United States
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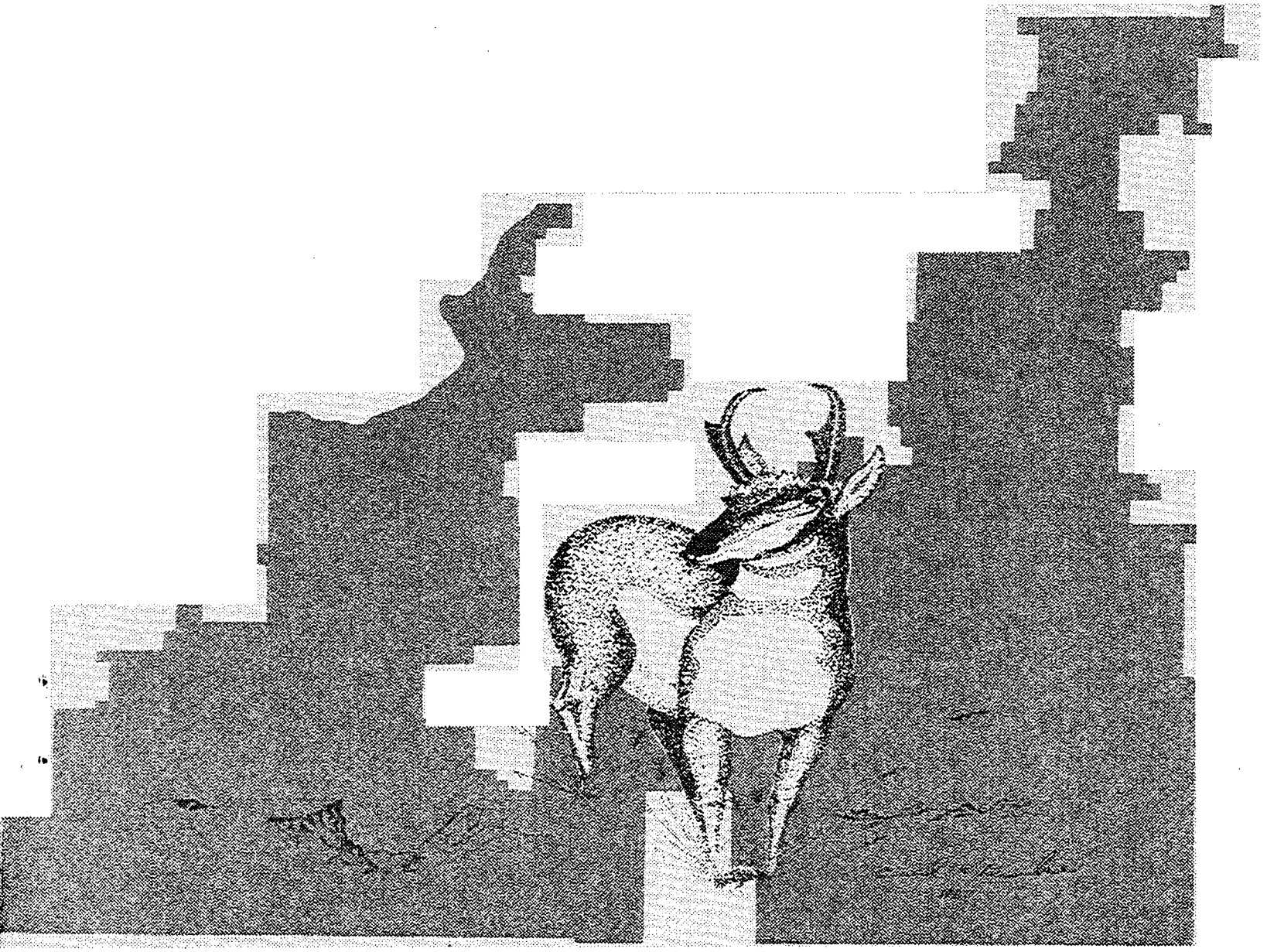
PLANT ASSOCIATIONS

Of The Crooked River National Grassland, Ochoco National Forest



PLANT ASSOCIATIONS OF THE CROOKED RIVER NATIONAL GRASSLAND

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ERRATUM

for

PLANT ASSOCIATIONS OF THE CROOKED RIVER NATIONAL GRASSLAND, R6-Ecol-133-1983.

Page 6: line 12
Reads- Moist(bluegrass) Meadow.....27
Change to- Moist Meadow.....27

Page 27: line 19
Reads-Soils in the juniper/willow/rush community are.....
Change to- Soils in the streamside are.....

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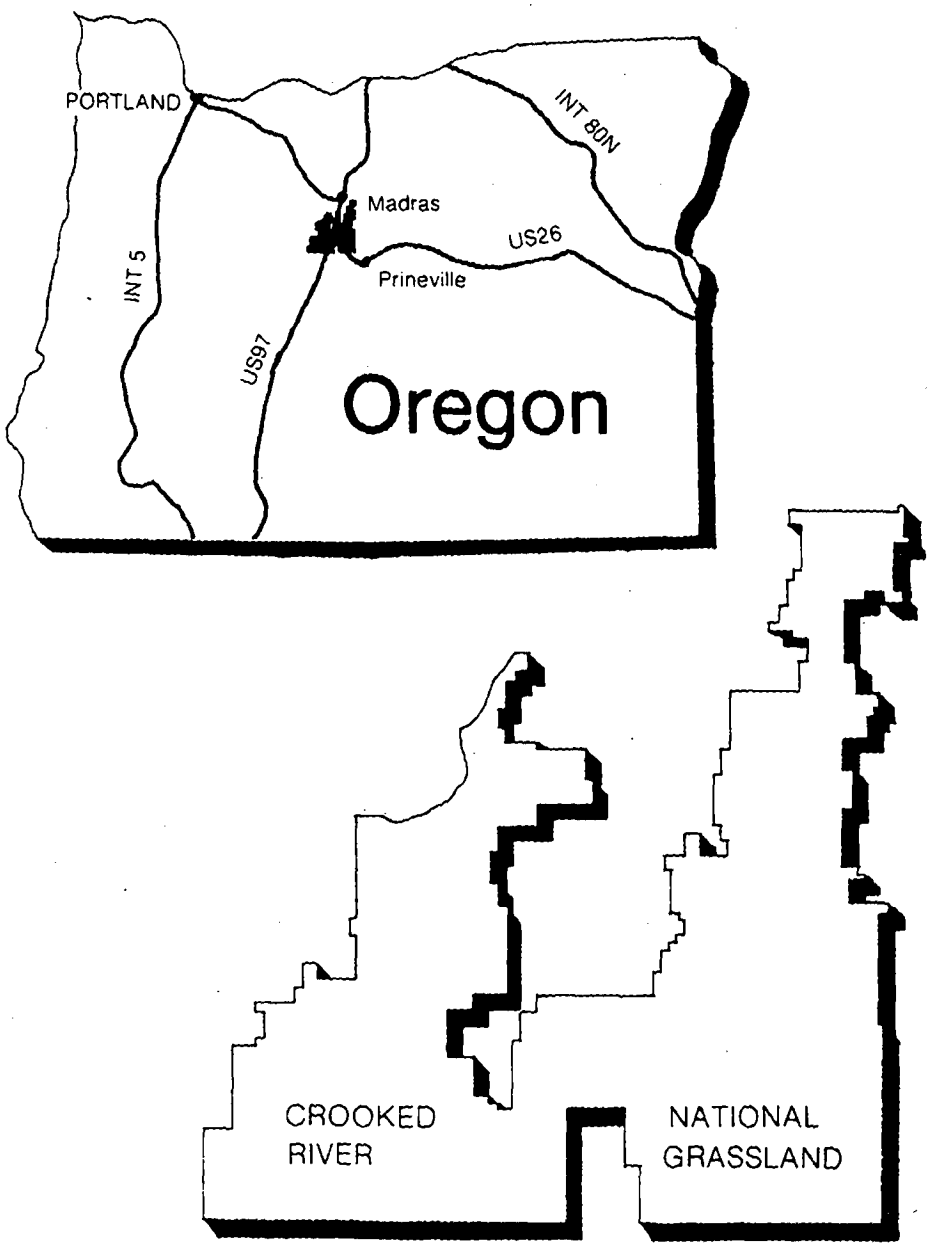
INTRODUCTION

This plant association guide has been developed as an aid for Forest Service resource managers to identify long term stable plant associations found on the Crooked River National Grassland. The guide describes in detail good, fair, and poor range condition on lands seeded to either crested wheatgrass or beardless wheatgrass in addition to a discussion of a roadside exclosure considered to be in good to excellent condition. Other associations described include seven native non-forested associations, an inclusive discussion of riparian types, and one forested association. A vegetation dichotomous key is found in the front of the guide and line drawings of all of the dominant plants are arranged by lifeform in the appendix.

Location Map



General Discussion

The Crooked River National Grassland comprises approximately 106,000 acres administered by the Ochoco National Forest headquartered in Prineville, Oregon. The Grassland is being managed so as to promote development of grassland agriculture and sustained yield of the forage, fish and wildlife, timber, water and recreation resources.

The general area was surveyed in 1869 and 1870, establishing township, section and quarter section corners. The surveyors made some notation concerning the soils and vegetation of Central Oregon. Comments such as ". . . this township is either level or gently rolling prairie with a good sod and is suitable for agriculture and grazing. There is good water in Willow Creek all the year. . ." appeared in the official report dated May 18, 1884. Once this report and others were released alluding to the lush western grasslands, emmense interest was generated among homesteaders. Soon the pioneers came. Starting around 1880 homesteaders were allowed to claim 160 acre tracts, where they worked to clear the land of the native bunchgrasses and began grain farming. Unfortunately, two major things were not considered. First, families could not make a decent living on a 160 acre farm. Second, there was inadequate rain to support crops of grain. These conditions led to crop failure and finally to homesteaders abandoning their farms and homes. There were approximately 700 homesteaders scattered across what is now the Crooked River National Grassland.

By 1935 about 35 percent of the 700 homesteads had been taken over by Federal Land Banks and private mortgage banks in foreclosures. The remaining 65 percent of the lands were still privately owned. Due to vast acres laying idle and not paying taxes, the local county officials pressed for legislation that would provide some type of revenue. Concurrently, another historical event was also to be staged. The Dustbowl Era associated with Oklahoma, Texas, Wyoming, and Nebraska was also taking its toll in central Oregon. At this time, the Federal Government began to buy the land back from the remaining homesteaders.

The Secretary of Agriculture was then directed, through legislation, to develop a program of land conservation and land utilization in order to correct maladjustments in land use. In an administrative order of July 15, 1938, the Secretary of Agriculture identified that "the requirement of protect or use, and management of said lands are identical to those of the adjoining and related National Forest lands". In January of 1954, jurisdiction was transferred to the Forest Service. On June 20, 1960, nineteen Land Utilization projects were officially designated as National Grasslands. Only four days later the Secretary of Agriculture issued an Administrative Order that stated that all Forest Service regulations and policies apply to the Grasslands.

During the mid 30's and early 40's, vast acres were treated in order to correct the poor forage conditions that existed over a large part of the Grassland. Acres were treated and planted to either crested wheatgrass or beardless wheatgrass.

Again, starting in the early 60's, many acres were variously treated in order to gain control of juniper and shrub competition with additional seeding of crested and beardless wheatgrass.

Physical Setting

Topography characteristic of the Grasslands is of gently rolling hills and low buttes separated by wide flats. There are also deep canyons along the Deschutes and Crooked Rivers in addition to less dramatic canyon relief along Squaw and Willow Creeks. Elevations range from under 2,000 feet in canyon bottoms to 2,300 feet at Madras to 5,108 feet on Gray Butte. The western portion of the Grassland is plateau-like while the eastern and northeastern part is gently rolling land. The greatest relief is associated with buttes and hills on the southeastern boundary of the Grassland. Midbasin plains occur in the vicinity of Madras, Culver, and Metolius.

Climate

The climate of the Grassland is similar to that of the rest of central Oregon. Average annual precipitation at Madras, Oregon approaches 9 inches and comes mainly during the winter months as snow. Temperatures tend to be moderate throughout the year with the coldest occurring in December and January. The frost-free season is very short with the average growing season approaching only 100 days. Due to widely varying day and night temperatures, frost can occur any month of the year.

