

munities of the salt desert ranges could be evolved. Such a knowledge was the vision of Dr. Lee Sharp. His quest may have been decades ahead of its time, but to seek such knowledge is a tribute to uncommon knowledge of rangeland resources.

Range improvement by seeding exotic wheatgrasses largely ended by the mid 1960's because of concern by some environmentalists about the conversion of degraded sagebrush communities to wheatgrass stands. The emerging field of wildlife management lashed out at range improvement as a convenient cause for the decline in population size of various game species on rangelands. Present day knowledge of the population dynamics of some of these species suggests causes for changes in numbers are far more complex than can be explained by localized range improvement.

The sagebrush/bunchgrass rangelands of the Snake River Country went from nobody's land in the 1930's to everybody's land in the 1970's. Rangeland managers were often bombarded by a host of conflicting demands concerning the uses and manipulation of rangelands. In frustration, some turned to simplistic grazing systems that were inherently

faulty or haphazardly applied as answers to complex problems. Range management appeared at times to be gripped in a paralysis induced by the shrill complaints directed at any management plan.

Resource managers may have been forced into positions of inertia as range science searched for new direction, but during the last two decades the rangelands of the Snake River Plains have remained dynamic. Much of the change in sagebrush ranges has literally been fueled by cheatgrass. Reoccurring wildfires and resulting annual grass dominance refused to stand still while society established a policy for resource management.

Perhaps we need to ride up to the Shoshone Basin and sit in the saddle on the high ridges where J.E. Bower looked down and saw the pristine sagebrush/bunchgrass communities of the Snake River Country. Such a view may help crystallize a policy where the perpetuation of the basic assemblage of soils and plant communities in equilibrium with the potential of the environment is the overriding principle upon which resource management must be built.

# Native Vegetation of Idaho

E.W. Tisdale

Knowledge of the vegetation of the State is still incomplete, although much progress has been made during the past three decades. We now have fairly adequate data for the forest, sagebrush-grass, and grassland communities, but information for others, including the salt-desert shrub, mountain brush, alpine and riparian types, is still sketchy.

Classification of the state's vegetation in recent years has been done mainly in categories and nomenclature used in the International Biologic Program. In this system the formation denotes the broadest class, such as forest or grassland, and region is used to describe a group of communities with similar appearance and regional climate such as conifer forest or sagebrush-grass. Series are groups of communities characterized by a single dominant species, and habitat types are smaller units with relatively uniform biotic and abiotic composition and structure. Series, which represent easily recognized and fairly extensive communities, were chosen as the most appropriate level for description in this article.

## The Physical Environment

Idaho is a large state (53 million acres), extending about 500 miles from its northern to its southern border. Four major physiographic regions, i.e.: Northern Rocky Mountain, Middle Rocky Mountain, Columbia Intermontane, and Basin and Range are represented. Seventy-five percent of the state is mountainous, and the only large areas of level terrain occur on the Snake River Plains in the southern part. A great variety of surface rock materials occur, including argillites, quartzites and metasediments in the northern part; granitic materials in the central Batholith; and Columbia basalt and other volcanics cover much of the western and southern portion. Alluvial sediments also occur on the Snake River Plains, and

