100.0
Total	27.6	18.3	50.3	3.4	0.4	100.0

^a Data supplied to the University of Idaho by the Public Land Law Review Commission.

Much of the land administered by the BLM in Idaho is inherently low producing because of limited precipitation and soil development. These lands were largely unsuited for disposal under the various homestead and settlement acts and were subjected to uncontrolled use for a longer period (until 1934) than those administered by the Forest Service.

Some improvements in carrying capacity of public lands have occurred because of investments in seeding, undesirable plant control, water developments and other range improvement practices. The U.S. Forest Service had seeded 41.5 thousand acres, controlled undesirable plants on 82.4 thousand acres and provided 989 additional water developments through 1970 on rangelands in Idaho (Godfrey 1972).

The range improvement program of the BLM has been more extensive than that of the Forest Service. Through the year 1970, nearly a million acres (992 thousand) of rangeland had been seeded. An additional 332.6 thousand acres had been treated for undesirable plant

control and 2,348 reservoirs, wells, ponds, springs, etc., had been developed (Godfrey 1972).

In 1966 it was estimated that 68 percent of the land suited for grazing and administered by the U.S. Forest Service in Idaho would benefit from some form of range improvement practice. About 71 percent of BLM land was judged to need and would benefit from such practices (University of Idaho with Pacific Consultants, Inc. 1970).

Private land owners have invested more heavily in rangeland development and improvement than the federal agencies. Private and state land seeded through 1970 amounted to 549 thousand acres. Brush and other undesirable plants were treated on 913 thousand acres and 4,369 water developments were installed, adding to the livestock productive capacity of private lands. Additional land has been converted to irrigated pasture and cropland to grow feed for livestock. As a consequence animal numbers in Idaho more than doubled from 1950 to 1970 and tripled by 1975 (Appendix Table A-9).

Table 8. Percentage of land allocated for grazing by the U.S. Forest Service and the Bureau of Land Management that was in various grazing capacity classes, 1966.^a

Agency	Grazing Capacity Classes - Acres/AUM					Total
	Under 5	5-10	10-15	15-25	Over 25	
U.S. Forest Service	28.8	36.6	19.9	8-7	6.0	100.0
Bureau of Land Management	19.4	28.7	28.8	15.3	17.8	100.0
Total	14.3	30.7	26.5	13.6	14.8	99.9

^a Data supplied to the University of Idaho by the Public Land Law Review Commission.

RANGE CONDITION. Range condition and trend evaluations became a formalized tool in making management decisions in the late 1930's and early 1940's. Range condition has been defined as the present state of the range with respect to its potential herbage production (Humphrey 1945, Sampson et al. 1951) or the climax plant community (Ellison 1949, Parker 1949). In either case, range condition evaluation is essentially the application of ecological principles and knowledge to management planning. The range condition classes (excellent, good, fair and poor) thus represent the major successional stages of plant communities as influenced by grazing use (Parker 1954). Range trend is a judgement as to whether the state of the range is improving (upward), declining (downward), or staying the same (static).

Although range condition classification by federal agencies continues, most areas had been classified by the mid 1960's. In 1966, estimates of range condition in Idaho showed 17.5 percent of the land administered by the U.S. Forest Service to be in excellent condition (Table 9). Only 2.7 percent of the land administered by the Bureau of Land Management was so classified. About 20 percent of the Forest Service and 25 percent of the BLM land were classified in poor condition. Significantly more land in Idaho appears in the excellent and good condition classes than the average of the 11-western states.

Table 9. Percentage of land^a administered for grazing by the U.S. Forest Service and the Bureau of Land Management in four range condition classes, 1966.^b

Range Condition Class	USFS		BLM	
	Idaho	Eleven Western States	Idaho	Eleven Western States
Excellent	17.5	2.9	2.7	2.2
Good	20.6	15.7	20.7	16.7
Fair	41.7	44.1	51.9	51.6
Poor	20.2	37.2	24.7	29.5

^a Percentages are based only on land classified as suitable for grazing.

^b University of Idaho with Pacific Consultants, Inc. 1970. Public land study: The forage resource. U.S. Dept. of Commerce/National Bureau of Standards, Clearinghouse for Fed. Sci. and Tech. Inform., PB 189-249. p III-12 and III-13.

Range condition classification in 1973 for public domain lands in Idaho indicated 3 percent in excellent, 24 percent in good, 52 percent in fair, 19 percent in poor and 2 percent in bad condition. At that time 17 percent of these range lands were judged to be improving, 71 percent were not changing and 12 percent were declining in range condition (Bureau of Land Management 1974).

A 1977 compilation of range condition by the Forest Service showed 39 percent of the suitable range in Idaho to be in excellent or good condition, 46 percent in fair and only 15 percent in poor or very poor condition (Cox 1978).

As indicated in the section on vegetation of Idaho, identification of climax plant communities is not well developed at present. Plant community description and classification is required before reasonable estimates of range condition and trend can be made. Present estimates can only be gross guides or indices to actual range condition and trend.

Natural variations in yearly distribution of precipitation, populations of herbage destroying insects, rodents, etc., are often not considered, or at least underrated as to importance, in making judgements of range condition and trend.

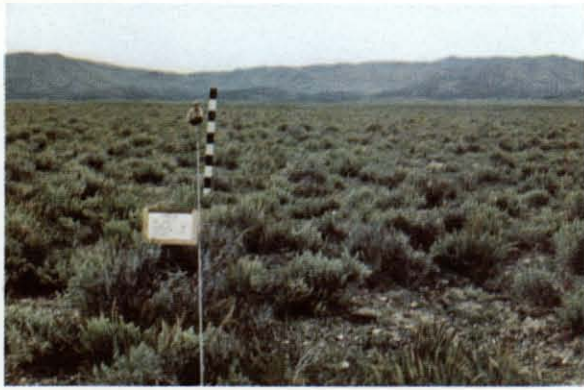
The variation in appearance of a plant community of the salt-desert shrub type in southern Idaho illustrates the problem of making condition and trend judgements (Figure 24). Between 1955 and 1958 a scale insect (*Orthezia annae*) infested the shadscale plants and caused the majority of them to die. Annual plants of halogeton, peppergrass and tansymustard dominated the stand through the dry years of 1959, 1960 and 1961. Return of shadscale was noticeable in 1963 and squirreltail grass increased in abundance after this time. More than average precipitation fell on the area in 1962, 1963, 1964 and 1965 and the vegetation responded accordingly. If a visit to the area had been made in these years and again in 1966 or 1969, the range condition, based on commonly used indicators, would in all probability have been rated lower in 1966 and 1969 and trend indicated as downward. The lower condition and downward trend rating in these two years would not be justified since the area had not been grazed by domestic livestock since 1945.

It is difficult to believe, however, that substantial improvement in range conditions has not occurred in the last four or five decades. Renner (1954) of the Soil Conservation Service stated:

"... I believe most people who are widely familiar with western ranges will agree that during the past 25 years there has been marked improvement in range conditions throughout almost all of the area. The startling fact is that this improvement has taken place in the face of almost continuously increasing livestock numbers, instead of the reductions once thought necessary."

Data presented by the Forest Service and the Bureau of Land Management in 1973 and 1977, although limited in applicability because of reasons stated above, support the improvement of range conditions.

Additional improvement of our range lands can be made through investments in resource development and professional application of scientific knowledge to resource problems and situations.



1951



1955



1958



1961



1963



1964

Figure 24. Variation in the appearance of a shadscale stand in southern Idaho resulting from insect activities and variations in yearly weather conditions from 1951 to 1976.



1966



1967



1969



1971



1975



1976

Figure 24. Continued.

Land Used for Wildlife

Of the many important products and values associated with the rangelands of the state, wildlife and wildlife habitat values receive high priority. This resource is of great importance and adds greatly to the quality of life experienced by Idaho residents.

Obtaining information relative to wildlife populations and habitat conditions is difficult. Wild animals are difficult to inventory compared to domestic animals. Data on area used and habitat requirements are presently limited. A better knowledge and understanding of range conditions, plant community status, and animal needs and requirements would enhance man's ability to predict the consequences of various alternative management practices for wildlife management.

Information supplied to the Public Land Law Review Commission by Colorado State University (1969) shows about 85 percent of Idaho's land area is used by big game (Table 10). Federal lands supply 67 percent and state and private lands 33 percent of land used by these animals. Over 90 percent of all federal lands and 78 percent of the land in state and private ownership supply habitat for big game animals.

Table 10. Land areas of Idaho used by game animals, 1966.^a

	Acres and Percent
Area of state used by big game	44,993,152
Percent of state land area	85
Federal land used by big game	30,214,993
Percent of all federal land	92
Percent of all land used by big game	67
State and private land used by big game	14,778,159
Percent of state and private land	78
Percent of all land used by big game	33

^aColorado State University, Dept. of Fisheries and Wildlife Biology. 1969. Public land study: Fish and wildlife resources on the public lands. Clearinghouse for Fed. Scien. and Tech. Infor., Springfield, Va. PB 187246 and 187247.