Classification Concept

Plant communities are usually classified by one or two philosophies: the continuum or the discrete community (habitat type). A continuum in environment and climax vegetation as described by Hall (1970) has been chosen for this classification. Sampling was designed to encompass variability in soil, elevation, topography, climate, and vegetation. This approach provides the required data base for statistical analysis of vegetative response to its environment.

Native Vegetation[1]

Continuous undisturbed tracts of mature native vegetation no longer exist today as when the pioneers first settled the Grasslands. However, several places have been found where disturbance appears to have been negligible and serve as valuable reference areas. These include the Island (Driscoll, 1964a, 1964b), the right-of-way along Highway 97, Round Butte, Crusher Butte, Juniper Butte, Haystack Butte, and Gray Butte among others.

Plant communities supporting native vegetation were grouped into "plant associations" to facilitate land management. The plant association provides the ecological basis for management guidelines related to tree stockability, silviculture, successional patterns, and vegetative mapping. The following criteria had to be met before being classified as an association: (1) the association differs from all other associations in land management limitation and opportunities; (2) the association can be recognized on the ground in any stage of disturbance; (3) the association should have limited variability in species composition; and (4) the association should have limited variability in productivity.

Plant associations can be readily identified in the field approximately 70 percent of the time. The interface between associations is often very subtle and difficult to distinguish because of localized climates and edaphic (soil) gradients. When mixed associations are encountered the land manager is encouraged to form a management decision based on management needs.

Introduced Vegetation

Homesteaders modified the majority of lands found on the Grassland. Due to aggressive farming of the deeper soils on the flat ground, the natural vegetation has been lost in many cases. Efforts to reestablish native vegetation on plowed acres has met with minimal success and most of these acres have been planted with introduced grasses. Today, approximately 70,000 acres of the total 106,000 acres support either crested or beardless wheatgrass. The plantings date back to as much as 40 to 45 years. Therefore, it would be convenient to assume that both crested and beardless wheatgrass are now a well established vegetative component of the Grassland. Indeed, they appear to have successfully replaced bunchgrasses on the areas they have been established.

Both crested and beardless wheatgrass are usually used to seed rangeland in poor condition. Intermediate wheatgrass and big bluegrass have been used occasionally with some success. These bunchgrasses are usually planted as grass monocultures and following a 2-year period of establishment, are pastured.

Tracts of land supporting crested and beardless wheatgrass were sampled in 1981 in order to gain information on variability in soil, elevation, topography, climate, and vegetation. These data were then analyzed in order to gain an understanding of vegetative response to environment. Attempts were made to form plant associations based on the presence of perennial lifeforms (tree/shrub/herb) which appeared to have some degree of association from site to site. Unfortunately, these highly modified sites did not offer significant differences in the three lifeforms to form different plant associations. For instance, soils varied from fine sands to silty loams, with depths from 6 to 60 inches, but no significant difference in species composition, percent canopy cover, or density was found from site to site. Apparently, the

[1]Kenneth E. Neiman, Plant Ecologist, USDA Forest Service, assisted in collection and analysis of native vegetation during the first field season.

70,000 acres that were planted to either crested or beardless wheatgrass appear to meet the minimal growth requirements for these two grasses. The overall vegetative capacity of these modified acres appears now to be expressed in a combination of perennial woody vegetation (juniper and shrubs) in addition to the introduced bunchgrasses.

Also, the plowed land now occupied by introduced bunchgrasses lies almost totally within land forms associated with the native western juniper/big sagebrush/bluebunch wheatgrass - Idaho fescue association. It is, therefore, reasonable to assume that the introduced acres occupy one relatively uniform site that was once occupied by the above native association and there is no need to identify introduced communities at levels finer than dominance by either crested or beardless wheatgrass.

Consequently, a Reconnaissance Forage Rating procedure was developed to help the range manager appraise vegetative composition. The procedure revolves around a balance of decreasing bunchgrass canopy cover to increasing bunchgrass and shrub canopy cover. Crested and beardless communities of good, fair, and poor condition are described in relation to the Reconnaissance Forage Rating procedure.

Plant Association and Community Codes and Criteria

Name: Each native plant association and introduced community is given a name that should reflect the important trees, shrubs, and herbaceous plants. In some cases one of the lifeforms may be omitted; e.g., stiff sagebrush/sandberg bluegrass-bigseed lomatium.

Taxonomic Nomenclature and Authority: Common names are used exclusively throughout the descriptions. All common names and scientific names are listed in the species list. Taxonomic authority for scientific names is Hitchcock et al. (1955-69), Hitchcock and Cronquist (1973), and Peck (1961). Common names follow Garrison et al. (1976), Hitchcock and Cronquist (1973), and occasionally Peck (1961). A slash (/) in the name separates species of different lifeforms, while a dash (-) separates species of similar lifeform.

Environment and Soils: Notations are given in feet and inches; values that occur outside the usual range of data are noted in ( ).

Vegetation: Dominants are those shrubs and herbaceous plants expressed by percent canopy which dominant under good range conditions. Average stand composition does not always represent climax vegetative conditions; note plant status in the "Status" column. Vegetation is also summarized in Tables 1 and 2 and in the Appendix.

Constancy: Constancy is the percent of plots containing the given species regardless of size of the plant or abundance.

Status: A decreaser is a plant so palatable or site sensitive that it is the first plant to decrease under excessive grazing or site disturbance. An increaser is a plant either low in palatability or insensitive to heavy grazing or site disturbance. The decreaser-increaser designation is used exclusively for shrubs and herbaceous plants. Trees are designated as either seral (successional) or climax depending upon their ability to successfully regenerate with minimum stand disturbance. Seral species are the most aggressive in occupying an area following any disturbance; however, their regeneration potential declines as environmental conditions begin to stabilize towards prevailing climatic and edaphic norms. Major-minor suggests the relative dominance of the species in a stabilized state; major implies the stand dominant, and minor refers to a subordinate or weak codominant status. Key indicator species may be absent in stands that have closed canopies, in which case openings or roadsides should be used as reference areas for determining plant potentials.

Productivity (forested types): Site Index (SI) is based on average height of dominant trees at age 100 for the ponderosa pine/bitterbrush/fescue association found on the southern end of the Grassland west of Crooked River. (Refer to literature cited for source of site index tables.) TBA is total basal area of each species within the stand and is measured in square feet/acre. GBA is growth basal area or that basal area at which crop tree(s) grow at 20 rings per inch at diameter breast height.

Characteristics for Non-Forest Associations: Each discussion represents data for good to excellent range condition unless otherwise noted. Herbage is air dried weight of all forbs, grasses, and grasslikes found on a plot and expressed in lbs./acre. Surface rock is gravels and stones exceeding .75 inch in diameter which lie on the soil surface. BG+P is bare ground and naturally occurring pavement less than .75 inch in diameter. Moss is the cover of ground surface other than rock that is occupied by moss and lichens. Percent canopy cover references only the decreaser bunchgrasses and a combination of juniper and shrub.

$Ft^3/yr.$ Index: This index is a relative measure of cubic volume which may not be realized under management. The equation SI/10 x GBA/10 x 0.5 was derived for ponderosa pine by Hall (1973). This equation was applied to the ponderosa pine association.

It must be impressed upon the land manager that the cubic volume associated with the ponderosa pine/bitterbrush/fescue association is merely a relative estimate of site potential. Mean is the average value for the type. Five percent CI is the confidence interval at the 95 percent probability level; i.e., a mean site index value of 70 and a 5 percent CI of 2 suggest a stand within that association can have a site index value between 68 and 72 or 70 ± 2, 95 times out of 100. The 5 percent CI figure is strongly affected by sample size. In some cases, the data base is either too small or variable to compute a meaningful 5 percent CI.

VEGETATION-SITE KEY TO NATURAL PLANT ASSOCIATIONS AND INTRODUCED COMMUNITIES WITHIN THE CROOKED RIVER NATIONAL GRASSLAND

Page

1. Site dominated by forest vegetation, ponderosa pine common

   Ponderosa pine/bitterbrush/fescue CPS2-11 44

1. Shrub-steppe or meadow vegetation predominates.

   2. Wet sites dominated by sedge, rush, willow, or Kentucky bluegrass.

      3. Kentucky bluegrass dominant, soil surface dry by early summer.

         Moist (bluegrass) meadow 27

      3. Kentucky bluegrass absent or subordinant to sedges, rushes, and forbs.

         4. Wet meadow dominated by sedges and rushes.

            Wet meadows 27

         4. Seeps, springs, and streamsides

            5. Streamside sites dominated by willows, alders, rushes, sedges, grasses, and forbs.

               Streamside riparian 27

            5. Seeps and springs dominated by shrubs, sedges, grasses, and forbs.

               Seeps and springs 27

   2. Dry sites dominated by upland shrubs and bunchgrass.

      6. Introduced bunchgrasses on reclaimed farmland

         7. Crested wheatgrass dominant grass; obviously planted.

            Western juniper/gray rabbitbrush-big sagebrush/crested wheatgrass CJS2-91

            Roadside exclosures 13
            Good Condition Crested 15
            Fair Condition Crested 17
            Poor Condition Crested 19

         7. Beardless bluebunch wheatgrass dominant grass; obviously planted.

            Western juniper/gray rabbitbrush-big sagebrush/beardless wheatgrass CJS2-92

            Good Condition Beardless 21
            Fair Condition Beardless 23
            Poor Condition Beardless 25

      6. Native upland shrub/bunchgrass sites.

Page

8. Slopes less than 20%, generally flat gently rolling topography.

9. Patterned ground (mound and swale); mounds with deep rockless soil and swales with abundant surface rock on shallow soil.

Western juniper/big sagebrush/bluebunch wheatgrass-Idaho fescue, MOUND, and Sandberg bluegrass, SWALE CJSB-11 29

9. Ground not obviously patterned;

10. Sandberg bluegrass and stiff sagebrush dominant on shallow rocky soils.

Stiff sagebrush/Sandberg bluegrass-bigseed lomatium, SCABLAND SD91-31 32

10. Moderately deep soils dominated by big sagebrush, bluebunch wheatgrass, Idaho fescue, and occasionally Thurber needlegrass.

Western juniper/big sagebrush/bluebunch wheatgrass-Idaho fescue, FLAT CJS2-26 34

8. Slopes greater than 30%, generally on sides of buttes.

11. Canyonlands, usually steep side slopes above drainages.

12. Southerly aspects (E - NW) dominated by bluebunch wheatgrass.

Western juniper/big sagebrush-rock spirea/bluebunch wheatgrass-arrowleaf balsamroot, STEEP S CANYON CJS2-31 36

12. Northerly aspects (NW - E) dominated by Idaho fescue and bluebunch wheatgrass.

Western juniper/big sagebrush-green rabbitbrush/Idaho fescue-arrowleaf balsamroot, STEEP N CANYON CJS2-32 38

11. Steep slopes on buttes, hills, and ridges.

13. Southerly aspects (ESE - WNW) dominated by bluebunch wheatgrass.

Western juniper/big sagebrush/bluebunch wheatgrass-Sandberg bluegrass, S SLOPE CJS2-13 40

13. Northerly aspects (WNW-ESE) dominated by Idaho fescue and bluebunch wheatgrass.

Western juniper/big sagebrush/Idaho fescue-bluebunch wheatgrass, N SLOPE CJS2-12 42

RECON FORAGE RATING OF STANDS OF CRESTED OR BEARDLESS WHEATGRASS OR NATIVE VEGETATION

1-- Estimate the combined canopy cover for the following decreaser bunchgrasses:

A) Crested wheatgrass
B) Beardless wheatgrass
C) Intermediate wheatgrass
D) Bluebunch wheatgrass
E) Big bluegrass
F) Idaho fescue
G) Thurber's needlegrass
H) Western needlegrass

2-- Estimate the combined canopy cover for all the following species of shrubs and increaser bunchgrasses:

A) Big sagebrush
B) Gray rabbitbrush
C) Green rabbitbrush
D) Bitterbrush
E) Rock eriogonum
F) Bottlebrush squirreltail
G) Bulbous bluegrass
H) Sandberg s bluegrass

3-- Subtract the shrub/increaser bunchgrass value from the decreaser bunchgrass value. Assume the decreaser bunchgrass value to be a positive integer while the combined shrub/increaser bunchgrass value is negative. Therefore, a negative value is possible. For example: 12% = total decreaser bunchgrass canopy cover and 30% = total shrub/increaser bunchgrass canopy cover.