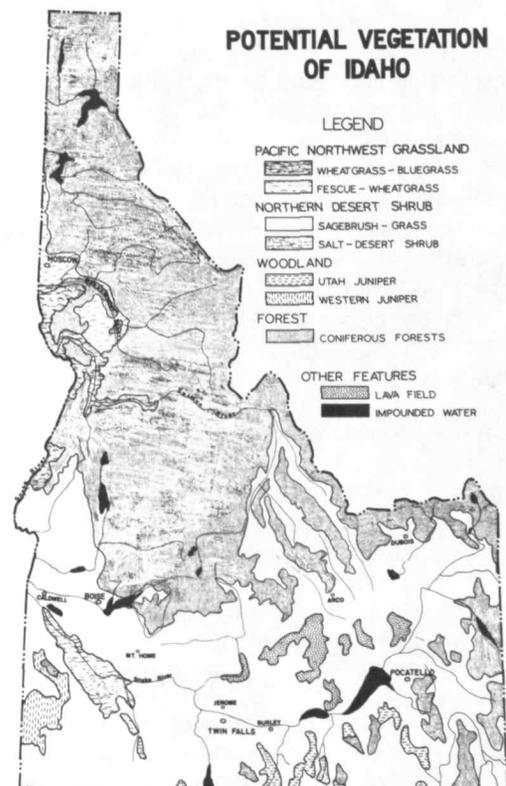


Fig. 1. Map of main vegetation types and other landscape features of Idaho. Boundaries are approximate due to their actual irregularity and the scale of the figure.

deposits of loess and volcanic ash add surface material over much of the northern and western portions.

Climate varies greatly, mainly in response to physiographic influences and latitude. The northern part has annual

precipitation ranging from 30 to 60 inches in the forested areas to 13 to 22 inches in the canyons of the Snake and Salmon Rivers. Southern Idaho is generally much drier, and large areas of the Snake River plains receive 10 to 12 inches or less. Half or more of the annual precipitation occurs in the winter months in most of the State, and the mid-summers are extremely dry. Temperatures vary greatly with elevation, but are generally milder than those in comparable areas east of the Rockies.

A great variety of soils has developed in response to parent material and climatic influences. Many soils are rocky and/or shallow, but most are relatively productive within the limits of available moisture. Some, such as the granitic soils of the Idaho batholith are highly erosive when the natural plant cover is disturbed.



Fig. 2. Western redcedar type with some western hemlock and western larch included.

### Vegetation Types

In broadest terms, the vegetation of the state may be visualized as consisting mainly of conifer forests in the northern and central parts, with shrub vegetation in the southern portion, and a band of grassland in the west central part. Other types include juniper woodland, riparian and alpine vegetation (Fig. 1).

### Forest Vegetation

Forest is one of the major formations, occupying about 20

million acres. The forests are mainly coniferous, although deciduous trees occur in riparian sites and aspen (*Populus tremuloides*) dominates certain areas in southeastern Idaho.

The coniferous forest series occur along a gradient of moisture and temperature which covers a wide climatic range. The most mesic series is that dominated by western hemlock (*Tsuga heterophylla*), the most shade tolerant and moisture-demanding of the conifers. Slightly less moist sites are occupied by the western redcedar (*Thuja plicata*) series, with a wider range of temperature and moisture tolerance. The moist and relatively mild climate of both series is