Deer and elk are the most abundant big game species in the state. Deer occur over the entire area used by all big game species (Table 11). Fifty-nine percent of deer habitat is on federal and 41 percent on state and private lands. State and private lands contribute about the same percentage to antelope habitat (42 percent) but less to elk habitat (35 percent) than that of deer. The majority of habitat for moose and bighorn sheep occurs on federal land.

The information available relative to certain wild animal populations indicate that use of the forage resources 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 (Clawson 1967). About 4.5 million big game animals are presently estimated to occur on national forests and national grasslands in the 50 states compared to an estimated number of less than one (0.9) million in 1928 (Wolfe 1972). Game use of national forests surpassed in 1961 the use made by domestic animals (Clawson 1967).

Estimates of game animal use on public lands administered by the Bureau of Land Management rose from 1.2 million animals in 1947 (U.S. Dept. of Interior, Bureau of Land Management 1947) to 2.1 million in 1975 (U.S. Dept. of Interior, Bureau of Land Management 1977). Big game numbers in Idaho on BLM lands rose from 52,800 to 79,609 during the same period, an increase of 26,809 animals (Table 12).

The animal unit months of wildlife use on federal lands in Idaho was reported as 1.2 million AUM's in 1966 (Table 13). This compares with the 1.8 million AUM's of permitted livestock use for the same year.

In 1966 permitted livestock use of Forest Service land in Idaho was 0.6 million AUM's compared to the 0.9 million AUM's of big game use. Big game use of BLM administered lands at .26 million AUM's was 22 percent of permitted livestock use.

Table 11. Acreage of big game habitat in Idaho for selected species, 1966.^a

Species of animal	Total Acres	(1000 acres)			
		Federal		Other ^b	
		Acres	Percent	Acres	Percent
Deer	44,993	26,585	59	18,408	41
Elk	23,830	15,548	65	8,272	35
Antelope	7,940	4,641	58	3,299	42
Bighorn Sheep	3,705	3,052	82	653	18
Moose	13,284	12,284	93	949	7

^aPublic Land Law Review Commission Staff. 1970. Inventory information on public lands. National Tech. Inform. Service. U.S. Dept. of Commerce, Springfield, Va. Vol. I PB 194197.

^bMostly private and state lands.

Table 12. Estimated number of big game animals using public lands administered by the Bureau of Land Management, 1947 and 1975.

Animal	1947 ^a	1975 ^b	Increase or Decrease (-)
Deer	37,080	61,650	24,570
Elk	1,930	6,489	4,559
Antelope	12,605	10,420	-2,185
Bighorn Sheep	400	500	100
Moose	24	170	146
Mountain Goat	400	10	-390
Black Bear	140	370	230
Total	52,800	79,609	26,809

^a U.S. Dept. of Interior, Bureau of Land Management. 1947. Report of the Director of the Bureau of Land Management, 1947. Statistical Appendix. Washington, D.C.

^b U.S. Dept. of Interior, Bureau of Land Management. 1977. Public land statistics 1976. U.S. Govt. Printing Office, Washington, D.C.

Because of the extensive mountainous region in Idaho, summer habitat for game animals is in greater supply than winter habitat areas. Seasonal use of federal lands in Idaho (Table 13) indicates that 90 percent of the game use in the summer months occurs on federal land. Winter range is more critical in the management of game animals from the standpoint of area available. More of the critical winter range areas are in private and state ownerships (36 percent) than those used during the summer.

In addition to wildlife and domestic livestock use of the forage resources, a growing population of wild horses is dependent on the rangelands of Idaho. In 1976 an estimated population of 1,060 horses consumed 15.9 thousand AUM's of forage (Table 14).

Table 14. Number of wild horses and AUM's of use in Idaho, 1976.

Agency Reporting	Number	AUM's ^c
Bureau of Land Management	1,055 ^a	15,825
U.S. Forest Service	5 ^b	75
Total	1,060	15,900

^a U.S. Dept. of Interior, Bureau of Land Management. BLM facts, Idaho. State Director's Office, Boise, Idaho. p. 22.

^b Personal communication with Winn Green of the Region 4 office of the U.S. Forest Service, Ogden, Utah.

^c A conversion ratio of 1.25 animal units per horse multiplied by 12 months.

Land Used for Recreation

A few short years ago, the average wage earner of this country spent most of the income earned to provide the necessities of life, i.e., food, clothing and shelter. Little time and less excess money existed for recreational activities of the type participated in by people today.

In 1900 the average weekly hours of employment was 60.2. This dropped to 49.7 hours in 1920, 45.9 in 1930, 40.0 in 1950 and is predicted to be 32 by 1980 (Clawson et al. 1960). Per capita personal income was \$1,504 in 1950 and is predicted to be nearly double this in the 1980's. Thus the time and excess income of the wage earner over that needed to provide the necessities of life is being directed more and more to outdoor recreational activities. Continuing improvement in modes of travel and access to a greater land area through increased numbers of roads, landing fields and boating facilities cause increased demands for recreational use of the land resource.

The spectacular scenery, the high percentage of land that is forested, and the numerous lakes and miles of running water make Idaho an exceptionally attractive area for recreationists. In addition to the more common

Table 13. Wildlife use in animal unit months (AUM's)^a on federal lands in Idaho, 1966.^b

Agency	Summer	Winter	Total	Percent of state AUM's on Federal land.	
				Summer	Winter
U.S. Forest Service	723,456	177,060	900,516	c	
Bureau of Land Management	187,768	79,044	266,812	c	
All other Federal Agencies	1,057	434	1,491	c	
Total	912,281	256,538	1,168,819	90	64

^a Animal unit months (AUM's) are calculated from 1962-1966 average population estimates supplied directly or indirectly by the state game and fish agencies. These estimates vary in reported accuracy from less than 70 percent to more than 95 percent.

^b Public Land Review Commission Staff. 1970. Inventory information on public lands. National Tech. Inform. Service. U.S. Dept. of Commerce, Springfield, Va. Vol. I PB 194-197.

^c Data not presented in source cited above.

activities of camping, picnicking, hunting and fishing, a substantial recreational use involving off-road vehicles has developed.

Data compiled by Clawson (1967) showed that total recreational visits to national forests more than doubled between 1956 and 1964 and had increased thirty times between the periods 1925-29 and 1968-72. The estimated number of visitor days to national forest system lands in Idaho increased by slightly more than ten million from 1966 through 1975 (Appendix Table A-11).

The Bureau of Land Management began a continuing inventory and evaluation of outdoor recreation resources in 1962. The data compiled show an increase from 720 thousand visitor days in 1964 to over five million in 1976 (Appendix Table A-12).

By 1966 federal agencies had withdrawn approximately 160 thousand acres of public land from livestock grazing for recreational use (University of Idaho with Pacific Consultants, Inc. 1970). A recent tabulation (Table 15) of areas in Idaho with special use designation indicates that the dominant use on most of these is recreation oriented. Other uses may not be excluded but are permitted only as long as they do not interfere with the purpose for which the area was designated.

About 1.5 million acres in Idaho are designated as wilderness and another 1.4 million acres of primitive areas may be designated as wilderness. Under direction provided by the Federal Land Policy and Management Act of 1976 (P.L. 94-579), the Bureau of Land Management is required to review those roadless areas of five thousand acres or more having wilderness characteristics as described in the Wilderness Act of 1964. As a consequence, additional wilderness is likely to be designated for Idaho.

The two designated National Recreation Areas in Idaho occupy 1.4 million acres but 0.3 million acres of this is included in the wilderness designated areas. Wild and scenic rivers, national parks, natural areas, state parks, national wildlife refuges, land owned by the Idaho Fish and Game Department and research natural areas encompass an additional 0.5 million acres.

The special use areas listed above total to about 4.5 million acres or 8.5 percent of the total land area of the state. When the 6.4 million acres of undeveloped or roadless areas outside designated primitive areas of the Forest Service—much of which is candidate wilderness area—is added to the 4.5 million acres, then about 20 percent or more of the state's land area is or has the potential of being specifically designated primarily for recreation or scientific purposes.

The desire to visit wilderness and other back country areas of Idaho has led to an increase in grazing pressure by horses and mules used as riding and pack stock. Records of such use are limited. Estimates of use made by horses incident to recreational use were made by the Forest Service for the Public Land Law Review Commission (University of Idaho with Pacific Consultants, Inc. 1970) from 1962 through 1966. Beginning in 1973 free use permits for recreational stock were tabulated separately in the "Grazing Statistical Reports of the

Forest Service" (U.S. Dept. of Agric., Forest Service 1974, 1975, 1976). These data permit rough comparisons to be made (Table 16). The data indicate that there has been nearly a 50 percent increase in AUM's of use by recreational stock in 1976 over that in 1962. The Bureau of Land Management, at this time, does not tabulate such information.

Land Used for Water Production

Water covers more than 563 thousand acres of the surface area within the boundaries of Idaho (U.S. Dept. of Interior, Bureau of Land Management 1977). There are over 16,000 miles of streams and more than 2,000 natural lakes. Numerous man made lakes and reservoirs appear across the landscape and more than 51 of these have a storage capacity of 5,000 acre feet or more (Idaho Water Resources Board 1972).