12 - 30 = -18

Apply a constant of +60 (allows a 0-100 scale).

-18 + 60 = 42

The score is 42, or a low fair forage condition (Figure 1). Notice how the intercepts of decreaser bunchgrass cover (12 percent) and combined shrub/increaser bunchgrass cover (30 percent) with the score of 42 fall within acceptable confidence limits for their regressions.

This technique will work satisfactorily for tracts that have not been treated in the last 8-10 years for shrubs or reseeding. If the area has been treated for shrubs or juniper by herbicides, fire, or disking it is highly questionable if the Recon Forage Rating approach is an actual measure of forage condition. However, if the area still supports the dead shrubs from a recent treatment, the user may, with experience, estimate the total shrub canopy cover and use the Recon approach as outlined. For example: observed canopy cover is 10 percent for crested wheatgrass, 7 percent for Sandberg's bluegrass, and 5 percent for shrubs. The "score" is 10 - (7 + 5) + 60 = 58. Looking at Figure 1, the scorer might initially estimate a forage rating of high fair using the "score" only. Closer examination of Figure 1 shows the intercept of cover values for decreaser bunchgrasses (10 percent) and increaser bunchgrasses + shrubs (12 percent) with the score (58) falls outside acceptable confidence limits along the vertical projecton of "score" 58. The stand does not fit measured relationships. Further examination of the site reveals numerous charred shrub stems from a fire about 5 years ago. Estimated prefire shrub cover is 30 percent, giving a new score of 10 - (7 + 30) + 60 = 33, or high poor condition.

Figure 2 on page 10 presents regressions for native associations and is used in a similar manner.

FIGURE 1. REGRESSIONS FOR RATING RANGE CONDITION ON INTRODUCED COMMUNITIES

A---Width of shaded area above and below each regression line indicates the 5% Confidence Interval for a single measurement installed on a given site in order to establish a condition rating.

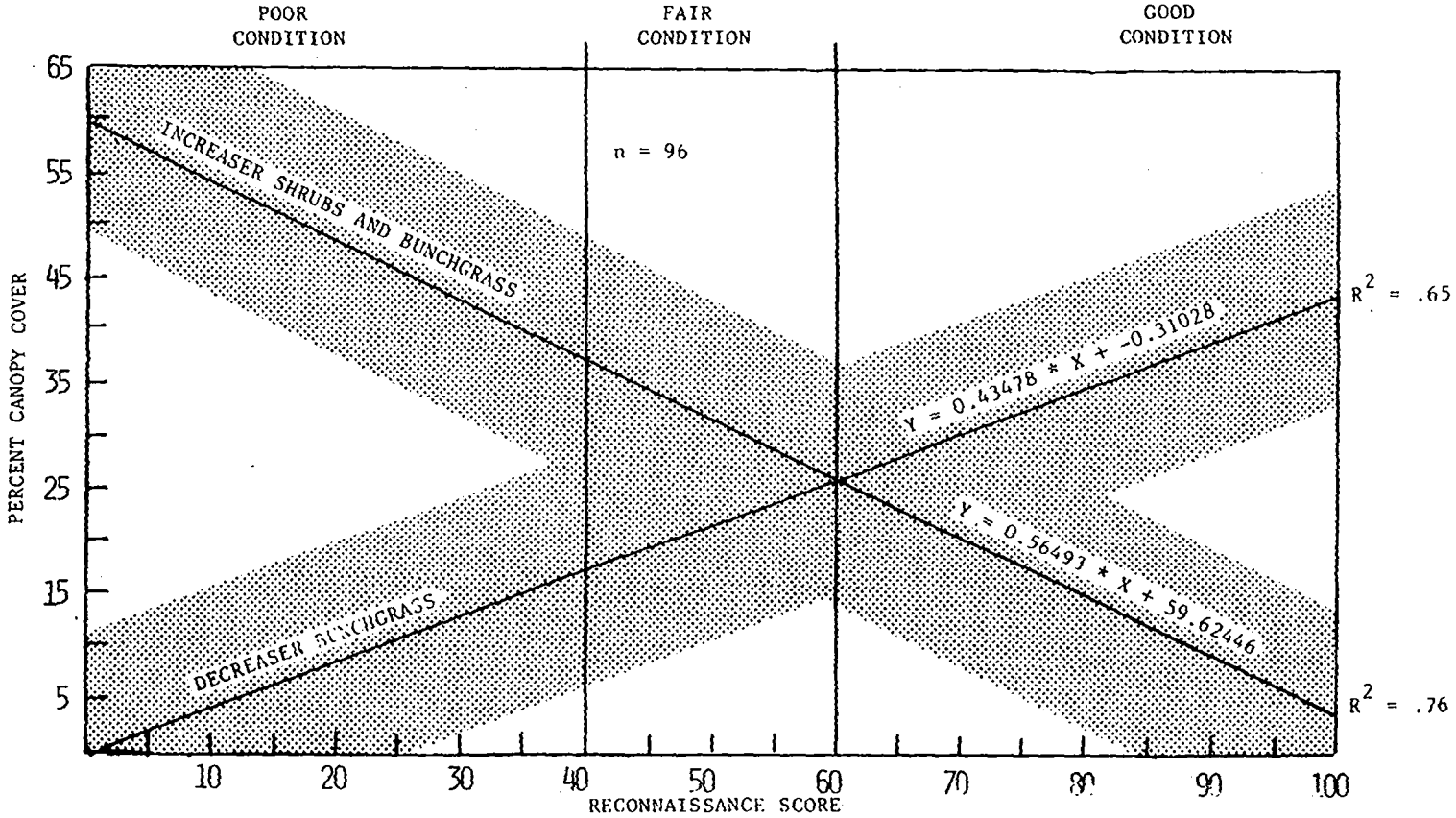


FIGURE 2. REGRESSIONS FOR RATING RANGE CONDITION ON NATIVE ASSOCIATIONS

A----Width of shaded area above and below each regression line indicates the 5% Confidence Interval for a single measurement installed on a given site in order to establish a condition rating.

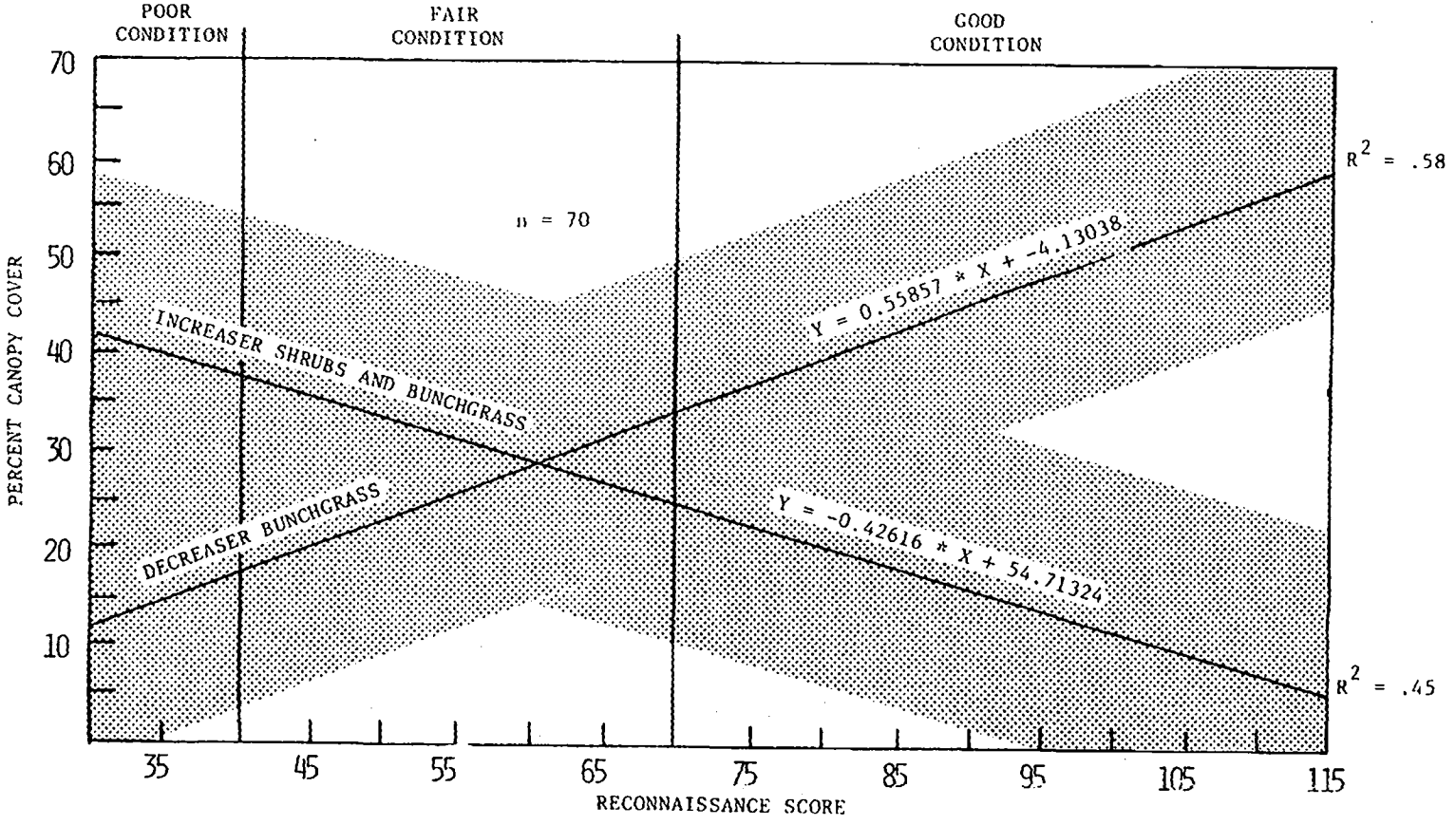


TABLE 1. COMPARISONS OF VEGETATION COVER CLASSES ON SEVEN CONDITIONS OF INTRODUCED COMMUNITIES (%)

	CJS2-91 EXCLOSURE	CJS2-91 GOOD	CJS2-91 FAIR	CJS2-91 POOR	CJS2-92 GOOD	CJS2-92 FAIR	CJS2-92 POOR
JUNIPER	1	2	2	3	2	2	3
SHRUBS	18	10	22	28	16	14	29
DECREASER BUNCHGRASS	37	26	25	13	32	21	12
INCREASER BUNCHGRASS	4	7	8	13	6	13	13
ANNUAL GRASSES	13	17	11	13	13	17	23
PERENNIAL FORBS	11	23	12	9	11	11	17
ANNUAL FORBS	8	6	8	11	9	10	8

WESTERN JUNIPER/GRAY RABBITBRUSH-
BIG SAGEBRUSH/CRESTED WHEATGRASS
(ROADSIDE EXCLOSURES)
CJS2-91

CJS2-91

WESTERN JUNIPER/GRAY RABBITBRUSH-BIG SAGEBRUSH/CRESTED WHEATGRASS (ROADSIDE EXCLOSURES)

ENVIRONMENT

Slope position: Bottoms, flats
Aspect: All exposures
Slope: Flat to 5%
Elevation: 2800-3200'
Topography: Gentle undulating; concave to convex

SOILS

Geology: Highly weathered tuffs & basalts intermixed with ash
Surface texture: Sand to sandy loam
Rooting depth: 9-48"
Total depth: 9-48"
Remarks: Roadside exclosures for upwards of 40 years following introduction of introduced bluegrass

VEGETATION

Dominants	% Canopy Cover	Constancy	Status
Juniper	1-2	100	Increaser/climax
Big sagebrush	1-4	100	Increaser/climax
Gray rabbitbrush	2-15	100	Increaser/unpalatable
Green rabbitbrush	1-10	100	Increaser/unpalatable
Crested wheatgrass	32-45	100	Introduced/palatable
Bulbous bluegrass	0-5	43	Increaser/palatable
Sandberg bluegrass	0-5	71	Increaser/palatable
Cheatgrass	1-35	100	Increaser/palatable
Sixweeks fescue	0-5	43	Increaser/unpalatable
Bottlebrush squirreltail	0-1	71	Increaser/palatable
Yarrow	1-4	100	Increaser/unpalatable
Lupine	0-8	86	Increaser/unpalatable

Good to Excellent Condition: Dominant herbaceous grass is represented by the introduced crested or beardless wheatgrass with a cover averaging 37 percent. Bulbous bluegrass, Sandberg bluegrass, and bottlebrush squirreltail may be found on these sites but the combined canopy cover rarely exceeds 4 percent. Dominant perennial forbs would include yarrow and lupine with a combined canopy cover approaching 6 percent. Chickweed, littleflower collensia, alyssum, spring draba, and small-flowered willowweed comprise the important annual flora and contributes 5 percent canopy cover. The remaining checklist of both perennial and annual plants may be viewed as very insignificant and will contribute only 3 percent of the overall canopy cover in these reference sites.