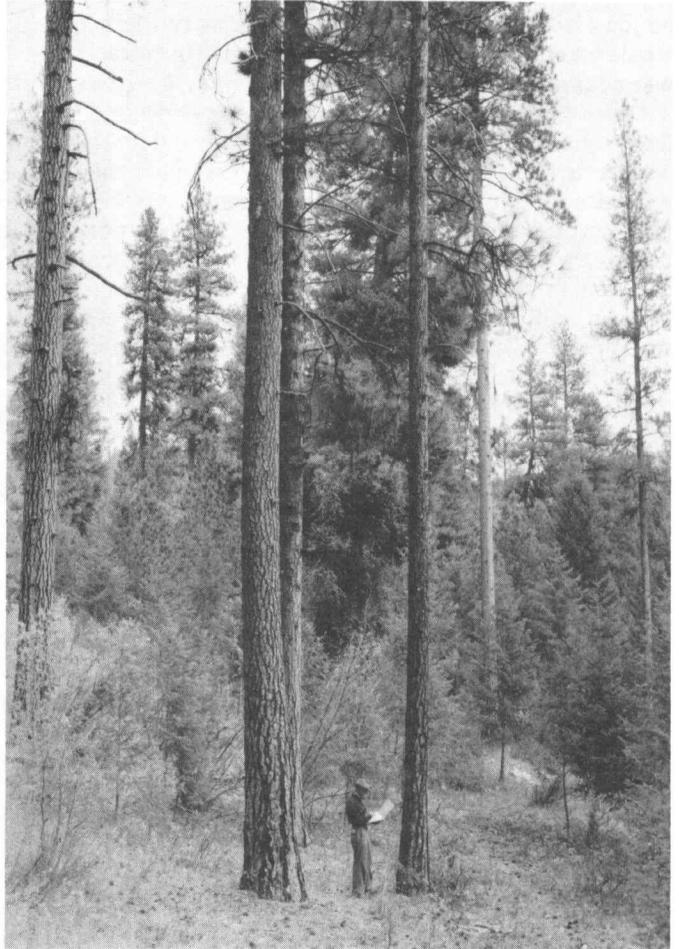


Fig. 3. Large ponderosa pine growing as successional species in Douglas-fir type. Tree reproduction is mainly of Douglas-fir.

indicated by the lush growth of trees, and by the nature of the understory which contains many disjunct species, common in West Coastal forests, but not found inland except in this northern Idaho area. The understory is rich in ferns, shrubs and forbs including lady fern (*Athyrium filix-femina*), oak fern (*Gymnocarpum dryopteris*), menziesia (*Menziesia ferruginea*), queen's cup (*Clintonia uniflora*), and gold-thread (*Coptis occidentalis*)

Another series with high moisture requirements confined to northern Idaho is formed by mountain hemlock (*Tsuga mertensiana*) which occurs in scattered stands at higher elevations. Common understory species include beargrass (*Xerophyllum tenax*) and wood rush (*Luzula hitchcockii*).

Some conifer series have a wider distribution in the State.

The grand fir (*Abies grandis*) series, for example, occurs in all but the southeastern section. It occupies sites with some of the mild climatic characteristics of the hemlock and western redcedar types, but with less available moisture.

High elevations throughout the State are occupied by the subalpine fir (*Abies lasiocarpa*). Its habitat is marked by low temperatures and a very short growing season. The understory is well developed and contains species such as huckleberries (*Vaccinium* spp.) and bluejoint (*Calamagrostis canadensis*). The upper part of this type, just below timberline, often contains open heath and grassy balds.

Douglas-fir (*Pseudotsuga menziesii*) forms a wide-ranging series which occurs in all forested parts of the State. It occupies sites which are drier than those supporting grand fir and warmer than those occupied by subalpine fir. The tree stands are generally more open than in the series described so far and support well-developed understories dominated by shrubs such as ninebark (*Physocarpus malvaceus*) or grasses such as Idaho fescue (*Festuca idahoensis*).

Lodgepole pine (*Pinus contorta*) occurs extensively as a fire successional species but also forms a climax series in certain habitats. These generally have shallow, excessively drained soils, occurring in areas cooler than those of the Douglas-fir type and drier than those of the grand fir series. Lodgepole pine is well adapted to cold-air drainages. Common understory species include dwarf huckleberry (*Vaccinium*) species, elk sedge (*Carex geyeri*), and Idaho fescue.

The ponderosa pine (*Pinus ponderosa*) series occupies sites drier than areas dominated by Douglas-fir, and usually constitutes the lowest forest zone, just above shrub or grassland types. It is well developed in the central and southwestern parts of the state, but becomes scarcer and finally absent in the eastern parts due to lower temperatures in the dry forest areas. Ponderosa pine stands are fairly open with well-developed understories dominated by shrubs such as ninebark and bitterbrush (*Purshia tridentata*), and by Idaho fescue and bluebunch wheatgrass (*Agropyron spicatum*) (*Elytrigia spicata* of some authors).

Less extensive coniferous series include one dominated by limber pine (*Pinus flexilis*). This type occurs on dry sites scattered across the east central and southeastern parts of the state and intermingles with the Douglas-fir series, with the pine occurring on the rockier, drier sites. It often occupies the lower edge of the forest zone and may border on the sagebrush-grass types as seen in Craters of the Moon National Monument. Another coniferous series is formed by Engelmann spruce (*Picea engelmanni*), which forms stands along stream courses with cold-air drainage. Whitebark pine (*Pinus albicaulis*) occupies exposed sites at upper timberline, and contacts the subalpine fir and lodgepole pine types at lower elevations or cooler sites.