The average annual water yield for Idaho is estimated at 38.2 million acre feet (Wheatley et al. 1969). Of this water yield, 76 percent is derived from public lands within the state. The lands administered by the Forest Service supply 74 percent of that derived from public lands.

Water consumption and use is increasing rapidly. Important uses of water in Idaho, other than for culinary and urban use, are irrigation of farm land, generation of hydroelectric power, food processing and recreational activities.

Irrigated land in Idaho was estimated at 3.5 million acres in 1966 and more than 3.7 million acres in 1971 (Idaho Water Resources Board 1972). The total irrigable area in the state has been estimated at 12.1 million acres. Since irrigation is by far the largest consumptive water use in the state, the development of additional acreages will need to be carefully considered in connection with other water uses and energy requirements. Since most of the potentially irrigable area is presently range land, any mass conversion of this land to irrigation may adversely affect range livestock production.

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. Regulations of both agencies state that a watershed may be closed to the grazing of livestock when necessary to reduce accelerated erosion, increase water yield, or prevent pollution. Between 1947 and 1966 grazing was excluded from about 922 thousand acres in Idaho for watershed protection (University of Idaho with Pacific Consultants, Inc. 1970). All but ten thousand acres of this was administered by the Forest Service.

Table 15. Special use designated areas in Idaho, 1978.

Type of Area	Date Established	Ownership in Acres			Percent State Area	Remarks
		Federal	State & Private	Total		
WILDERNESS						
Selway-Bitterroot ^a	1936	988,688	491	989,179		Within NRA boundaries
Sawtooth ^a	1972			216,383		Within NRA boundaries
Hell's Canyon ^b	1975			84,100		
Gospel Hump ^c	1978			206,000		
SUBTOTAL				1,495,662	2.82	
PRIMITIVE AREA						
Idaho	1937	1,224,190	8,011	1,232,804		Primitive area acreages also included in RARE II acreages.
Salmon River Breaks	1936	216,870	315	217,185		
SUBTOTAL				1,449,989	2.74	
WILD AND SCENIC RIVERS^d						
						RIVER MILES
Middle Fork, Clearwater	1968			7,040		22.0
Lochsa	1968			21,760		68.0
Selway	1968			35,520		111.0
Middle Fork, Salmon	1968			35,520		111.0
Snake	1975			9,701 ^e		67.5
Rapid	1975			8,412 ^e		26.8
St. Joe (proposed)				21,803 ^f		72.8
SUBTOTAL				139,756	.26	Subtotal includes proposed St. Joe River
NATIONAL RECREATION AREAS						
Sawtooth ^{a,g}	1972	727,769	27,358	538,744		Total area of Sawtooth NRA, including wilderness, equals 755,127 acres
Hell's Canyon ^b	1975			577,900		
SUBTOTAL				1,116,644	2.11	Total area of Hell's Canyon NRA, including wilderness, equals 662,000 acres
RARE II (USFS-ROADLESS AREA^h REVIEW & EVALUATION II)						
	1978	7,803,862	122,876	7,926,738	14.98	
NATIONAL WILDLIFE REFUGESⁱ						
Minidoka	1909			25,630		
Deer Flat	1909			11,424 ^j		
Camas	1937			10,565		
Bear Lake				16,978 ^j		
Kootenai	1965			2,762		
Grays Lake	1965			16,033 ^k		
SUBTOTAL				83,483	.16	
NATIONAL PARKS AND MONUMENTS^l						
Craters of the Moon	1924	53,545		53,545		
Yellowstone	1872	31,488		31,488		
Nezperce National Historical Park	1965	1,391		3,000		
SUBTOTAL				88,033	.17	
NATURAL AREAS^m						
Established:						
Forest Service		7,021		7,021		
The Nature Conservancy			888	888		
Idaho State University			120	120		
Recognized but not established:						
National Park Service		600		600		
Bureau of Land Management:						
Snake River Birds of Prey						
Natural Area ⁿ		31,000		31,000		
Forest Service		423		423		
SUBTOTAL				40,052	.08	
STATE PARKS^o						
				27,007	.05	

(continued)

Table 15. Continued.

Type of Area	Date Established	Ownership in Acres			Percent State Area	Remarks
		Federal	State & Private	Total		
IDAHO FISH/GAME^p						
Owned				78,297	.15	
BUREAU OF INDIAN AFFAIRS^q		33,000		829,000	1.57	
ATOMIC ENERGY COMMISSION^r		572,307		572,307	1.08	
DEPARTMENT OF DEFENSE^r						
Air Force				112,291		
Army				1,742		
Navy				22		
Corps of Civil Engineers				51,711		
SUBTOTAL				165,766	.31	
TOTAL				14,012,734	26.48	
Land Area of State = 52,913,280 acres ^r						

^a U.S. Dept. of Agric., Forest Service. 1976. National Forest system areas as of June 30, 1975. U.S. Govt. Printing Office, Washington, D.C.

^b U.S. Dept. of Agric., Forest Service. 1976. Hell's Canyon National Recreation Area planning team fact sheet.

^c Endangered American Wilderness Act, Public Law PL 95-237. Feb. 24, 1978.

^d Michalson, E.L. and Joel Hamilton. 1973. Scenic river study No. 10. Summary report for a methodology study to develop evaluation criteria for wild and scenic rivers. Water Resources Research Institute, University of Idaho, p. 3.

^e U.S. Dept. of Agric., Forest Service, Nez Perce National Forest, Payette National Forest, & Wallowa-Whitman National Forest. 1977. Snake and Rapid Rivers proposed wild and scenic river boundaries: Hell's Canyon National Recreation Area. p. 11, 14. Acreage estimated to be half of total.

^f Personal communication with Ed Javorka, Panhandle National Forest, May 31, 1978. Senate Bill 3052 introduced into Senate by Senator Church on May 9, 1978.

^g Young, H.B. 1973. Geology of the Sawtooth National Recreation Area. *In* *Naturalist* 24(2):3.

^h U.S. Dept. of Agric., Forest Service. 1978. RARE II. Idaho supplement to draft environmental statement: roadless area review and evaluation. USFS Intermountain Region (R-4) and USFS Northern Region (R-1), p. B-1 to B-5.

ⁱ U.S. Dept. of Interior, Fish and Wildlife Service. 1973. National wildlife refuges in Region 1, Bureau of Sport Fisheries and Wildlife, RL 89-R3.

^j U.S. Dept. of Interior, Bureau of Sport Fisheries and Wildlife, Portland, Oregon. Information collected by Carl Hruska. Figures reported as of Oct. 11, 1973.

^k Personal communication with Gray's Lake National Wildlife Refuge, Spring, 1977.

^l U.S. Dept. of Interior, National Park Service. 1972. National parks and monuments. Areas administered by the National Park Service and related properties as of January 1, 1972. U.S. Govt. Printing Office, Washington, D.C., p. 16.

^m Established Natural Areas in Idaho, and Other Recognized Natural Areas in Idaho, April 1978. Tables furnished by Chuck Wellner, Chairman, Research Natural Areas Committee, Moscow, Idaho.

ⁿ U.S. Dept. of Interior, Bureau of Land Management. 1971. Withdrawal for natural area, Public Land Order I-3823. Code of Federal Regulations, Title 43—Public Lands: Interior, Chapter II—Bureau of Land Management, Appendix—Public Land Orders.

^o Idaho Division of Budget, Policy Planning and Coordination. 1976. County profiles of Idaho. (Indicators for a development strategy). Bureau of State Planning and Community Affairs, Statehouse, Boise, Idaho.

^p Compiled from State of Idaho Fish & Game Department Land Compilation as of Feb. 1, 1976.

^q U.S. Dept. of Commerce, Bureau of the Census. 1977. Statistical abstracts of the United States. National data book and guide to sources. 98th annual edition. U.S. Govt. Printing Office, Washington, D.C.

^r U.S. Dept. of Interior, Bureau of Land Management. 1977. Public land statistics. 1976. U.S. Govt. Printing Office, Washington, D.C.

Table 16. Use of national forests in Idaho by recreational stock, 1962-1975.^a

Year	Number	AUM's
1962	<i>b</i>	8,407
1963	<i>b</i>	8,033
1964	<i>b</i>	9,294
1965	<i>b</i>	9,735
1966	<i>b</i>	10,297
1973	10,385	10,704
1974	22,305	8,216
1975	16,345	12,128

Table 16. Continued.

^a Data for 1962-1966 taken from: University of Idaho with Pacific Consultants, Inc. 1970. Public land study: The forage resource. Clearinghouse for Fed. Sci. and Tech. Inform., Springfield, Va. PB 189249, PB 189251 and 189252. Data for 1973-1975 taken from: U.S. Dept. of Agric., Forest Service, 1974, 1975 and 1976. Annual grazing statistical reports. Use summary, 1973, 1974, 1975. Data for 1962-1966 includes permitted and nonpermitted stock. The values for 1973-1975 were obtained by adding free use recreational stock to paid horse use under temporary permit.