Indicators: Nearly pure stands of crested or beardless wheatgrass with insignificant amounts of other bunchgrass and forbs indicate a stable condition. Shrub cover usually in excess of 10 percent but not more than 20 percent.

Revegetation: Both crested wheatgrass and beardless wheatgrass perform satisfactorily on flat to gently rolling topography characteristics of these down slope sites. Natural revegetation of these sites has been slow.

Problems Associated with Management: All of these sites should be preserved as reference areas. Various vegetation treatments such as fire or herbicide spraying should be used in part of these communities for response measurements and reference to woody plant development.

CHARACTERISTICS (7 plots in good - excellent condition) % Canopy Cover

	Herbage	Surface Rock	BG + P	Moss	Decreaser Bunchgrass	Juniper/ Shrubs
MEAN	529	2	42	40	37	19
5% C.I.	69	2	9	8	4	7

WESTERN JUNIPER/GRAY RABBITBRUSH
BIG SAGEBRUSH/CRESTED WHEATGRASS
(GOOD CONDITION)
CJS2-91

WESTERN JUNIPER/GRAY RABBITBRUSH-BIG SAGEBRUSH/CRESTED WHEATGRASS (GOOD CONDITION)

ENVIRONMENT

Slope position: Bottoms and flats
Aspect: All exposures
Slope: Flat to 15%
Elevation: 2200-3200'
Topography: Flats, gentle side-slopes, plateaus

SOILS

Geology: Highly weathered tuffs & basalts intermixed with ash
Surface texture: Sand - sandy loam
Rooting depth: 10-30"
Total depth: 10-30"
Remarks: Plowed soils with some loss of A horizon; durapan usually present.

VEGETATION

Dominants	% Canopy Cover		Constancy	Status
Big sagebrush	(0)	1-6	86	Increaser/climax
Gray rabbitbrush	(0)	2-15	83	Increaser/unpalatable
Green rabbitbrush	(0)	1-10	93	Increaser/unpalatable
Crested wheatgrass		15-45	100	Introduced/palatable
Sandberg bluegrass		0-6	79	Increaser/palatable
Cheatgrass		1-40	100	Increaser/palatable in spring
Sixweeks fescue		0-5	48	Increaser/unpalatable
Bottlebrush squirreltail		0-4	52	Increaser/palatable
Spring draba		1-2	100	Invader/unpalatable
Chickweed		1-4	100	Increaser/unpalatable

Good Condition: Crested wheatgrass dominant grass with an average canopy cover of 29 percent. Assortment of forbs with annuals being the most important. Combined cover of all perennials and annuals not exceeding 19 percent. Crested wheatgrass, beardless wheatgrass, bluebunch wheatgrass, western needlegrass, and Thurber needlegrass exhibits a canopy cover averaging 31 percent. Combined juniper and shrub canopy ranges from 3-27 percent.

Indicators: Decrease in crested wheatgrass cover and increase in bottlebrush squirreltail, bulbous bluegrass, and Sandberg bluegrass associated with a lowered condition rating. Presence of some juniper and shrubs consistent with a good condition rating.

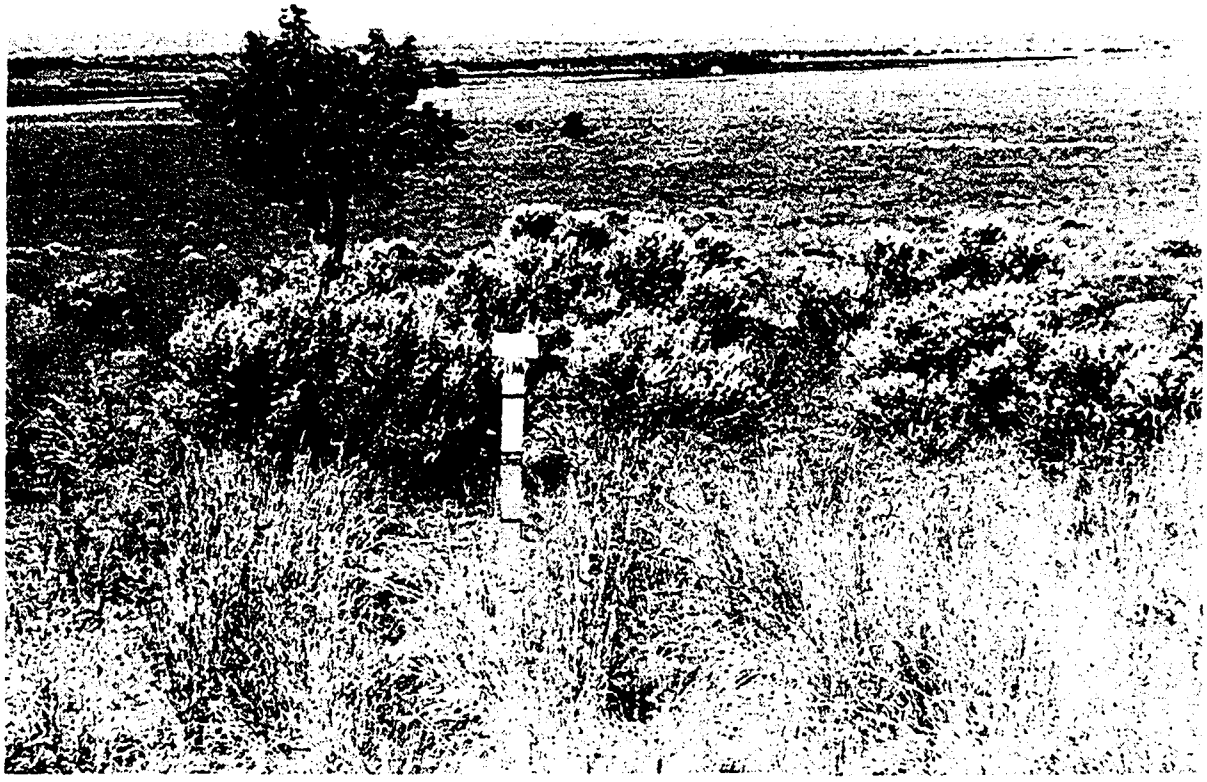
Revegetation: Productive sites normally associated with deep soils. Both crested and beardless wheatgrass perform very satisfactorily. Shrub control desirable but some shrub cover beneficial for wildlife. Bitterbrush potential and distribution unclear due to past management.

Problems Associated with Management: Maintain vegetative cover to help protect sites. Herbage production is moderate on these communities.

CHARACTERISTICS (22 plots in good condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover: Decreaser Bunchgrass	% Canopy Cover: Juniper/ Shrubs
MEAN	318	3	63	28	31	14
5% C.I.	23	1	7	6	2	3

WESTERN JUNIPER/GRAY RABBITBRUSH-
BIG SAGEBRUSH/CRESTED WHEATGRASS
(FAIR CONDITION)
CJS2-91



WESTERN JUNIPER/GRAY RABBITBRUSH-BIG SAGEBRUSH/CRESTED WHEATGRASS (FAIR CONDITION)

ENVIRONMENT

Slope position: Toeslopes, flats
Aspect: All exposures
Slope: Flat to 15%
Elevation: 2600-3300'
Topography: Flats, gentle side-slopes, plateaus

SOILS

Geology: Highly weathered tuffs & basalts intermixed with ash
Surface texture: Sand - sandy loam
Rooting depth: 6-46"
Total depth: 6-46"
Remarks: Plowed soils with loss of part of A horizon; mixed with B

VEGETATION

Dominants	% Canopy Cover	Constancy	Status
Big sagebrush	(0) 1-20	85	Increaser/climax
Gray rabbitbrush	(0) 2-17	100	Increaser/unpalatable
Green rabbitbrush	(0) 3-15	100	Increaser/unpalatable
Crested wheatgrass	15-30	100	Introduced/palatable
Bulbous bluegrass	0-15	50	Increaser/palatable
Sandberg bluegrass	0-10	85	Increaser/palatable
Cheatgrass	(0) 1-25	96	Increaser/palatable
Sixweeks fescue	(0) 0-7	81	Increaser/unpalatable
Bottlebrush squirreltail	0-5	81	Increaser/palatable
Yarrow	(0) 1-5	92	Increaser/unpalatable
Spring draba	1-2	97	Invader/unpalatable
Chickweed	0-3	88	Increaser/unpalatable

Fair Condition: Crested wheatgrass dominant grass with average canopy cover of 23 percent. Area supports a noticeable increase in juniper and shrubs. More diverse flora than found in good condition. Beardless wheatgrass, intermediate cheatgrass, crested wheatgrass, bluebunch wheatgrass, bulbous bluegrass, western needlegrass, and Thurber needlegrass contribute an average canopy cover of 25 percent with a range of 15-36 percent. Juniper and all species of shrubs range from 8-36 percent with an average of 24 percent canopy cover on a given site.

Indicators: Increase in bottle squirreltail and bulbous bluegrass, and decrease in palatable decreaser bunchgrasses indicate a condition moving away from a rating of good. Increase in both annual plant diversity and canopy cover further indicates a changing condition.

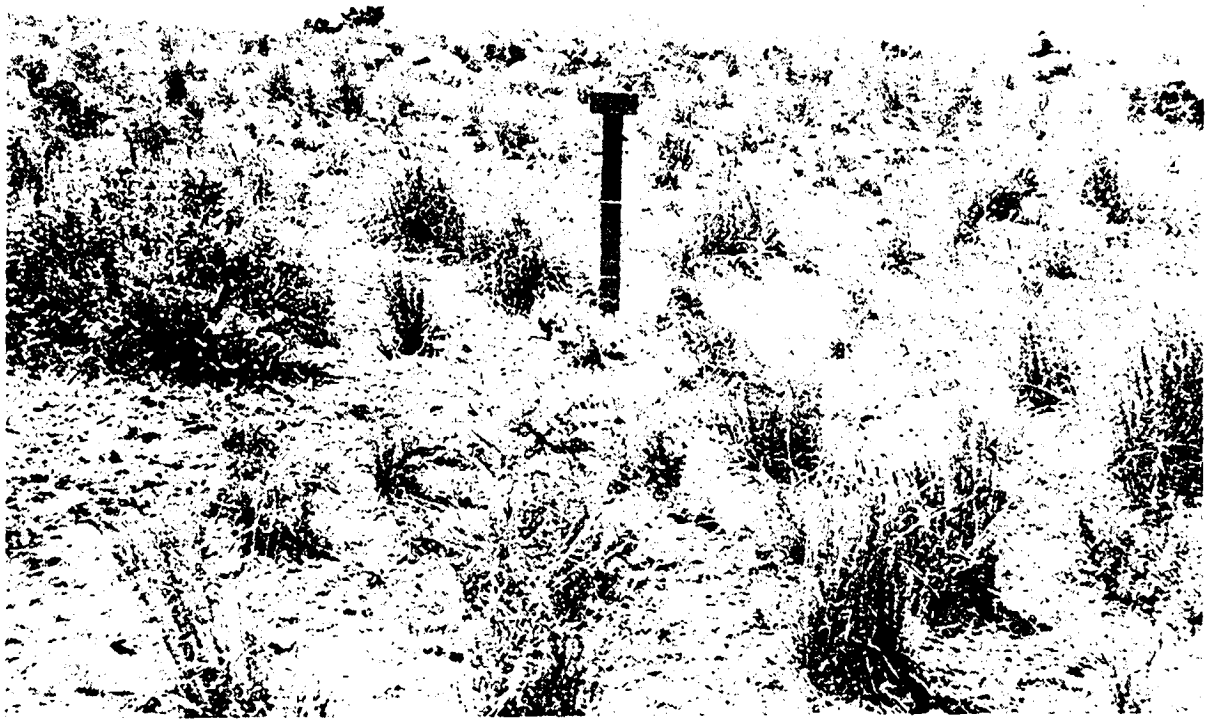
Revegetation: Past use has allowed juniper and shrubs to occupy site due to overuse of grasses. Normal shrub and juniper cover should range between 10-18 percent canopy cover. Crested or beardless wheatgrass best suited for these sites unless a commercial seed source for native bunchgrasses is found.