A feature of the coniferous forests is the extent to which most of the series dominants can occur and grow well in other series in a successional role. Ponderosa pine is common in the Douglas-fir and grand fir series; and Douglas-fir in the western red cedar and grand fir types. White pine (*Pinus monticola*) and western larch (*Larix occidentalis*), do not form climax communities but occur as successional members of several series, especially the western hemlock and western red cedar. The presence of successional species is due to disturbance by fire or other causes, and these

species tend to maintain themselves for long periods due to the longevity of the individuals.

### Shrub Vegetation

This formation occupies virtually all of the Snake River plain and adjacent foothills, and some of the communities extend much farther North. The total area of potential shrub vegetation is about the same as the forested lands, but the shrub types have been more altered by land use. The formation includes the extensive sagebrush-grass region, along with a number of smaller types.



Fig. 4. Basin big sagebrush/bluebunch wheatgrass community. Note open stand of sagebrush and abundant grass cover.



Fig. 5. Low sagebrush/bluebunch wheatgrass community. The grass is equal in height to the sagebrush.

### Sagebrush-Grass Region

Most of the southern part of the state was occupied by sagebrush-grass prior to white settlement, and sagebrush stands still occupy some 12.5 million acres. The composition is more variable than suggested by general appearance, for it includes 8 species and several subspecies and varieties of sagebrush, each with its own ecological requirements and associated vegetation. The understory in undisturbed condition is well-developed and dominated by perennial grasses



**Fig. 6.** Canyon grasslands on the lower Snake River. The bluebunch wheatgrass and Idaho fescue series—both occur on different aspects and elevations of this landscape.

such as bluebunch wheatgrass, sandberg bluegrass (*Poa secunda*), and Idaho fescue.

Big sagebrush (*Artemisia tridentata*) is a variable and widely distributed species which dominates communities over a wide range of precipitation (8-24 inches); and elevation (800-11,000 ft). Fortunately, recognition of subspecies and varieties has helped to define the ecological relationships of this species. Currently four subspecies: *tridentata*, *wyomingensis*, *vaseyana* and *spiciformis* are recognized. Each of these subspecies forms vegetation series characterized by differences in composition of the understory grasses and forbs. Basin big sagebrush (subsp. *tridentata*) occupies sites with low to moderate precipitation but deep soils; Wyoming big sage (subsp. *wyomingensis*) occurs on areas of similar precipitation but shallower soils; foothill or mountain big sage (ssp. *vaseyana*) grows in areas of higher elevation, with higher precipitation and lower temperatures and has one subalpine variety; and *spiciform* big sage (ssp. *spiciformis*) is restricted to high elevation sites in the southeastern corner of the state. The Wyoming and foothill subspecies form the most extensive types of big sagebrush in Idaho.

The three-tip sagebrush (*Artemisia tripartita*) series occurs mainly in the eastern part of the sagebrush region, apparently favored by the lower temperatures and higher percentage of summer rainfall in that area. Three-tip sage is noted for its ability to sprout after fire or other injury. It occurs in relatively small, scattered stands, and no obvious site characteristics separate it from certain big sagebrush types.

Silver sagebrush (*Artemisia cana* subspecies *viscidula*) represents the western form of a predominantly Great Plains species. In Idaho, it dominates a type confined to stream banks and dry meadows. Communities of this nature are small in extent and most have been greatly altered by grazing.

Low sagebrush (*Artemisia arbuscula*) is one of a group of low-growing species which occupy harsh sites within the sagebrush region. The low sagebrush series occurs over a wide range climatically, but is confined to soils which are either shallow to bedrock or have a strongly restrictive layer

developed at shallow depth. This type is most extensive in the western and central parts of the sagebrush region, where it alternates with big sagebrush, in a pattern determined by differences in effective soil depth. The understory grasses are similar to those in the big sagebrush types.

The black sagebrush (*Artemisia nova*) series is confined to the driest part of the sagebrush region, usually on shallow calcareous soils derived from limestone. The type is most extensive in the eastern part of the sagebrush region, where it borders the salt-desert shrub. Bluebunch wheatgrass is the principal associated species.