^b Not reported.

ISSUES AND PROBLEMS ASSOCIATED WITH RANGE USE AND MANAGEMENT

Because the rangeland resources are complex, the problems and issues relating to their use, development, improvement and management are extremely complex. The complexity of these problems and issues results not only from social and political conditions of the past and present, but also anticipated or projected future conditions. Identifying the causes and suggesting solutions to rangeland problems are made difficult by the complexity of the issues involved.

Although of more direct concern to the western states, and people residing in those states, rangeland problems and their resolutions are of major concern to the nation, both now and in the future. How the problems are resolved will impact the general welfare of the people of Idaho and the nation more significantly than any time since the initiation of land disposal policies. An increasing population with additional needs for food, clothing and shelter along with demands for less environmental pollution and more outdoor recreational opportunities will make this so.

Problems in rangeland use, development and management began to develop soon after settlement pressed westward from the humid and sub-humid areas to the semi-arid and arid regions of the United States.

As early as 1863 the Secretary of the California Woolgrowers expressed concern over deterioration of rangeland productivity (Talbot and Cronemiller 1961). Public land commission reports of 1880 (Williamson et al. 1880); 1905 (Richards et al. 1905); 1931 (Committee on the Conservation and Administration of the Public Domain 1931); and 1970 (Public Land Law Review Commission 1970) all identified problems and issues associated with the rangeland resources. Numerous studies and publications from a variety of fields - agricultural economics, range science, forestry, geography, history and agricultural policy - have discussed rangeland problems and their solution.

In spite of all the previous attention given to problem identification and suggested solutions, present day rangeland problems and issues have increased and become more acute.

The national public lands were first created when the original states surrendered their western land claims to the federal government (Gates 1968). The size of this public domain was enlarged through purchase, accession, treaty and compromise. No other country in the world has had the privilege and responsibilities of disposing of so much land for settlement and development in a national interest that did not include colonial or imperial purposes (Hibbard 1916).

Several questions were raised and debated regarding the purpose for administration and disposition of the public lands. Were they to be administered for the benefit of all the states or to assure speedy settlement of

the newer communities which would later become states? What level of government, state or federal, should be the major dispenser of land titles?

The public lands policy first developed was that of selling the land for the purpose of running the federal government and retiring the Revolutionary War debt. As surpluses of money over that needed to run the federal government and meet debt obligations accrued they were distributed, for a time, to the various states based on representation in Congress. The non-public land states received the majority of the proceeds because of their greater population densities. This distribution of proceeds seemed to favor the position that the public lands were to be administered for the direct benefit of all the states. Educational grants, which included public land scrips issued to the older non-public land states, also favored this position.

The western or newer states' position of seeking speedy settlement and authority in the dispensing of land titles was favored by the passage of the various private land grants and grants to states for internal improvements, transportation and reclamation.

Today as in the past, the central issue in public land management is how these resources are to be used; for what purpose will they be used; who will pay the costs; and who will receive the benefits.

The issue is of utmost importance to the economy, social conditions and environment of western states such as Idaho. The issue is especially acute in the eleven western states and Alaska because most of the remaining public lands (93 percent) are concentrated here. Of the public land in the 48 contiguous states, 88 percent is located in the eleven western states. In total, nearly one-half (48 percent) of all land in the eleven western states is federally owned. Only four percent of lands in Alaska are owned by other than the federal government.

BEGINNING OF RANGELAND PROBLEMS

Rangeland production was but a minor agricultural activity during the development of early land policies. Settlement had not progressed much farther west than the Mississippi Valley in the early part of the 19th century. It was a little over a century ago that the western range livestock industry was in its formative states. 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 (Dale 1930). Expansion of livestock grazing as a land use activity was rapid following the Civil War. Problems associated with range livestock production were becoming evident at the close of the 19th century.

The major problem associated with the rangeland resources, according to most analysts, whether individuals, committees or commissions relates to the decline in productivity associated with past and present use and management. Commonly identified past conditions causing the present situation are: (1) unsuitable land settlement policies for the semi-arid and arid regions; (2) geographic perceptions colored by conditions of the sub-humid and humid regions; (3) political unawareness in dealing with land policy problems; (4) lack of regulation and control over unappropriated and unreserved rangeland until 1934; and (5) inadequate recognition of the importance and value of the rangeland resources economically, socially and environmentally.

Inappropriate Land Policies

During the period of expansion of the livestock industry in the plains and western states, the early land policy was designed to stimulate settlement of the western lands. Existing policy consisted largely of free grants of land to settlers. The acreages granted or sold at very nominal costs under the existing land alienation laws ranged from 160 to 640 acres.

Precedent for the 160 acre tract was probably established in 1796 when the discussions in Congress argued in favor of land disposition to original settlers rather than through land companies. If the original settler was to be favored over speculators, then land had to be offered in small tracts and lots of 160 acres were proposed (Hibbard 1924).

The National Land Reform Association, formed in 1844 (Gates 1968) and championed by Horace Greeley, strongly advocated the granting of 160 acre tracts as free homesteads to actual settlers. Thus the basis for grants of 160 acres under the Original Homestead Act of 1862 was well established. This size tract was about as much area as could be worked with the equipment and technology available by a family operation involved in cropland agriculture.

As settlement progressed westward to the sub-humid, semi-arid and then the arid areas it became obvious that the land alienation laws designed for the east were unsuited for the western areas. In addition, 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:

"I fear this cattle-ranching, with long intervals between the ranches, is destined to half-barbarize many thousands of the next generations, whom schools can scarcely reach and to whom the sound of the church-going bell will be a stranger."⁴

Thus, land policy makers generally viewed cattle ranching as a transient occupation to be replaced by family farms as settlement moved westward. The physical environment, however, dictated otherwise.

⁴Cited in Kollmorgen (1969) p. 217.

Geographic Perceptions

The cultural background of the early colonizers, the framers of our system of government and the subsequent land policy makers, was rooted in the humid, wooded environment of western Europe. The natural physical environment of the eastern United States was similar to that from which the early settlers came. As a consequence, programs and policies for growth and development were not hampered by inexperience with an alien natural environment. In the main, farms small in acreage were directed to growing cultivated crops. Grazing animals consisted primarily of wild species and the few oxen or cattle and horses used for draft purposes.

Following the Civil War the line of settlement progressed westward from the tall grass prairie country of the eastern plains to the short grass prairies east of the Rocky Mountains and then to the semi-arid and arid regions west of the Rockies and east of the Sierra-Cascades. Precipitation decreased, soils were shallower and less fertile and water supplies were limited. Much of the early westward traffic was a movement from the wooded areas of the east to the coastal valleys of Oregon, Washington and California. The expanse between was merely an obstacle in getting from one humid environment to another.

During the period following the Civil War, the livestock industry, spawned in Texas, found a physical environment through the plains region well suited to the pasturing of livestock. Conditions were less favorable for livestock grazing in the intermountain country than the plains, but these lands could be used for few other kinds of agricultural production.

As the realities of the western environment became evident, several attempts were made to mitigate the limitations imposed by this physical environment on cropland agriculture. The Timber Culture Act of 1873 was designed to promote the planting of trees through the plains with the thought of favorably modifying the climate. It was proposed by a professor at the University of Nebraska that plowing the soil would increase rainfall and thus make the areas with scant rainfall suitable for family size farms. A series of experiments conducted by the Division of Forestry tested the rainmaking potential of gunpowder explosions (Kollmorgen 1969).

Most successful in modifying the semi-arid environment was the practice of irrigation that developed in Utah, California and Colorado and later adopted at other places where water could be obtained. The Desert Land Act of 1877, the Carey Act of 1894 and the Reclamation Act of 1902 were land policy measures designed to promote irrigation and overcome the limitations imposed by low rainfall. Settlement of small tracts as family farm units was thus made possible in some areas. Irrigable land, however, is but a small portion of the total land area in the west. As Box (1978) states:

"Seldom do people in the more humid climates understand the ecological realities of the physical environment or the sociological and economic restrictions of arid regions".

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

"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."⁵

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 (Gates 1968). Selling of the shortgrass lands west of the 100th meridian to ranches, "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 (Lavendar 1965).

In 1874-75 Hayden, Powell and Wheeler were instructed to classify the land they surveyed as agricultural, timber, pastoral or barren. 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 (Powell 1878). 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.

Political Unawareness

The conditions that existed during the settlement and development of the country were not overly favorable to livestock grazing enterprises. No distinction was made in the amount of land required for different agricultural pursuits. Intensive agriculture was promoted in an area primarily suited for extensive forms of agriculture.

That the small family farm concept did not fit western conditions, except in limited areas, is attested to by the fact that 47.5 percent of the land area of the 11 western states remains in federal ownership (U.S. Dept. of Interior, Bureau of Land Management 1977). This is in contrast to 4.3 percent federal ownership in the remaining 48 contiguous states. Domestic livestock grazing is a primary use on 69 percent of the land in these states. In Idaho 67 percent of the 52.9 million acres of land is grazed by domestic livestock.