Problems Associated with Management: Range manager should allow for some shrub cover to develop on these sites. Disking, prescribed fires, or the use of herbicides may further weaken desirable herbaceous vegetation if applied too frequently.

CHARACTERISTICS (26 plots in fair condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover: Decreaser Bunchgrass	% Canopy Cover: Juniper/ Shrubs
MEAN	280	5	66	20	26	24
5% C.I.	28	2	6	5	2	3

WESTERN JUNIPER/GRAY RABBITBRUSH-
BIG SAGEBRUSH/CRESTED WHEATGRASS
(POOR CONDITION)
CJS2-91



CJS2-91

WESTERN JUNIPER/GRAY RABBITBRUSH-BIG SAGEBRUSH/CRESTED WHEATGRASS (POOR CONDITION)

ENVIRONMENT

Slope position: Ridgetops, flats
Aspect: All exposures
Slope: Flat to 15%
Elevation: 2500-3400'
Topography: Concave, convex, flats, sideslopes, plateaus

SOILS

Geology: Weathered tuffs & basalts intermixed with ash
Surface texture: Sand - sandy loam
Rooting depth: 7-48"
Total depth: 7-48"
Remarks: Plowed soils with loss of some of the A horizon.

VEGETATION

Dominants	% Canopy Cover	Constancy	Status
Juniper	(0) 1-10	93	Increaser/climax
Big sagebrush	0-40	86	Increaser/unpalatable
Gray rabbitbrush	1-30	100	Increaser/unpalatable
Green rabbitbrush	0-17	79	Increaser/unpalatable
Crested wheatgrass	2-20	100	Introduced/palatable
Bulbous bluegrass	0-10	36	Increaser/palatable
Sandberg bluegrass	(0) 3-20	93	Increaser/palatable
Cheatgrass	2-30	100	Increaser/palatable
Sixweeks fescue	0-15	79	Increaser/unpalatable
Bottlebrush squirreltail	0-5	86	Increaser/palatable
Yarrow	0-4	86	Increaser/unpalatable
Alyssum	0-5	79	Increaser/unpalatable
Chickweed	1-5	100	Increaser/unpalatable
Spring draba	1-3	93	Invader/unpalatable

Poor Condition: Combination of juniper and shrubs dominant these sites. Crested wheatgrass dominant bunchgrass with an average canopy cover of 11 percent. Beardless wheatgrass, intermediate wheatgrass, crested wheatgrass, bluebunch wheatgrass, Idaho fescue, big bluegrass, western needlegrass, and Thurber needlegrass have an average canopy cover of 14 percent. The combined canopy cover of juniper and shrubs ranges between 12-53 percent with an average 31 percent. These sites support a wide variety of annuals and perennials.

Indicators: Combined shrub and juniper cover in excess of 18 percent canopy cover suggest a poor condition. However, the juniper/shrub component must be viewed in light of the bunchgrass canopy cover. Combined increaser bunchgrass in excess of 8 percent also suggest a degraded site.

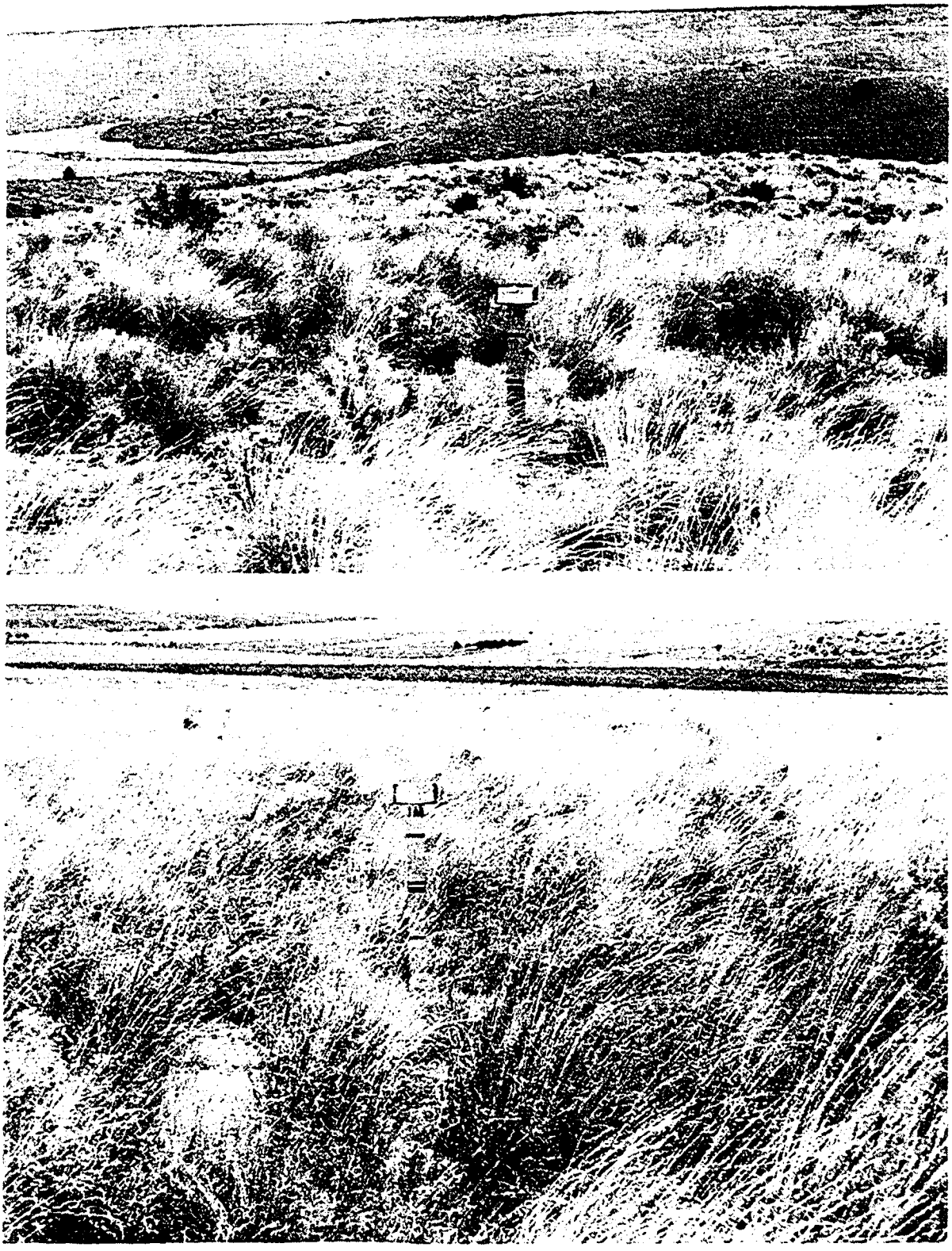
Revegetation: Juniper and shrub control measures should be taken and the area interplanted with either crested or beardless wheatgrass. Native vegetation could be reintroduced if a satisfactory seed-source can be located.

Problems Associated with Management: Past management has allowed shrubs and juniper to become dominant. Removal of shrubs and juniper will not by itself result in satisfactory response by bunchgrasses. Seeding of bunchgrasses is often needed. Cattle should be excluded for several years to allow establishment of bunchgrasses on seeded range.

CHARACTERISTICS (26 plots in poor condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover: Decreaser Bunchgrass	% Canopy Cover: Juniper/ Shrubs
MEAN	166	5	69	19	14	31
5% C.I.	39	3	9	7	5	7

WESTERN JUNIPER/GRAY RABBITBRUSH-
BIG SAGEBRUSH/BEARDLESS WHEATGRASS
(GOOD CONDITION)
CJS2-92



WESTERN JUNIPER/GRAY RABBITBRUSH-BIG SAGEBRUSH/BEARDLESS WHEATGRASS (GOOD CONDITION)

ENVIRONMENT

Slope position: Toeslopes, flats
Aspect: All exposures
Slope: Flat to 10%
Elevation: 2500-3100'
Topography: Generally flat to undulating

SOILS

Geology: Highly weathered tuffs & basalts intermixed with ash
Surface texture: Sand - sandy loam
Rooting depth: 14-36"
Total depth: 14-36"
Remarks: Plowed soils with some loss of the original A horizon

VEGETATION

Dominants	% Canopy Cover		Constancy	Status
Juniper	(0)	1-3	90	Increaser/climax
Big sagebrush		0-15	80	Increaser/unpalatable
Gray rabbitbrush		2-20	100	Increaser/unpalatable
Green rabbitbrush		1-5	100	Increaser/palatable
Beardless wheatgrass		12-37	100	Introduced/climax
Sandberg bluegrass		0-8	80	Increaser/palatable
Cheatgrass		2-30	100	Increaser/palatable in
Sixweeks fescue	(0)	1-2	90	Increaser/unpalatable

Good Condition: Sites somewhat simple in terms of plant diversity. A wide range of annuals present and outnumber perennials. However, perennials dominate sites due to their large size. Combined canopy cover for beardless wheatgrass, intermediate wheatgrass, crested wheatgrass, bluebunch wheatgrass, Idaho fescue, big bluegrass, western needlegrass, and Thurber needlegrass ranges between 20-47 percent with an average of 32 percent. Combined juniper and shrub canopy cover ranges between 8-39 percent. Cheatgrass and sixweeks fescue canopy cover ranges from between 4-27 percent. Chickweed, spring draba, and yarrow appears widespread and with low canopy cover.

Indicators: Dominant herbaceous grass is beardless wheatgrass but a variety of additional native and introduced grasses may occur.

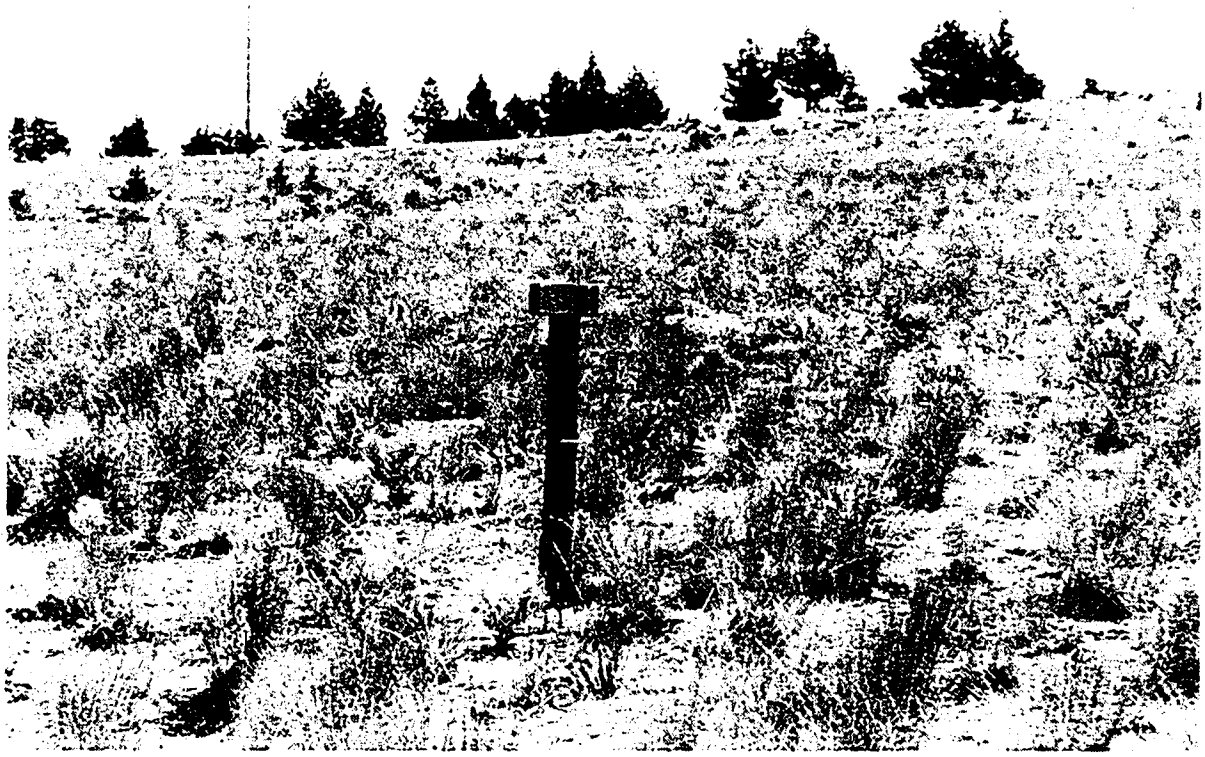
Revegetation: Sites supporting beardless wheatgrass or a combination of both beardless and crested wheatgrass can be maintained by proper management. Interplanting of either species recommended where void areas occur. Some shrub/juniper cover desirable to allow for important cover for wildlife (Maser and Gashwiler, 1978).