The early sagebrush (*Artemisia longiloba*) series is another low-growing type, occurring on shallow soils with strongly developed claypans. Stands of this series are mostly small in size and occur mainly in the central and western part of the sagebrush region.

Types of very limited extent are dominated by stiff sagebrush (*A. rigida*) and Owyhee sagebrush (*Artemisia papposa*), respectively. Stiff sagebrush is limited to soils that are very shallow over basalt in the extreme western edge of the state and extends north beyond the sagebrush region into suitable spots in the Pacific Northwest Bunchgrass region. Owyhee sagebrush is a dwarf species which forms a type restricted to shallow depressions or shallow, intermittent water courses where extra moisture is available early in the growing season.

#### Salt-desert Shrub Region

This name is used to describe a group of communities which occur in areas of low precipitation and saline or droughty soils. The dominant species are low-growing shrubs or semi-shrubs, mostly members of the goosefoot (*Chenopodiaceae*) family. This vegetation occurs in the same geographical area as the more xeric sagebrush communities and intermingles with them. The type occupies about 1.6 million acres; much of it has been altered by heavy grazing dating back to the earlier years of the livestock industry.

The ecology of this type is not well understood, in spite of many studies of individual species. The dominants, shadscale (*Atriplex confertifolia*), saltsage (*Atriplex nuttallii* subspecies *falcata*), winterfat (*Ceratoides lanata*), red molly (*Kochia americana*), and greasewood (*Sarcobatus vermiculatus*), occur singly or in mixtures and most stands contain few herbaceous species. In the current state of knowledge it is not clear to what extent these "pure stands" represent natural dominance of well-adapted species on harsh sites, or to what extent associated species have been removed by grazing. Stands have been found, mainly in the shadscale type, that have a well-developed cover of grasses such as squirrel-tail (*Sitanion hystrix*) and Indian rice grass (*Oryzopsis hymenoides*).

#### Mountain Brush Region

This term is used for a loose grouping of species which occur in moister parts of the shrub formation. This group includes shrubs of relatively low stature such as bitterbrush, snowberry (*Symphoricarpos* spp.) and snowbrush (*Ceanothus velutinus*), as well as larger forms such as serviceberry (*Amelanchier alnifolia*), bittercherry (*Prunus emarginata*), chokecherry (*Prunus virginiana* var *melanocarpa*) and moun-

tain mahogany (*Cercocarpus ledifolius*). This type usually occurs between the sagebrush and forest communities, but it also mingles to some extent with the foothill and subalpine sagebrush series. Most stands of this type support a well-developed herbaceous understory including bluebunch wheatgrass, Idaho fescue, mountain brome (*Bromus carinatus*) and a great variety of forbs. The total area is only about one-half million acres, but the type has forage and cover value disproportionate to its size.

### Juniper Woodlands

The juniper region is represented by two species, western juniper (*Juniperus occidentalis*) and Utah juniper (*Juniperus osteosperma*). Pinyon pine (*Pinus monophylla*) is restricted to small areas close to the Utah border. Western juniper is confined to the southwest corner of the state, and Utah juniper is restricted to the southcentral and southeastern parts. Old established stands of western juniper are fairly open, with understories of bluebunch wheatgrass, Idaho fescue, bitterbrush, etc. Many younger stands, however, represent invasion into adjacent sagebrush communities, generally foothill sagebrush, where the juniper forms dense stands with sparse understories. This invasion appears to be due mainly to fire suppression since white settlement, but may also be influenced by a longer term trend towards moister climate. The Utah juniper type generally occurs under drier conditions, and varies from stands with well-developed understories of shrub and grass to dense stands with little associated vegetation. There is some invasion of adjacent sagebrush stands but not to the extent shown in the western juniper.