That the politicians were wrong in their policies for land settlement and development of the semi-arid and arid areas is also supported by the massive governmental purchase program of the 1930's and early 1940's. Land utilization that developed in the plains and western states was considered so untenable that about

11.3 million acres of privately owned land were purchased by the government (Wooten 1965). About 7.5 million acres were restored to range livestock production.

Feeble recognition that 160 acres were 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. Hibbard (1924) states:

"In the language of the Chief of the Bureau of Forestry, it was nothing short of a crime to open the land to homestead under the Act of 1916."

On the average, Barns (1913) 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.

Although the amount of land required to justify a complete range livestock production unit varies greatly in various sections, Cotton (1907) 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 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 greater. Here the area required to support a family will vary from 16,000 acres in better sections to 25,000 and in some cases as much as 40,000 acres are required."

Despite the concern over rangeland deterioration that developed in a number of quarters, little was being done by the Congress to regulate grazing on the public lands to stop such injury. Department of Agriculture personnel were expressing alarm in the 1880's and 1890's at the injury occurring to rangeland because of overstocking. 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 (U.S. Dept. of Agric., Forest Service 1905).

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 (Cotton 1907). In the early 1880's, widespread objection to this fencing occurred and the U.S. Department of Interior declared fencing of the public domain illegal and took steps to correct this abuse.

⁵Cited in: Hibbard (1924), p. 425-426.

Near the beginning of the 20th century a concept developed that the general welfare of the country would be better served if certain kinds of lands were held in public ownership. Forest reserves were withdrawn from private entry and certain other special use areas were designated. The goal of settlement and development remained strong, however, in the policies that developed governing the use of the forest reserves (later designated national forests). The United States administered its reserved land not as an ordinary proprietor seeking to sell the products, i.e., timber, wood, and grazing, at the highest possible price, but offering it on liberal terms, including free use, to encourage the citizens to develop the country.

The reservation of forest land marked the beginning of orderly and regulated use of public land for grazing purposes. It cannot be inferred, however, that the intent of Congress is passing such legislation had anything to do with providing for use of public land for grazing purposes. That such intent was lacking is supported by the lack of any Congressional concern for the remaining unappropriated and unreserved public domain.

Lack of Regulation and Control

Many attempts were made to bring the unreserved and unappropriated western lands under grazing regulations following the report of the Public Land Commission appointed in 1879 (Gates 1968). Despite the continuous attempts to introduce bills in Congress that would allow leasing or some sort of permit system on these 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—Senator Burkett's bill of 1907 and the Kent Grazing Bill of 1913 (Barnes 1926).

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 (Peffer 1951). The Taylor Grazing Act, thus officially recognized that some lands were chiefly valuable for grazing and provided for regulation and use of such unreserved and unappropriated lands. It is noteworthy that the Act provided for regulation of these lands until disposal. Apparently, Congress intended that they would pass into private ownership at some future time. Not until 1976 when the Federal Land Management and Policy Act (PL 94-579) was passed did Congress indicate that it would be the policy of the United States that these lands be retained in federal ownership.

The regulations under the Taylor Grazing Act for allocating grazing use were largely patterned after the allocation procedure used by the U.S. Forest Service.

Since the lands administered under the Taylor Grazing Act were largely unsuited for private ownership under existing land alienation laws and had been used without restriction for the longest period of time, the vegetation and soil mantles were altered more than lands in other ownerships (U.S. Dept. of Agric., Forest Service 1936). It is the present state of these lands that is of expressed concern today.

Importance of Rangeland

If extent is used as a criterion of importance then range is the most important kind of land in the 48 contiguous states.⁶ Almost one-half (46 percent) of the total land area of the country is grazed. However, 85 percent of such land is located in the 17 western states and 59 percent in the 11 western states.

Until recently the rangelands have been accorded importance primarily on the basis of outputs that are valued in an economic sense. Common approaches are to equate food and fiber production of rangelands relative to the national production of these items.

Importance of western rangelands for animal production, particularly the public rangelands, is often considered inconsequential when viewed in the national perspective (Attebery 1976).

In 1974, 19 percent of all beef cattle and 48 percent of all stock sheep were found in the 11 western states (U.S. Dept. of Commerce, Bureau of the Census 1975). Although not producing the majority of beef and sheep in the United States, this area makes a substantial contribution to the food supply. Cook (1971) in a discussion of the importance of public rangelands uses calculations of energy captured by range forage along with animal requirements to arrive at a hypothetical potential for beef production. With the assumptions made, it was shown that the forage resources of public lands were capable of furnishing enough energy to produce about 52 percent of the total beef consumed per capita in the United States.

Population increases from 152 million in 1950 to a projected high of 300 million in year 2000 (U.S. Dept. of Commerce, Bureau of the Census 1975) indicate that needs for food will increase. Based on trends in 1974, the Council for Agricultural Science and Technology (1974) estimated that consumer demand for beef would require about a 30 percent increase in numbers by 1985. If projections of increased food needs, including meat, and conversions of rangeland to cropland occur in areas such as the Great Plains, then the far western rangelands will become more important in satisfying food requirements. Because of the physical nature of the western lands, only small amounts can be converted to other kinds of agricultural production.

Often overlooked in rating the importance of rangeland is the fact that agriculture is a major economic activity in most of the western states. Of all agricultural commodities, livestock production

⁶All future reference to the country or United States will refer only to the 48 contiguous states unless otherwise stated.

produces the most income. In Idaho for example, the sale of livestock and livestock products generates more income than any other agricultural commodity. Nearly 38 percent of cash receipts from all farm commodities is derived from the sale of livestock (Idaho Division of Tourism and Development 1977). Many local economies depend almost entirely on the livestock production that occurs on rangelands of the area, a majority of which may be in public ownership.

As Attebery (1976) emphasizes, western livestock ranching as a use of rangelands, public and private, cannot be considered inconsequential to the people of the west or of the nation. The importance, however, is more than economic and involves humanistic values as well.

It should be obvious, but apparently is not, that the basic necessities of life; i.e., food, clothing and shelter; must be met before other human interests or ideals may be achieved. Because of the abundance of land and the policies followed in its disposition, farmers and ranchers have produced food and fiber much in excess of that needed to satisfy the basic requirements of the population. As a consequence, the American consumer expends less time and income in satisfying these basic requirements of life than any other people on earth. Thus the time and resources of individuals, at present, are such that activities which add to the quality of life are made possible to a degree never before experienced by so many.

Part of the discretionary income presently available as the result of our performance in producing the basic necessities of life is being directed to outdoor recreational activities. The open space and scenic attractiveness of rangeland cause an increasing number of people to use these resources for recreational enjoyment. This kind of activity and use will increase as people grow in numbers and need release from congested living and conditions associated with such living. These pursuits will impinge more directly on the traditional uses of the public lands at a time when the needs for food and fiber production will be increasing.

The rangelands must also be accorded importance in providing suitable environmental conditions for the maintenance of many wild species of plants and animals. Range livestock enterprises, because of the extensive units of land required in the production system, are more favorable to maintaining or improving the habitat of wild species than other land use activities.

CONTEMPORARY RANGELAND PROBLEMS

To improve the performance of the rangeland resources in their function of providing goods and services that contribute to the general welfare, the Idaho Rangeland Committee viewed the following as important subjects to be addressed:

1. Goals or ends to be achieved in management of the public rangeland.
2. Assessment of the social and economic consequences of various rangeland practices and management decisions.

3. Investment for the development and improvement of rangeland resources.
4. Coordination of range resource management among ownership entities, i.e., federal, state and private.
5. Professionalism in the management of range resources.
6. Role of state and local governments in determining effective use of the public lands.

The subject areas or problems are interconnected and overlapping and no simple solution is possible. Discussion or debate of these problems may, however, suggest ways of improving the output of the rangeland resources.

Inadequately Defined Goals

When the public lands came into existence, the Union had a major debt to discharge resulting from the Revolutionary War and a need to bind the states together. Land disposal legislation at the time was clearly aimed at these ends. As these ends were achieved, other purposes for the public land developed. Population was growing through natural increase and immigration. Land was plentiful and the country was far from settled. Land policies that developed during the mid and late 19th century had the clear purpose of promoting settlement of the unoccupied parts of the country and stimulating development of these lands.

Should all public lands pass into private hands or were there some kinds of land that would serve the public interest better if held in public ownership? This question arose increasingly in the late 1800's. Public land legislation that created Yellowstone Park and provided for setting aside of forest reserves indicated that this was also a goal of public land policy. Even the Taylor Grazing Act was made sufficiently specific by Congress to guide the agency in implementing Congressional intent.

Following the depression of the 1930's and World War II, settlement and internal development ceased to be dominant goals in public land policies. These objectives had been accomplished. The affluent society, that developed because of the policies followed, visualized other needs and desires that the public lands could fulfill. Outdoor recreation, hunting, fishing, and preservation of areas of various sorts - i.e., wilderness, wild and scenic rivers, recreational areas, wild horses, etc. - were visualized as suitable purposes for management of the public lands.