Problems Associated with Management: Range manager should allow for some juniper and shrub cover. Frequent burning, disking, or use of herbicides may disturb sites and create opportunities for establishment of undesirable vegetation.

CHARACTERISTICS (10 plots in good condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover Decreaser Bunchgrass	% Canopy Cover Juniper/ Shrubs
MEAN	363	10	64	19	32	18
5% C.I.	69	5	8	7	5	7

WESTERN JUNIPER/GRAY RABBITBRUSH-
BIG SAGEBRUSH/BEARDLESS WHEATGRASS
(FAIR CONDITION)
CJS2-92



WESTERN JUNIPER/GRAY RABBITBRUSH-BIG SAGEBRUSH/BEARDLESS WHEATGRASS (FAIR CONDITION)

ENVIRONMENT

Slope position: Toeslopes, flats and bottoms
Aspect: All exposures
Slope: Flat to 15%
Elevation: 2400-3100'
Topography: Generally flat to undulating

SOILS

Geology: Highly weathered tuffs & basalts intermixed with ash
Surface texture: Sand to sandy loam
Rooting depth: 6-32"
Total depth: 6-32"
Remarks: Generally well drained surface; plowed and mixed horizons.

VEGETATION

Dominants	% Canopy Cover	Constancy	Status
Juniper	0-7	82	Increaser/climax
Big sagebrush	0-20	73	Increaser/unpalatable
Gray rabbitbrush	0-15	55	Increaser/unpalatable
Green rabbitbrush	0-10	64	Increaser/unpalatable
Beardless wheatgrass	4-25	100	Introduced/climax
Sandberg bluegrass	1-30	100	Increaser/palatable
Cheatgrass	1-35	100	Increaser/palatable in
Sixweeks fescue	0-10	91	Increaser/unpalatable
Bottlebrush squirreltail	0-8	82	Increaser/palatable
Yarrow	0-15	82	Increaser/unpalatable
Lupine			

Fair Condition: Beardless wheatgrass rather evenly dispersed among the various species of shrubs. Similar checklist of annuals found here as represented in other crested and beardless wheatgrass stands. Combined canopy cover for beardless, intermediate, crested, and bluebunch wheatgrass plus Idaho fescue, big bluegrass, western needlegrass, and Thurber needlegrass averages 22 percent. The combined canopy cover for juniper and all shrubs ranges between 10-30 percent.

Indicators: Stands dominated by beardless wheatgrass with shrub and juniper cover in excess of 15 percent. The combination of decreaser bunchgrasses and increaser bunchgrass in conjunction with shrubs are critical in determining this condition.

Revegetation: Sites may be maintained with either beardless or crested wheatgrass. Native vegetation appears to be rather slow at reinvading the majority of the sites but are successful when established. A combination of both crested and beardless wheatgrass may be desirable.

Problems Associated with Management: Necessary to identify this condition in order to develop a grazing program that would result in a up-trend of these sites. A downward trend on these sites will result in the need for woody plant control and reseeding of bunchgrass.

CHARACTERISTICS (10 plots in fair condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover: Decreaser Bunchgrass	% Canopy Cover: Juniper/ Shrubs
MEAN	240	4	70	19	22	16
5% C.I.	51	4	10	8	4	5

WESTERN JUNIPER/GRAY RABBITBRUSH-
BIG SAGEBRUSH/BEARDLESS WHEATGRASS
(POOR CONDITION)
CJS2-92

WESTERN JUNIPER/GRAY RABBITBRUSH-BIG SAGEBRUSH/BEARDLESS WHEATGRASS (POOR CONDITION)

ENVIRONMENT

Slope position: Toeslopes, flats
Aspect: All exposures
Slope: Flat to 25%
Elevation: 2500-3500'
Topography: Gentle rolling to undulating flats

SOILS

Geology: Highly weathered tuffs & basalts intermixed with ash
Surface texture: Sand - sandy loam
Rooting depth: 4-46"
Total depth: 4-46"
Remarks: Soils tend to be more sandy in texture than sandy loams

VEGETATION

Dominants	% Canopy Cover	Constancy	Status
Juniper	0-5	88	Increaser/climax
Big sagebrush	0-20	88	Increaser/unpalatable
Gray rabbitbrush	3-22	100	Increaser/unpalatable
Green rabbitbrush	2-20	100	Increaser/unpalatable
Beardless wheatgrass	2-20	100	Introduced/climax
Sandberg bluegrass	0-20	88	Increaser/palatable
Cheatgrass	1-35	100	Increaser/palatable in
Sixweeks fescue	0-10	63	Increaser/unpalatable
Bottlebrush squirreltail	0-8	88	Increaser/palatable
Yarrow	1-5	100	Increaser/unpalatable

Poor Condition: Juniper and shrubs dominant these sites with a combined woody plant canopy cover of more than three times that of the decreaser bunchgrasses. The annuals occur at approximately the same percent of canopy cover in these sites as they have in other condition classes. Combination of beardless wheatgrass, intermediate wheatgrass, crested wheatgrass, bluebunch wheatgrass, Idaho fescue, big bluegrass, western needlegrass, and Thurber needlegrass canopy cover ranges between 5-20 percent with the average cover being 12 percent. Juniper and shrub cover ranges between 27-37 percent.

Indicators: Abundant canopy cover of juniper and shrubs and low cover of beardless wheatgrass indicate a poor condition.

Revegetation: Sites suggest beardless and crested wheatgrass as well as native bunchgrass perform very satisfactorily. Excessive juniper and shrub cover will be strong competors for site and adversely impact the important bunchgrasses. The use of prescribed fire has been successful in gaining control of excessive juniper and shrubs (Martin, 1978).

Problems Associated with Management: All poor condition sites present the opportunity for the range manager to gain control of species mix. To maximize investments, the range manager needs to identify sites where the potential for response to management is highest. The major characteristics for good response would include 1) deep soils, 2) 0-10 percent slopes, 3) lack of large surface rock, and 4) size and abundance of existing decreaser bunchgrasses.

CHARACTERISTICS (8 plots in poor condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover: Decreaser Bunchgrass	% Canopy Cover: Juniper/ Shrubs
MEAN	156	6	66	21	12	32
5% C.I.	61	6	9	7	5	2

WET SITES

Status: Riparian areas are of minor importance on the Grassland in terms of acres but not in terms of importance to livestock and wildlife. Unfortunately most riparian sites have been very disturbed. Because riparian classification will require more than a cursory glance we chose not to do extensive sampling at this time but to make the grassland riparian part of a larger riparian study being initiated on the Deschutes, Ochoco, Fremont, and Winema National Forests in 1982. Descriptions below are therefore very general.

Observed communities: Four broad riparian communities were observed on the Grassland in 1981[1]

1. Streamside riparian occurs along perennial and intermittent water in canyons and foothills.

2. Moist meadow was observed at Squaw Flat (Volland, 1976).

3. Wet meadow was observed on the broad basin just northeast of the Grassland Headquarters (Volland, 1976).

4. Seeps and springs - perennial wet.

SOILS

The meadow soils are deep and fine textured. The water table is within 30" of the soil surface throughout the growing season in the wet meadow and within 45" of the surface through mid-July in the moist meadow. Soils in the juniper/willow/rush community are coarse and stony and have water near the surface throughout the year.

VEGETATION

Estimated dominants:

Streamsides	Moist Meadow	Wet Meadow	Seeps/Springs
Rose	Kentucky bluegrass	Slender bog sedge	Western Juniper
Current	Slenderbeak sedge	Beaked sedge	Big Sage
Willow	Baltic rush	Nebraska sedge	Willow
Snowberry	Mat muhly	Bulrush	Mockorange
Alder	Western yarrow	Reedgrass	Baltic rush
Dogwood	Western aster	Baltic rush	Kentucky blue-grass
Kentucky bluegrass	Longstem clover	Alkali muhly	Sedges
Monkey flower	Slender wheatgrass	Tall managrass	Herbs
Bedstraw	William's needlegrass	Beardless wild rye	
Veronica	Junegrass	Cattail	
Herbaceaous sage	Pussypaws	Bedstraw	

Revegetation: Attempt livestock control to help regain composition of riparian species. Lost vigor under fair condition can be regained in as little as 2 years. Thereafter, prevent early use every season. Conversion of sedge and rush dominance to domestic species such as canarygrass, alta fescue, timothy, or meadow foxtail will improve grazing capacity of wet meadows.

Problems Associated with Management: Riparian communities are sensitive to livestock use. Streamsides are subject to severe peak flooding and associated scouring when protective riparian cover is reduced. Proper seasonal use and effective livestock distribution should be practiced to return and retain these communities in their productive state. Failure to control juniper cover adjacent to streams will result in increased water demand on herbaceous vegetation resulting in lower forage production (Jeppesen, 1978).

[1]Aspen and cottonwood communities occur on the grassland but are scattered and are not discussed here.

TABLE 2. COMPARISONS OF VEGETATION COVER CLASSES ON EIGHT NATIVE ASSOCIATIONS (%)

	CJSB-11 1/ MOUND	SWALE	SD91-31	CJS2-26	CJS2-12	CJS2-13	CJS2-31	CJS2-32	CPS2-11
JUNIPER 2/	9	2	2	9	7	10	6	17	39
SHRUBS	20	14	14	20	18	17	24	16	23
DECREASER BUNCHGRASS	33	1	1	33	39	23	28	33	17
INCREASER BUNCHGRASS	8	17	17	8	8	6	3	3	2
ANNUAL GRASSES	5	3	3	5	2	8	26	5	5
PERENNIAL FORBS	12	4	4	12	16	12	16	10	12
ANNUAL FORBS	6	7	7	6	8	7	2	4	2

1/ CJSB-11. Mound data from CJS2-26, Swale data from SD91-31.
2/ Juniper. CPS2-11 juniper cover includes *ponderosa pine* cover.

WESTERN JUNIPER/BIG SAGEBRUSH/BLUEBUNCH WHEATGRASS-
IDAHO FESCUE, MOUND, AND SANDBERG BLUEGRASS, SWALE
CJSB-11

CJSB-11

WESTERN JUNIPER/BIG SAGEBRUSH/BLUEBUNCH WHEATGRASS-
IDAHO FESCUE, MOUND, AND SANDBERG BLUEGRASS, SWALE

ENVIRONMENT

Location: West central Grassland in the vicinity of the old townsites of Geneva and Grandview. Scattered elsewhere.
Aspect: Essentially flat
Percent slope: Less than 10%
Elevation: 2600-2800'
Slope position: Flat
Topography: Patterned ground, mound and swale, biscuit/scabland, are some of the commonly used names to describe this site.

SOILS

Geology: Basaltic lava flow/volcanic sediments
Percent stone (mounds): Scattered, increasing towards edge
Percent stone (swales): Abundant on the surface, usually scattered or absent below
Rooting depth (mounds): 6-20"
Rooting depth (swales): 2-8"
Total depth (mounds): 24-48"
Total depth (swales): 7-18"
Surface texture (mounds and swales): Silt loam

Special: Mounds are 30-60 ft. in diameter, surrounded by broad drainage swales with abundant surface rock. The proportion of mounds to swales is approximately 30/70. The formation of mound/swale was caused by intensive frost action under a former peri-glacial climate. Soils are mostly loess and alluvium deposited during the Pleistocene and volcanic ash of recent orgin. Mounds are classified in the mesic family of Xerollic Camborthids, Agency series. Swales are skeletal, mesic Lithic Haploxerolls in the Bakeoven series.