### Grassland Formation

Despite earlier ideas of a large grassland belt extending across the southern part of Idaho between the sagebrush and forest regions, true grasslands are of limited extent. These are of two types, the Pacific Northwest Bunchgrass region which extends in a narrow band along the western edge of central and north-central Idaho, and Mountain Grassland which occurs scattered throughout much of the mountainous portions. The whole grassland formation is estimated to occupy about 1.3 million acres.

#### Pacific Northwest Bunchgrass Region

The area occupied by this type in Idaho consists of two sections, the Palouse Prairie on the Columbia Plateau area, and the Canyon Grasslands of the Snake and Salmon Rivers and their tributaries. The Palouse Prairie section is extensively cultivated, with few remnants. Most of these remnants fit the pattern of Palouse Prairie in Washington but include a type dominated by rough fescue (*Festuca scabrella*). This type usually occurs close to the forest edge, on sites which appear to be slightly cooler and moister than those dominated by Idaho fescue.

The Canyon Grasslands, due primarily to steep topography, have remained largely intact. Three major vegetation series occur along a moisture-temperature gradient

determined by a combination of elevation and aspect. The Hood's sedge (*Carex hoodii*) series is confined to relatively small areas at high elevation (6,500-8,000 ft). It occurs on shallow stony soils in stands often interspersed with coniferous forest. The vegetation is dominated by several species of dryland sedge, along with a number of grasses including Idaho fescue, mountain brome and timber oatgrass (*Danthonia intermedia*).

The Idaho fescue series is an extensive type which occurs as low as 1,300 ft. on north slopes and up to 6,500 feet on south slopes, with a range of precipitation from 15 to 20 inches or more. The dense cover includes bluebunch wheatgrass, Junegrass (*Koeleria cristata*), and a large number of perennial forbs, including species of balsamroot (*Balsamorhiza*), lupine (*Lupinus*), and aven (*Geum*).

The bluebunch wheatgrass series occurs on still drier and warmer sites, in a precipitation range of 12 to 18 inches, and at elevations from 700 to 4,500 ft. The vegetation is strongly dominated by the wheatgrass, usually growing in strictly bunch form. Sandberg bluegrass is the only other perennial grass of common occurrence. Forbs are less common than in the fescue series, but several species of *Astragalus*, *Lomatium* and *Phlox* are characteristic of different subtypes

Limited areas of the canyon bottoms and lower slopes support other perennial grasses: sand dropseed (*Sporobolus cryptandrus*), red threeawn (*Aristida longiseta*), and needle-and-thread (*Stipa comata*). The ecological status of these species is not fully understood, but sand dropseed and needle-and-thread may be climax on sandy soils. Red threeawn is an unpalatable species which behaves as an increaser on most sites.

### Mountain Grasslands

This type is smaller in area, and less studied than the Pacific Northwest Bunchgrass. Series dominated by green fescue (*Festuca viridula*), sheep fescue (*Festuca ovina*), and Idaho fescue respectively have been recognized. The green fescue type occurs on "balds" surrounded by coniferous forest and is confined to the northern part of the state. The sheep fescue series is strictly a high elevation community, and grades into true alpine vegetation.

### Alpine Vegetation

The alpine formation, defined by its position above timberline, occurs in areas above 10,000 feet elevation in southern and central Idaho, and at slightly lower elevations in the northern part. The area of land above these elevations is not extensive, but the vegetation occupying it exhibits tremendous variety. Studies made to date have recorded many vegetation types, but little has been done to determine the relationships of these communities to site characteristics and to each other. In many cases it appears that the nature of the parent rock and microtopography are dominant influences. Common types include those dominated by low growing herbs such as cushion phlox (*Phlox pulvinata*), Ross's aven (*Geum rossii*), and sheep cinquefoil (*Potentilla ovina*). Low shrub types include white mountain-aven (*Dryas octopetala*), snow willow (*Salix nivalis*), and heathers (*Phyllodoce* spp.) Purple pinegrass (*Calamagrostis purpurascens*) and a

number of sedges (*Carex* spp.) also form common types.