Congress responded with legislation that specified these various ends as goals of public land policy. In so doing, statutes such as the Desert Land Act, the Taylor Grazing Act (replaced by the Federal Land Management and Policy Act of 1976) and the Carey Act maintained previously stated goals.

The consequence has been the broadening of powers and scope of the federal agencies administering public lands. Rather than only implementing policy directed by Congress they have become, by default, the principal arm of government establishing land policy. Since

Congress has provided so many policy options and no basis for establishing priority of one over the other, it is likely that whichever policy direction is pursued will be mitigated in the courts.

The Public Land Law Review Commission (1970) in their report to Congress and the President of the United States indicated concern "that the Congress has not established a clear set of goals for the management and use of public lands." They felt that a clear statement of policy goals and objectives for the management and use of the public lands was needed to give focus and direction to the planning process.

"The greatest good for the greatest number" and the application of "multiple use" as a policy goal appear to be insufficient direction for management decisions. These policy goals are the chief supporting argument for public ownership and the chief source of the problems and conflicts in land use and management (Kelso 1947).

The major problem in providing specific direction for land use and management is distinguishing between desires and wants of individuals or groups in our society and needs of future generations. Desires and wants today create high demand for recreational use and preservation of the range and forest resources. Current events and happenings suggest that food and fiber will increase in importance as an output of the range resources. This is based on an increasing population and a need to produce food and fiber without the expenditure of large amounts of fossil fuels and other nonrenewable resources.

Vaux (1968) and some members of the Idaho Rangeland Committee point out that desires, wants and needs are continually changing and the need for changing and evolving the goal structure is essential to progress. Lack of precision in broad goal statements permits adaptation of actions to the uncertain future.

Nevertheless, a better means of indicating the direction and ordering priorities for land use and management of the rangeland resources is needed if the full benefits of natural resources are to accrue to society.

The Idaho Rangeland Committee supports a concept that the people, through Congress, should establish some basis for establishing priorities in the administration of the public lands. Policy and priorities are being established by unelected officials in the bureaucracy. Even here it is often the lowest individual in the hierarchical bureaucracy structure that has the most to say about priorities.

In establishing priorities, Congress should fully assess the consequences of any policy in the light of past commitments, present conditions and need, and most importantly, future conditions and needs.

Assessing Economic and Social Consequences

Economic considerations dominated the land policies pursued during the developmental stage of our history. This emphasis was natural for a nation with limited revenues to run the government and a populace seeking economic freedom. Land was abundant and the need for conservation was not accorded high priority.

The land policies followed provided food, clothing and shelter for the population to the extent that activities directed to satisfying these basic requirements of life were greatly reduced. The wealth thus released could be used to enrich life.

Present day public land policies reflect a change in which the non-economic land uses and values are stressed at the expense of the commodity uses. Open space, wilderness, national recreational areas, wild and scenic rivers, and other such designations are supported by a growing affluent population residing in areas of concentrated population. The public land areas are looked to for social amenities that rejuvenate the mind and uplift the spirit.

Public land agencies have responded, through regulations and emphasis in management decisions, to the expressed desires and demands for this kind of land allocation. The result is a de-emphasis on the traditional land uses. Perhaps this is natural for when land was abundant the need for conservation was not evident; and likewise, when the supply of food and fiber is plentiful the production of such items is afforded a low priority in public land use allocations.

Since 89 percent of all federal public land of the 48 states is located in the 11 western states, public land policies have more direct effect on the economic and social characteristics of this region than the remaining states. However, to what extent various public land policies affect the social and economic characteristics of these states has never been fully assessed.

That the primary basis for resource decisions is maintenance of the productive capacity of the resource cannot be denied. Few would oppose the concept that the integrity of natural resource ecosystems must be maintained if both the needs of the present and a full range of options for future generations are to be met. However, these natural resource ecosystems may be subjected to a variety of uses and levels of use without losing the capability of renewal.

Too often decision assessment stops with an action that will achieve the primary objective of resource management, i.e., resource integrity. Alternatives that will accomplish the primary objective and also achieve social and economic objectives are not explored.

Reduction or elimination of grazing from public lands may be justified if the integrity of the ecosystem is impaired by such grazing, regardless of the short-term economic and social impacts. This will also occur on private lands as economic viability cannot be long maintained with a declining resource base. Factors other than ecosystem integrity may make it uneconomical for the range livestock enterprise to exist. Whether or not reduction or elimination of livestock grazing can be justified on social or environmental grounds is a subject being debated extensively in our society today. Because of the attacks made by environmental, conservation and preservation groups, social acceptability of livestock grazing on public lands has declined.

Support of the family farm (and ranch) is a stated policy of the government as indicated by the Department of Agriculture (Cook 1976). A stated objective, to

be a real objective, must be supported by actions or programs that have a good chance of accomplishing that objective. Some of the desired social consequences of such an objective are: (1) dispersed populations with a high regard for the stability of government; (2) dispersed production units that are openly competitive in the market system; and (3) a highly efficient system for the production of food and fiber. All segments of society have benefited from this arrangement. What subsidies that have been provided to maintain this system, whether wheat support or grazing fees, have been a subsidy to the American consumer. A farming enterprise or any other private enterprise cannot exist without a profit. Wheat supports, grazing fee levels, etc., make possible the existence of more units competing for a share of the market. This competition maintains lower food and fiber prices for the general populace.

Some actions by public land management agencies indicate that they are unaware of the objective for maintaining the family farm or ranch. If the objective were of high priority, then more attention to possible ways to accomplish the objective would be sought. As the Public Land Law Review Commission (1970) report indicates, "the federal right hand doesn't know what the federal left hand is doing."

The congestion in cities and urban areas of the country is creating problems of crime, poverty, welfare and social maladjustment. Many of the public land policies which make it difficult for people to derive a living through use of the natural resources increase movement from the country to the cities.

People of the public land states are disadvantaged from the standpoint of schools, hospitals, transportation systems and other social services because of the limited amount of taxable property. Low population density, open space, accessibility to outdoor recreation opportunities and a quality environment, however, are social amenities not enjoyed to the same extent by the non-public land states. Should these conditions be considered in management of public lands?

The social structure of the western states is tied, in a large measure, to the public lands. The institutions, economies and way of life of the people were developed and conditioned by the private-public land relationships. It is, then, important that greater cognizance be given to these private-public land relationships and the consequences of decisions made with respect to these relationships.

Investment for Development and Improvement

In a developing economy, which emphasized production and possessed abundant natural resources, capital and labor would naturally flow to those lands with the greatest potential for production. Because of the inherent low productivity of rangelands of the west, there has been historically a low assignment of importance to the range resources. As a consequence, limited investment in their maintenance and improvement has been made over the years. This has been noticeably true of the lands administered by the Bureau of Land Management.

Traditionally low appropriations for management and use of rangeland resources provide a minimum amount over that needed to administer and regulate the use of these resources. The National Plan for American Forestry (U.S. Dept. of Agric., Forest Service 1933) indicated an urgent need for capital investments for range improvements. Additional requests have been made over the years.

Total capital investments for improvements installed on national forest ranges were estimated to be about 5.8 million dollars or about 7 cents per acre by the mid 1930's (Forsling et al. 1936). Compilations by Clawson (1967) show investments in range improvements and development to be about 172 million dollars from 1941 through 1965 on federal land administered by the U.S. Forest Service and Bureau of Land Management. Since land allocated for grazing by the two agencies was 263 million acres in 1966, the average investment per acre during the entire period was 65 cents.

A part of the cost of range improvements has been borne by livestock owners who use the public lands. About 30 percent of the investment for this purpose on Bureau of Land Management administered lands was contributed by private land holders through 1966. Presently, costs of maintaining range improvements are largely borne by the livestock permittees in addition to the grazing fees paid. Where intensive management systems have been developed that include subdivision of the range by fences, this cost of maintenance is appreciable.

Many of the problems in rangeland use and management could be overcome with reasonable investments in these lands. With the criticisms being made about the condition of the western rangelands, it would seem appropriate that more could be done by way of investment in these resources than has or presently is occurring.

Perhaps the quotation from Schroeder (1963) indicates an attitude well worth considering:

"To say that the Western Lands, for instance, are overgrazed or are abused does not tell the story. To say that the title to them is in the United States, in all of the people, and must be preserved to them, says little more unless there is inherent in the thought, the responsibilities of ownership. To say that the overgrazing is the result of abuses by the livestock industry, adds little to the solution, in the light of history.

The ultimate question is this: To what extent is the maintenance and improvement of the remaining public lands an obligation of the whole of the United States? It is true they were used, perhaps used badly, but they were only used, not removed from public ownership. From the Alleghenies to the Rockies the public lands were exploited to the ultimate extent by their conversion to private ownership. From the Rockies to the Sea most of the public lands were exploited by use alone. Without the exploitation we find in history the right to assume that the American destiny would not have been manifest at all. If this is true, then the uses, perhaps the abuses of the remaining public land were part of the price which we, all of us, from Virginia to California, have paid. If it is the current thought that the price must now be repaid in the rehabilitation of the lands that remain, it is my judgment that the price must be paid by all of us, if it is to be repaid at all."