VEGETATION[1]

Dominants	% Canopy Cover	Constancy	Status
Mounds:			
Western juniper	5-20	100	Increaser
Big sagebrush	5-25	100	Increaser
Bitterbrush	5-25	100	Decreaser
Bluebunch wheatgrass	5-30	100	Decreaser/climax
Idaho fescue	5-25	100	Decreaser/climax
Thurber needlegrass	1-15	100	Decreaser/climax
Sandberg bluegrass	1-15	100	Increaser/palatable
Western yarrow	1-3	100	Increaser/unpalatable
Swales:			
Rock eriogonum	1-10	100	Increaser
Sandberg bluegrass	5-30	100	Decreaser/palatable
Foxtail barley/squirreltail	1-10	100	Increaser/unpalatable
Bigseed lomatium	1-2	100	Increaser/unpalatable

Good Condition: On mounds the herbaceous cover is dominated by bluebunch wheatgrass, Idaho fescue, and/or Thurber needlegrass. On swales the interspaces between surface rock is dominated by Sandberg bluegrass.

Poor Condition: On mounds bluebunch wheatgrass, Idaho fescue, and Thurber needlegrass are subordinant to annual grasses and forbs. On swales Sandberg bluegrass is found within the protection of surface rock and rock interspaces are dominated by forbs. Stiff sage absent.

Indicators: Large mounds covered with juniper, shrubs, and bunchgrass. Swales dominated by Sandberg bluegrass.

Revegetation: Mechanical treatment would be difficult on these sites. Crested and beardless wheatgrass or native bunchgrasses are adapted to the mounds. Hand broadcast seed and scarify. The swales are natural condition.

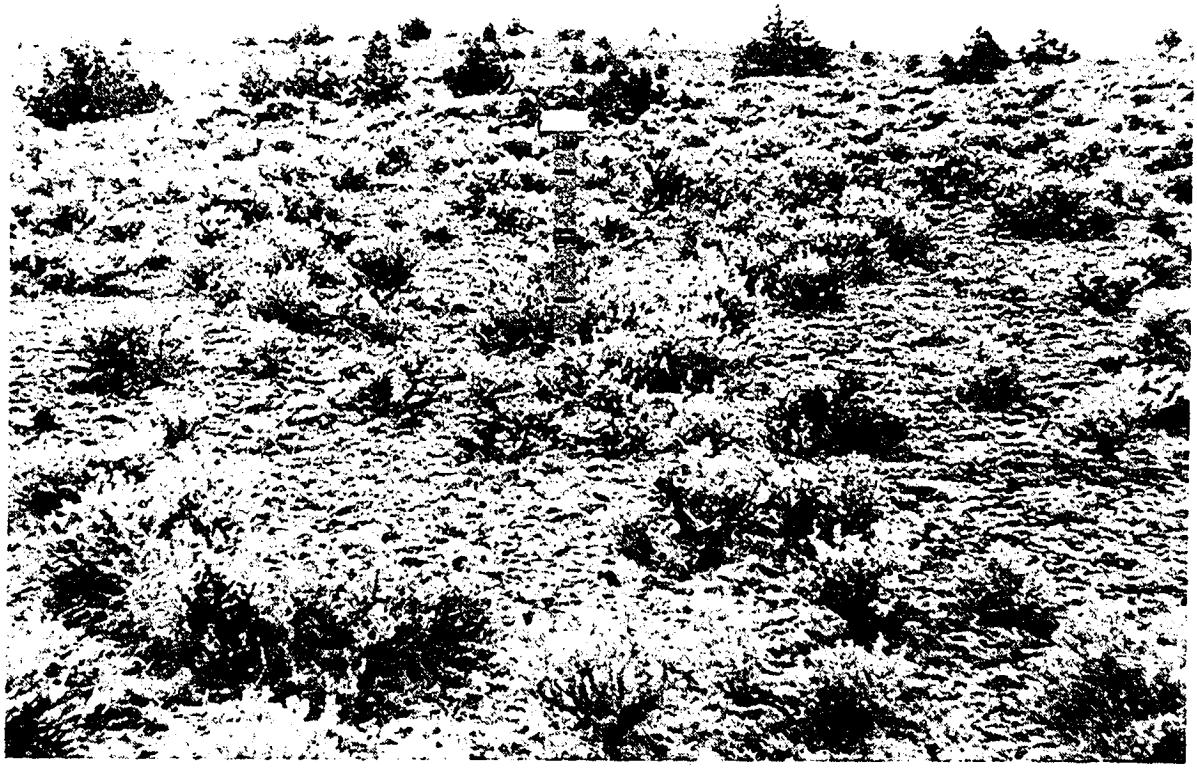
Problems Associated with Management: Sandberg bluegrass in swales is a preferred deer food in spring and early summer. Extreme water saturation on swales in late winter and spring, droughty in summer. Roads constructed through swales inhibit water drainage.

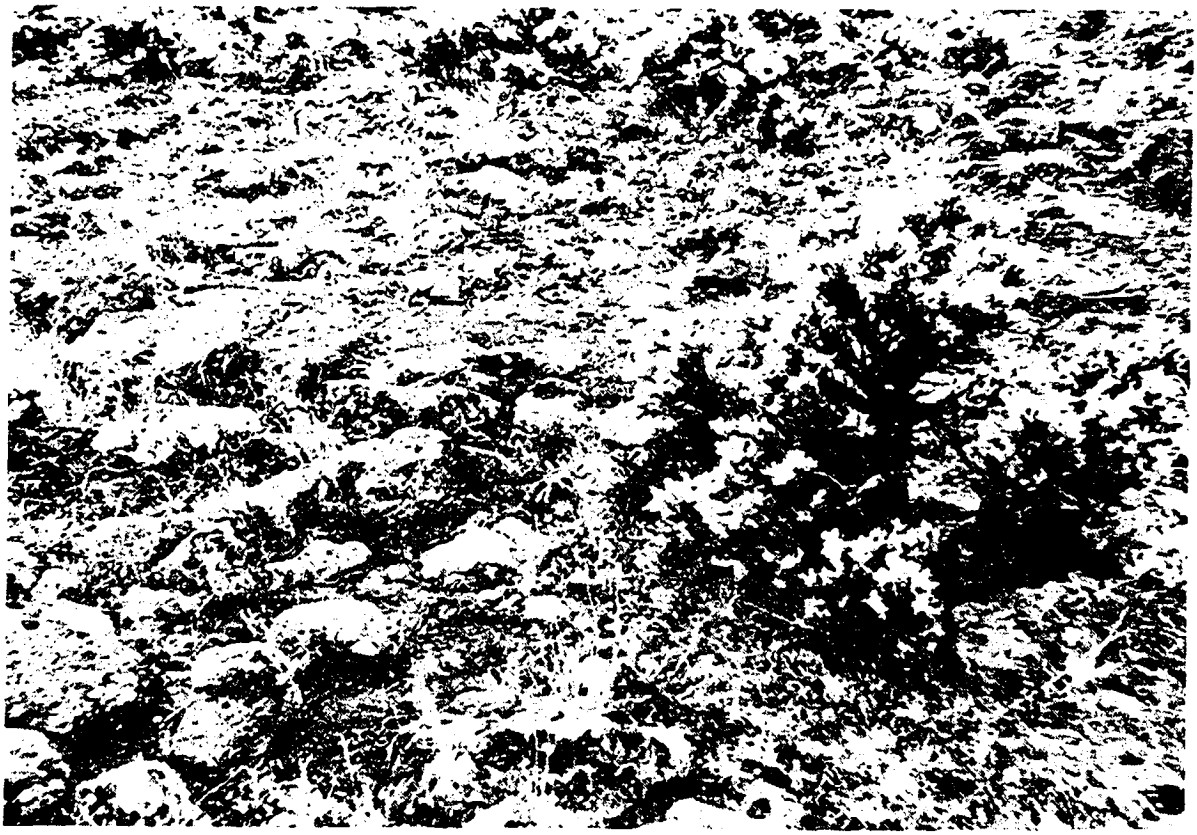
CHARACTERISTICS[1]

					% Canopy Cover	
	Herbage	Surface Rock	BG + P	Moss	Decreaser Bunchgrass	Juniper/ Shrubs
Mound						
MEAN	388	8	59	20	33	29
5% C.I.	74	8	10	11	8	13
Swale						
MEAN	30	48	32	18	1	16
5% C.I.	9	12	20	13	2	9

[1]Vegetation and characteristics: All observed mound/swale was in very poor condition. Estimates for swales are based on observations for native plots in good condition on stiff sage/Sandberg bluegrass-bigseed lomation, scabland. Estimates for mounds are based on observations for western juniper/big sagebrush/bluebunch wheatgrass-Idaho fescue, flat.

STIFF SAGEBRUSH/SANDBERG BLUEGRASS-
BIGSEED LOMATION, SCABLAND
SD91-31





SD91-31

STIFF SAGEBRUSH/SANDBERG BLUEGRASS-BIGSEED LOMATIUM, SCABLAND

ENVIRONMENT

Location: Scattered over CRNG.
Elevation: 2750-3750 ft.
Aspect: All aspects
Percent slope: Less than 10%
Slope position: Flats
Topography: Flat sites, usually on tops of ridges, buttes, canyon rims, low mounds may be present

SOILS

Geology: Basalt residuum
Total depth: 7-18"
Grass rooting depth: 2-8"
Percent stone: 0-63
Surface texture: Sandy to silt loams
Special: Very shallow soils over basalt bedrock. Churned by frost in spring and very dry in summer. Clay pan on top of bedrock.

VEGETATION

Dominants	% Canopy Cover	Constancy	Status
Stiff sagebrush	(0) 12-20	86	Decreaser/palatable
Sandberg bluegrass	4-30	100	Decreaser/climax
Foxtail barley/squirreltail	(0) 1-12	71	Increaser/unpalatable
Bigseed lomatium	1-2	100	Increaser/unpalatable

Good Condition: Interspaces between exposed surface rock are dominated by Sandberg bluegrass and stiff sage. Combined coverage is usually greater than 15 percent. Annual grasses and forbs are very subordinant. Perennial forbs such as biscuitroot are subordinant to grasses.

Poor Condition: Perennial grasses within protection of surface rock and shrubs; strongly pedestalled. Interspaces dominated by annual and perennial forbs.

Indicators: Scattered western juniper, big sage, bitterbrush, or bunchgrasses such as bluebunch indicate deeper soils or cracked bedrock. Stiff sage cover may be reduced or eliminated on burned scablands.