### Riparian Vegetation

This is defined as vegetation requiring soil moisture in addition to that supplied by local precipitation. Typically, it occurs along stream banks, in meadows, and the bottoms of narrow valleys. This habitat is intermediate between uplands and truly aquatic sites. Like the alpine formation, the riparian type is relatively small in area, extremely varied, and has received little detailed study. This is unfortunate, since there is currently much concern over land use and related prob-

lems of water quality and soil erosion in the type.

Community dominants include a wide range of life forms and many species. Cottonwoods (*Populus trichocarpa* and *P. angustifolia*), alders (*Alnus incana* and *A. rhombifolia*), and white birch (*Betula papyrifera*) form common tree types. Shrub communities are dominated by species of willow (*Salix*), red osier dogwood (*Cornus stolonifera*), and water birch (*Betula occidentalis*). Beaked sedge (*Carex rostrata*) forms a common type, as do several other sedges, baltic rush (*Juncus balticus*), and tufted hairgrass (*Deschampsia caespitosa*).

# Curlew National Grassland

Frank Beitia and Frank Gunnell

The Curlew National Grassland of the Caribou National Forest consists of 47,600 acres of land in the extreme southern portion of Idaho. It is representative of the basin and range-type topography and is predominantly covered with sagebrush and crested wheatgrass. Over 35,000 acres of native range was cultivated and farmed in the early 1900's. This land is capable of producing vegetation such as alfalfa, small burnett species, and introduced wheatgrasses as a part of grassland agriculture. Sagebrush, bitterbrush, serviceberry, native grasses, and forbs occupy the unfarmed land.

The lands currently within the Curlew National Grassland were acquired from private individuals under Title 111 of the Bankhead-Jones Farm Tenant Act. During the late 1920's and early 1930's these lands failed to provide a sustained livelihood. In many places the land was badly eroded. The Soil Conservation Service administered the lands from 1938 to 1954 and carried out an intensive rehabilitation program. Originally there was approximately 168,000 acres in and adjacent to Curlew Valley that comprised the original land utilization project.

In April 1965, well-known author and range specialist Perry Plummer made a tour of the Curlew National Grassland and documented the following: "The trip was highly interesting for me since I had participated in the establishment of some experimental seeding plots in the general area in the late 1930's. This was the period when the Resettlement Administration was relocating many of the marginal farmers to other areas. Dust storms were then characteristic. The contrast in my mind between then and now was tremendous. Waving stands of perennial grass had replaced the fields abandoned to Russian thistle and old stubble. The sand dunes along some of the fences have apparently vanished. All the vacant houses had been removed, and the once dusty lanes we traveled had been replaced with either gravel or oil roads. The CCC camp buildings at Grandine had been all removed; however, the Forest maintains what appear to be

some good storehouses along with a trailer house on the same location. I was, to say the least, very much impressed with the remarkable transition from what had been marginal farming to what looked like prosperous grazing land."

In 1954, 47,600 acres of the land lying within the Curlew Valley were turned over to the Forest Service to be administered as National Grassland within the Department of Agriculture. Since the establishment of the project some of the original land has been returned to private ownership and a considerable acreage adjacent to Curlew Valley is administered by the Bureau of Land Management. The Curlew National Grassland has been managed to promote the development of Grassland agriculture. These lands have been intensively managed for the multiple-use and sustained-yield of the associated resources and products with assistance from the Soil Conservation Service, Intermountain Forest and Range Experiment Station, universities, Idaho Department of Fish and Game, Agricultural Research Service, and the local livestock operators.

The Bankhead-Jones Farm Tenant Act directed that these acquired lands should promote the development of grassland agriculture and sustained-yield management of the forage, fish and wildlife, water, and recreation resources in areas of which they are a part. The practices used should demonstrate sound and practical principles of land use and serve as models to show how responsive government can positively affect economical, cooperative planning and management at the local level. Grazing Associations under terms of appropriate agreements are used to carry out many of these objectives.

Much of the federally owned land is intermingled with associated private and other lands into fenced logical operable pastures, which creates an atmosphere for the development of sound land conservation and utilization practices. These lands serve as a range management laboratory for testing latest techniques in grassland agriculture and to