Recognition of the above concept by Congress is evidenced by legislation that has been considered - unsuccessfully to date - in recent years. Presently (summer of 1978) the House has passed a bill, HR 10587, that would establish a 360 million dollar fund to improve federal ranges over the next 20 years. The Senate has yet to act on this legislation.

Some opposition to range improvements and development arise because they are considered investments only for the livestock industry and thus a subsidy to this interest. When range improvements are made they generally improve conditions for most other uses of the land. Restoration of abused lands to at least a state of stability is a requirement of our land ethic.

Investment in range improvement is commonly considered only in terms of physical improvement. A source of many problems in rangeland use, management and development stems from the lack of detailed knowledge about resource characteristics, capabilities and limitations. Directing rangeland use and management is hampered by this limited knowledge. Limited knowledge is apparent, for example, in the section of this report that deals with the vegetation of Idaho. Korstian (1919) was indicating a need for the scientific study of vegetation so as to relate physical factors of a site to management practices of the vegetation, yet it is only recently that such information is being researched in the detail needed.

Members of the Idaho Rangeland Committee, Thomas and Ronningen (1965), Hutchinson (1969) and others indicate that one of the major problems in use and management of the billion acre range resource is lack of adequate inventories, evaluations and classification of the resources.

Allocation of human and financial resources to develop knowledge and information about the range resources and their management has consistently been at a relatively low level. Federal money spent on agricultural research prior to World War II was more than one-third of all federal money allocated to research (Paddock and Paddock 1967). In contrast agriculture received less than one percent of the federal research budget in 1967. Since so much of the agricultural research money is spent on intensive agricultural practices, little is left over for investigations dealing with extensive forms of agricultural production.

With the increasing number of mouths to feed in the world today and a projected increase of 2 to 3 billion in the next twenty-five years (Kendrick 1976), along with the pressing need to determine the capacities of the land resources so that their quality and productive capacity can be retained, much greater research effort will be required.

At the present time, many important decisions regarding the use and management of rangeland resources are based on touchstones, rules of thumb, or simple numerical guides. The full potential of these resources to produce benefits can not be realized with such crude management tools.

Coordination Among Ownerships

The arrangement of federal bureaus and agencies responsible for implementing land policy creates a partial and piece-meal approach to land resource problems. The Public Land Law Review Commission (1970) found that:

"... the agencies compete with each other in managing the federal lands to meet the needs of the public in a broad sense, but with no given or derived objectives for each agency and with no congressional directive to coordinate either land use planning procedures, or operational programs in furtherance of the objectives."

It was noted that in many instances, there is not only duplication of services and facilities, but lack of concern for the impact of one agency's program on those of other federal agencies. Not only does this occur with respect to one federal agency and another, but also with respect to federal agencies, state agencies, and private landowners. Regulations and agreements often provide for or permit coordination but they seldom have any major influence on land use programs.

Although procedures for coordinating activities have not as yet been established, the Federal Land Management and Policy Act of 1976 requires that the Secretary of Interior coordinate inventory, planning and management activities with other federal departments and agencies and with state and local governments within which the lands managed are located.

Note has been made previously about the percentage of public land in the western states and the impact this has on private land uses and values. Public land policy regulations tend to be unconcerned about conservation and protection of this private land base. That the privately-owned base property of livestock ranches, as an investment and a tax base, carry values that include the productive worth of the forage supplied by associated federal lands is not often considered in management decisions affecting use of the public lands. The failure to consider such relationships in public land decisions is disruptive of western ecosystems.

Present conditions, i.e., court ordered environmental impact statements, cause agency personnel to insulate themselves, to a degree, from the users of the resource and often from other agency actions and programs. The present situation is actually causing less coordination and integration than existed prior to this environmental impact statement issue concerning grazing on national resource lands. This issue is forcing land use planning by political subdivision to the detriment of resource development, improvement and use. Impacts are primarily considered only for the lands administered.

Complicating and aggravating the problems of coordinated and integrated resource planning is the insensitivity of agency people to the power they have. Schroeder (1977), in discussing the subject before a group of future resource managers at the University of Idaho, likened the agencies to a fourth branch of government. The administrators (of governmental agencies) have more power with respect to the day-to-day activity of American life than people in other branches of

government. He cautioned these future resource managers to be sensitive to the fact that they have power, otherwise, it will be misused.

Some examples of coordinated resource planning are around to demonstrate the value of this approach. The Morgan Creek allotment in Custer County, Idaho includes, in one plan, lands administered by the Forest Service, Bureau of Land Management and Idaho Department of Lands. Another such program in south central Idaho incorporates all land ownership including the private land in one comprehensive coordinated plan. Essentially all concerned and knowledgeable about the results of these programs agree that range resource improvement is occurring and that range resource values and benefits have increased.

Stronger coordination of land use plans and management can lead to greater net benefits - social, economic and physical - accruing to the general public than is now possible. This would be the first step in an ecosystem approach. Ecosystems do not function on geographic or political boundaries and although "a public lands policy restricted to lands in government ownership is politically expedient it is ecologically unrealistic" (Caldwell 1970). An ecosystem approach stresses the principles of ecology and a maxim of that science, which many seem to forget including practicing ecologists, is that everything in a system is related to everything else. One part or component can not be changed without influencing, in some way, all the other components. Social, cultural, economic and esthetic values would be a focus of management along with the physical and biological components under a strongly coordinated or ecosystem approach.

Coordinated resource planning will require more effort, and a more scientific approach than is currently being practiced in the management of the range resources. The benefits from such an approach promise to far exceed the costs based on the evidence at hand.

Professionalism in Management

If the paramount problem relative to effective range resource management were to be identified, it would undoubtedly be the professionalism of those charged with directing the use of these resources.

Range management as a science was developed in this country. Its inception began when early explorers entered the range region of the western United States and described the biological, topographic and climatic conditions encountered. Knowledge about the range resources began to accumulate rapidly as concern for declining productivity developed. Agencies of the federal government and universities, through their experiment stations, directed investigations so that more knowledge would be available for the management of these resources.

A period of rapid expansion of knowledge in range science occurred when the forest reserves were put under the administration of the Forest Service. Many of the pressing problems of the day related to grazing within these reserves. Trained foresters were given the additional responsibility of managing the range resources

as well as the timber. Universities began to add courses that emphasized the principles of grazing management. As knowledge accumulated and needs increased for specialists in grazing land management, several universities developed professional programs in this area.

The range ecosystem consists of biological (plant and animal), edaphic (soil), climatic, and topographic components. The knowledge and facts that contribute to the science of range management stem from the facts and knowledge about each of the components. Range science then draws from other scientific fields for its basic knowledge. What sets the science of range management apart from these other fields is its integrating focus. Knowledge and facts about the various components of the range ecosystem are interrelated and it is the knowledge of these interrelationships on which range science concentrates. Educational curricula stressed principles in the biological, physical and social sciences. In the biological sciences general botany, plant ecology, plant physiology, forestry and systems of plant classification were studied. Emphasis in animal science included zoology, nutrition, genetics, principles of production and wildlife management. Chemistry, physics, mathematics, soils and geology were considered basic requirements in the physical sciences. Courses in economics, the humanities and communication were stressed in the social sciences. A professional core of courses was developed to integrate the basic knowledge of the biological, physical and social science to form the science of range management or, in essence, a science of natural resource management. Skill in the application of this knowledge was developed through escalation of responsibilities assigned by the employer to the developing range scientist.

The pressing problems of land utilization that surfaced during the 1930's and the programs developed for overcoming these problems created an additional demand for range scientists. The outbreak of World War II dampened the availability of professionally trained people. The need for range scientists, however, remained and increased substantially following the war.

The few universities offering a professional degree in range science were unable to fill the demand that had developed. Other educational institutions began offering courses that would permit employment of their students in this field. These new programs commonly ignored the supporting or underlying science and, in a number of cases, were not equipped to offer training in all the areas even if they agreed they were essential. The professional standards required of range scientists were thus substantially lowered.

The Civil Service Commission, aided and abetted by some of the federal land management agencies and the attitude of the Society of American Foresters, not only permitted but fostered this decline in professional standards. The Society for Range Management, along with universities offering high quality professional programs, has repeatedly asked the Civil Service Commission to impose more stringent requirements on those qualifying as range scientists. Token appeasement was granted when the requirements were raised from six semester

hours of range science to 12 semester hours in the late 1960's. None of the supporting courses, however, were specified. The Civil Service Commission, since accepting the additional six semester hours of courses in range science, has subverted the intent of those pressing for higher standards. Almost any course in agriculture or biological science has been allowed to satisfy the 12 semester hour requirement in range science. Recently, the Soil Conservation Service assumed responsibilities for grading the applications for Range Conservationist and Range Scientist. Some individuals qualifying with high scores under Civil Service Commission standards are now being judged as unqualified for the position.

The consequences of lowered professional standards have been, overall, less than satisfactory performance of range resource managers in the management of these resources.

Decisions of serious magnitude are being made for use of the range resources by individuals without adequate academic training and/or experience to make those decisions. In a survey conducted in 1974 (Cook and Bonham 1974), it was found that 42 percent of the classified Range Conservationists did not have a degree in range science. In view of recent trends, the problem is more serious today than it was in 1974. Partly as a result of this situation there is limited confidence in decisions being made by "so called" professional range resource managers. Fewer decisions are based on knowledge of resource capabilities, limitations and consequences. Conflicts have increased and are partly a result of this situation.

Because of the importance of the range resources to the economies, social institutions and environmental quality of the western states, it is not in the best interest of the nation to turn the management of these resources over to inadequately trained or incompetent individuals. Acceptable minimum educational standards must be required of professional range conservationists or range scientists by the Civil Service Commission. Such standards have been established by the Society for Range Management and are supported by those universities with range science programs, the livestock industry, and the federal agencies with responsibility for management of these resources. Beginning professionals should not be placed in major decision making positions until sufficient experience and adequate professional skills have been developed to handle those positions.

A most serious consequence of not taking immediate steps to correct the problem of professional standards will be an increase in future problems and an increasingly difficult task of improving the professional qualifications of future range resource managers.

Role of State Governments

Through history the role of the state and federal governments with respect to the public lands has been debated. The debate is largely academic in all but the western states where nearly 90 percent of all federal land is located.

The Constitution established that Congress:

"... shall have the power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; . . ."

Congress has generally maintained the authority given. There has been a strong tendency on the part of Congress, until recently, to favor the concerns of the states in which the public lands are located. That the public land is owned by all the people is not disputed. The collectivist concept that all the people have an equal and undivided interest, however, has no sanction of Congress (Porter 1966b).

The kinds of social institutions, the economies, attributes of the people and the quality of life experienced by citizens of the western states are conditioned by and strongly tied to the kinds and amounts of public lands found within their borders.

The people of western states, such as Idaho, enjoy special benefits because of the public lands. These include open space, a clean environment, exceptional scenery, and low population density. Such benefits are not enjoyed to the same extent in other parts of the country. These states, however, assume additional costs that non-public land states generally do not assume. Some of these costs are reflected in lower personal income; higher support costs for schools, hospitals, transportation, and other service systems; and less direct influence, through state and local governments, on affairs that affect their lives.

Traditionally, plans and decisions for the use of the rangelands and rangeland resources have been made in the populated or eastern areas of the United States (Steiner 1976, Box 1978). The westerner objects to this colonial or imperialistic attitude. The objections are becoming stronger as evidenced by statements of the Governors of Colorado and Montana (Steiner 1976) and more recently by Governor Evans of Idaho. Perhaps the feeling of westerners is aptly portrayed in a recent editorial (August 21, 1978) found in the *Idaho Statesman*, a Boise newspaper. The editorial relates to President Carter's vacation in Idaho and is presented as an open letter to him. The following quotations are excerpts from that letter:

"In Idaho, Mr. President, there exists a strong feeling that many Easterners view our state not as a place where people live, but as a special preserve—a place set aside to be enjoyed by visitors, then put back on the shelf and preserved until the next 'trip out.'"

Particularly on issues involving use of our natural resources many Idahoans feel those from the East, with their much greater influence in political affairs, view Idaho as a playground, with little or no thought given to the people who live here and the political and social issues that affect our lives and livelihood.

Mr. President, you have inadvertently added credence to this regional prejudice by your itinerary on this vacation trip. In your understandable quest for peace and quiet, you have appeared to seek from Idaho only the relaxation its natural beauty can afford you."

Westerners can not deny that it is in their interest as well as the national interest to safeguard the productive capacity of the land, the water and the physical environment. It should also be obvious that it is in the national interest to administer the public lands in a way that ensures stable, economically viable communities and societies in the western states.

Decisions for the administration of these lands are frequently made with no concern for or consultation with local and state governments. Interests outside the western states proceed on the assumption that all people have an equal and undivided claim on the public lands without regard to the impact on the welfare of the people of western states or the nation.

The Federal Land Management and Policy Act of 1976 has stipulated that the Secretary of Interior coordinate land use inventory, planning and management activities of the federal lands with similar activities of the state and local governments in which the lands are located.

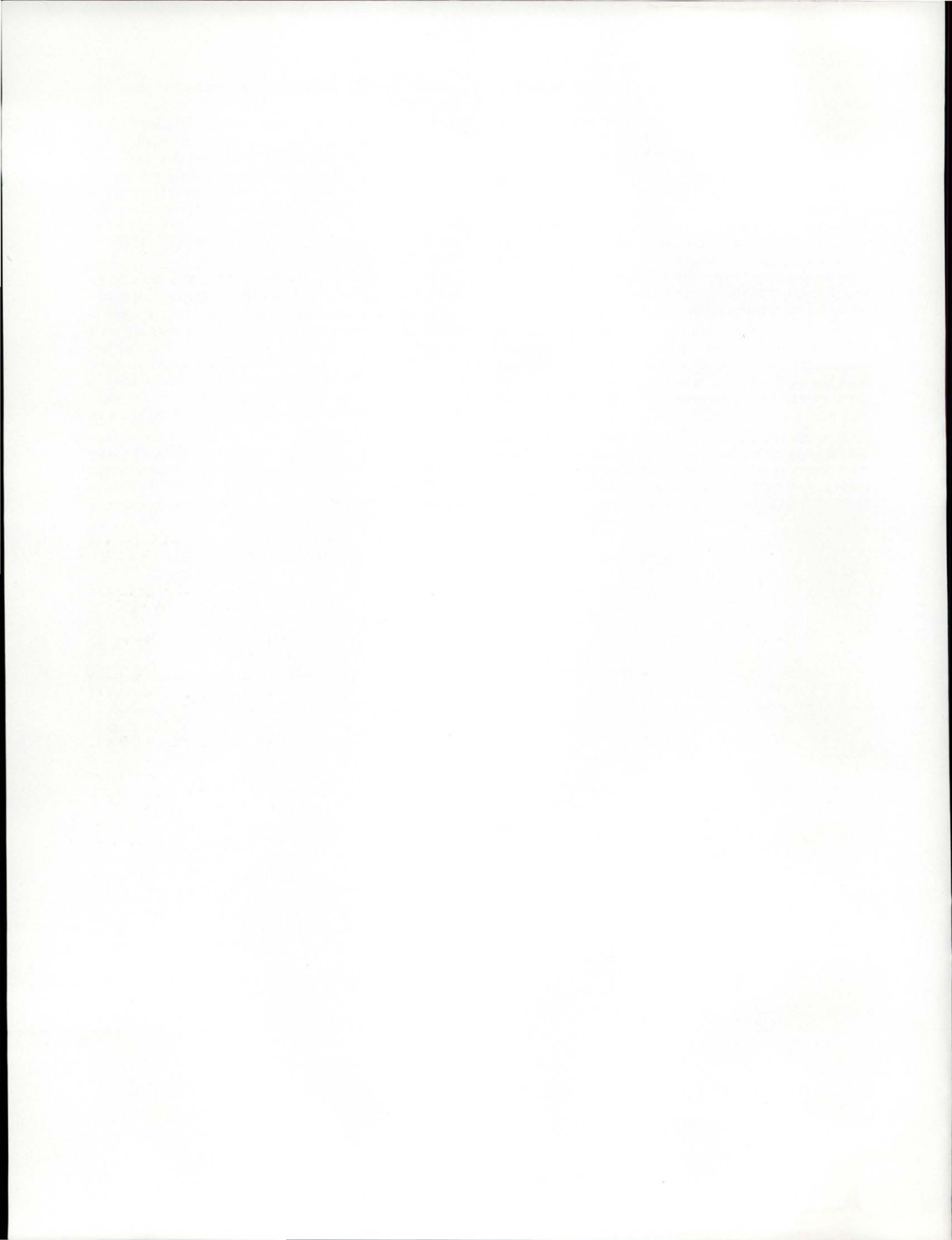
It is appropriate that Congress has recognized the need to coordinate federal land planning and management activities with the state and local governments. It is these governments that know the problems of the area most intimately and are more responsible and ac-

countable to the people than governmental units distantly removed.

Procedures for implementing coordination among units of government have not been established. The Idaho Rangeland Committee recommended to Governor Evans that, as a beginning, state and local groups review proposed federal land management programs with the purpose of ascertaining their impact on the welfare of the area. Following this an overview statement would be prepared by the Governor's office or designated state agency or department.

It is realized that citizens of Idaho and the western states may have little control over the demand for public land resources, but they should have a strong voice in how and to what extent those demands will be met. It is viewed as important to the western states that they not be exploited by outside forces. The individual states have never been considered as colonies of the original 13 states or the other states of the country. The western states insist that they not be treated as such in the use of public lands.

The public lands then will be important in determining to what extent the inalienable rights of the citizens of the western states are subverted by the alleged rights of the majority.



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