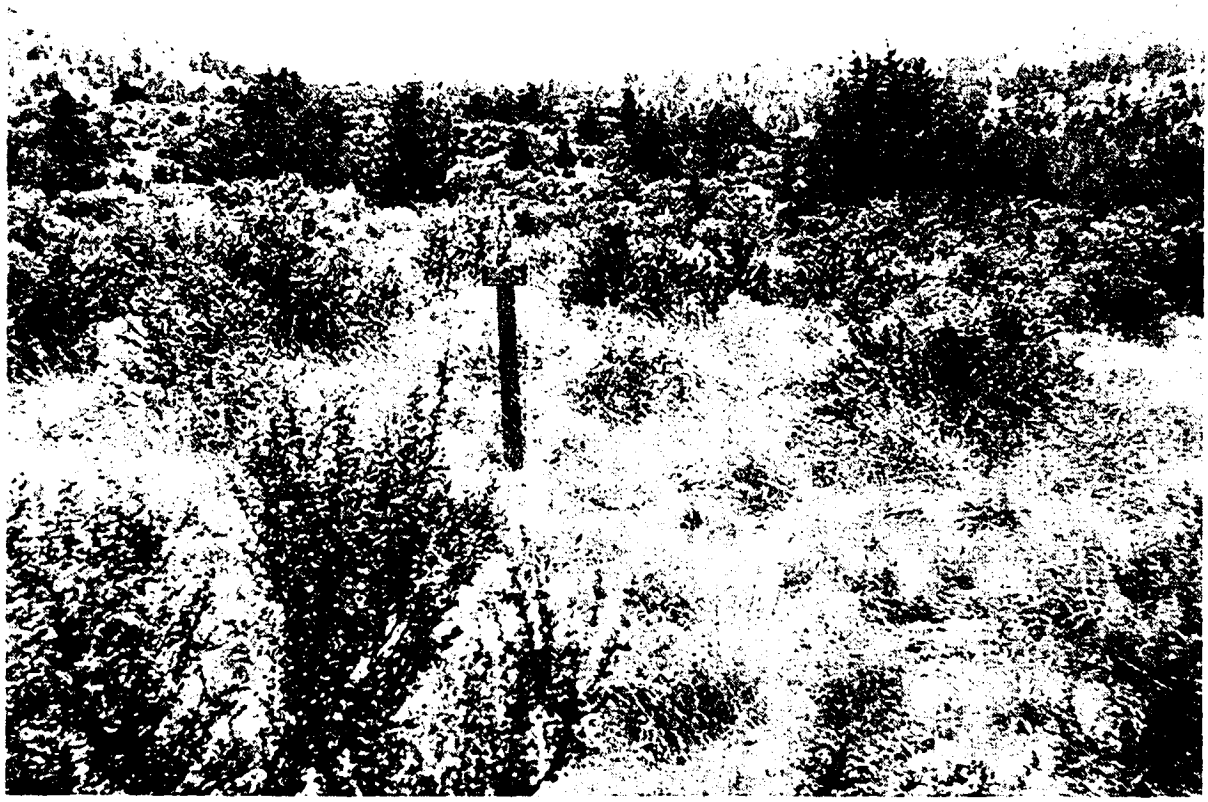
Revegetation: Revegetation should not be attempted. Surface rock must be kept in place.

Problems Associated with Management: Scablands are preferred by deer in early spring. Constructing roads across scablands will restrict water drainage. Bluebunch wheatgrass and Idaho fescue have little potential on scabland.

CHARACTERISTICS (7 plots in good condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover: Decreaser Bunchgrass	% Canopy Cover: Juniper/ Shrubs
MEAN	30	48	32	18	1	16
5% C.I.	9	12	19	13	2	9

WESTERN JUNIPER/BIG SAGEBRUSH/BLUEBUNCH
WHEATGRASS-IDAHO FESCUE, FLAT
CJS2-26



CJS2-26

WESTERN JUNIPER/BIG SAGEBRUSH/BLUEBUNCH WHEATGRASS-IDAHO FESCUE, FLAT

ENVIRONMENT

Location: All of CRNG
Elevation: 2200-4000 ft.
Aspect: All aspects
Percent slope: 0-12 (18)
Topography: Broad flat to rolling valleys or gentle slopes on broad tops of buttes and ridges

SOILS

Geology: Alluvium, loess, and residuum on basalt, welded tuffs
Total depth: 10-30"
Grass rooting depth: 6-20"
Percent stone: Horizon highly variable ranging from 0-45% stone
Surface texture: Sandy and silty loams
Special: Subsurface soil firm to hard, subangular blocky clay loam or massive clay. Duropan usually present.

VEGETATION

Dominants	% Canopy Cover		Constancy	Status
Western juniper		1-20 (29)	94	Increaser/climax
Big sagebrush	(1)	5-25	100	Increaser/climax
Gray rabbitbrush	(0)	1-4 (8)	67	Increaser/unpalatable
Green rabbitbrush	(0)	1-5	67	Increaser/unpalatable
Bluebunch wheatgrass	(2)	10-30 (40)	100	Decreaser
Idaho fescue	(0)	5-25	91	Decreaser
Thurber needlegrass	(0)	1-15	64	Decreaser
Sandberg bluegrass		1-12 (22)	100	Increaser/palatable
Western yarrow	(0)	1-3	94	Increaser/unpalatable
Phlox	(0)	1-5 (12)	70	Increaser/unpalatable

Good Condition: Bluebunch wheatgrass and Idaho fescue are the dominant herbaceous cover. Thurber needlegrass often common, sometimes codominant. Shrub and juniper cover variable--scattered to over 20 percent aerial cover, rabbitbrush scattered to common, bitterbrush present on only 30 percent of the sample plots. Bitterbrush is a climax decreaser shrub in the southerly portion of the Grassland, gradually decreasing in importance going north. Idaho fescue, a cool season grass, like bitterbrush, decreases with decreasing elevation and increasing temperature going north.

Poor Condition: Decreaser bunchgrasses subordinant to herbaceous cover, interspaces large. Cheatgrass, sixweeks fescue, and Sandberg bluegrass dominate the grass cover. Annual forbs, especially chickweed, spring draba, and longhorn plectritis abundant. Big sagebrush and juniper increasing in cover. Generally less than 15 percent decreaser bunchgrass cover.

Revegetation: Gentle slopes and moderately deep soils allow a wide variety of treatments. Most of the old homestead sites lie within this ecosystem and have often been successfully rehabilitated with crested and beardless wheatgrasses. Heavy grazing, especially on wet soils, will compact the top 3 or 4 inches of soil. This condition is resistant to bunchgrass seedling root penetration. Break the compaction by disking, followed by broadcasting of bunchgrass seed. Grazing should be delayed several years to allow establishment of bunchgrasses on seeded range. May need to thin juniper invasion on seeded range.

Problems Associated with Management: Gentle topography insures heavy use of these sites. Fire will encourage increase of rabbitbrush cover. Where present, maintain some density and vigor of bitterbrush for deer fall-winter-spring use. Moderately high potential for the production of bunchgrasses.

CHARACTERISTICS (33 plots in good condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover: Decreaser Bunchgrass	% Canopy Cover: Juniper/ Shrubs
MEAN	388	8	59	20	33	29
5% C.I.	74	8	10	10	8	13

WESTERN JUNIPER/BIG SAGEBRUSH-ROCK SPIREA/
BLUEBUNCH WHEATGRASS-ARROWLEAF BALSAMROOT, STEEP S CANYON
CJS2-31

CJS2-31

WESTERN JUNIPER/BIG SAGEBRUSH-ROCK SPIREA/ BLUEBUNCH WHEATGRASS-ARROWLEAF BALSAMROOT, STEEP S CANYON

ENVIRONMENT

Location: Canyon sideslopes
Elevation: 2500-3000 ft.
Aspect: E to NW
Percent slope: 40-80
Slope position: Lower 1/3 to upper 1/3
Topography: Steep canyon sideslopes. Vegetated sites among tallus and cliffs.

SOILS

Geology: Colluvial fragments of basalt and sedimentary exposed in canyons.
Total depth: Indeterminate
Grass rooting depth: Indeterminate
Grass rooting depth: Indeterminate
Percent stone: 45-70+
Special: Colluvially mixed sandy loam and stone of indeterminate depth.

VEGETATION

Dominants	% Canopy Cover		Constancy	Status
Western juniper	(0)	1-16	75	Increaser/climax
Big sagebrush	(3)	15-20	100	Increaser/climax
Gray rabbitbrush		1-2	100	Increaser/unpalatable
Rock spirea		1-15	100	Increaser/unpalatable
Bitterbrush	(0)	1-7	75	Decreaser/palatable
Bluebunch wheatgrass		10-20	100	Decreaser/palatable
Sandberg bluegrass	(0)	2-5 (22)	75	Increaser/palatable
Cheatgrass		3-50	100	Increaser/palatable in spring
Sixweeks fescue		3-7	100	Increaser/unpalatable
Western yarrow		1-5	100	Increaser/unpalatable
Phlox		3-15	100	Increaser/unpalatable

Good Condition: Bluebunch wheatgrass is the dominant herbaceous cover and balsamroot very common. Big sagebrush abundant. Juniper and bitterbrush scattered to common; either not well adapted to the driest and warmest sites or reduced by fire. Cheatgrass successfully invading steep loose surfaces. Species such as rock spirea and Richardson penstemon specialized to rocky sites. Bunchgrass interspaces large, even on undisturbed sites.

Poor Condition: Very little of this association is in poor condition. Where cattle have gained access to gentler slopes and benches, juniper, big sagebrush, rabbitbrush, and annual grasses and forbs increasing in cover. Bluebunch wheatgrass cover well under 10 percent.

Revegetation: Treatment options are limited by steep terrain and vicinity to water. Options limited to prescribed fire and seed broadcast.

Indicators: Bluebunch wheatgrass and balsamroot dominate the herbaceous cover. Rock spirea in rocks and cliffs.

Problems Associated with Management: Moderately low potential for the production of bunchgrasses. Steep slopes and loose soil make grazing by both cattle and sheep unrealistic. Bitterbrush a very desirable species for deer browse where present.

CHARACTERISTICS (4 plots in good condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover Decreaser Bunchgrass	% Canopy Cover Juniper/ Shrubs
MEAN	238	39	29	16	18	31
5% C.I.	75	14	18	8	6	7

WESTERN JUNIPER/BIG SAGEBRUSH-GREEN RABBITBRUSH/
IDAHO FESCUE-ARROWLEAF BALSAMROOT, STEEP N CANYON
CJS2-32

WESTERN JUNIPER/BIG SAGEBRUSH-GREEN RABBITBRUSH/ IDAHO FESCUE-ARROWLEAF BALSAMROOT, STEEP N CANYON

ENVIRONMENT

Location: Canyon sideslopes
Elevation: 2500-3000 ft.
Aspect: NW to E
Percent slope: (15) 50-70
Slope position: Lower 1/3 to upper 1/3
Topography: Steep canyon sideslopes. Vegetated sites among tallus and cliffs.

SOILS

Geology: Colluvial fragments of basalt and sedimentaries exposed in canyons.
Total depth: Indeterminate
Grass rooting depth: Indeterminate
Percent stone: 45-50+
Surface texture: Sand to sandy loam
Special: Colluvially mixed sandy loam and stone of indeterminate depth.

VEGETATION

Dominants	% Canopy Cover		Constancy	Status
Western juniper		6-35	100	Increaser/climax
Big sagebrush		2-20	100	Increaser/unpalatable
Gray rabbitbrush	(0)	1-2	80	Increaser/unpalatable
Green rabbitbrush		1-7	100	Increaser/unpalatable
Rock spirea	(0)	1-3	60	Increaser/unpalatable
Bitterbrush	(0)	1-5	80	Decreaser
Bluebunch wheatgrass		3-25	100	Decreaser
Idaho fescue		10-40	100	Decreaser
Sandberg bluegrass	(0)	1-7	80	Increaser/palatable
Arrowleaf balsamroot		1-2	100	Increaser/unpalatable
Longgray eriogonum	(0)	1-2	80	Inceraser/unpalatable

Good Condition: Idaho fescue and bluebunch wheatgrass the dominant herbaceous cover. Balsamroot present with low cover. Rock spirea and Richardson penstemon located in rocky sites. Juniper and big sagebrush common to abundant. Bitterbrush scattered.

Poor Condition: Where cattle gain access, juniper, big sagebrush, rabbitbrush, Sandberg bluegrass, and cheatgrass will increase in cover.

Revegetation: Treatment options are limited because of steep terrain.

Indicators: Bluebunch wheatgrass and Idaho fescue dominant. Balsamroot present. Rock spirea in rocks and cliffs.

Problems Associated with Management: Steep slopes restrict grazing opportunities. Moderately high potential for bunchgrass production.

CHARACTERISTICS (5 plots in good condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover Decreaser Bunchgrass	% Canopy Cover Juniper/ Shrubs
MEAN	400	21	43	25	33	34
5% C.I.	203	11	24	15	15	5

WESTERN JUNIPER/BIG SAGEBRUSH/BLUEBUNCH
WHEATGRASS-SANDBERG BLUEGRASS, S SLOPE
CJS2-13

CJS2-13

WESTERN JUNIPER/BIG SAGEBRUSH/BLUEBUNCH WHEATGRASS-SANDBERG BLUEGRASS, S SLOPE

ENVIRONMENT

Location: All of CRNG
Elevation: 2400-5000 ft.
Aspect: SSE to WNW
Percent slope: 20-55
Slope position: Toeslope to shoulderslope
Topography: Southerly-facing sideslopes of hills, buttes, and ridges.

SOILS

Geology: Residuum and ash on buttes and hills of John Day and Clarno sediments, basalts
Total depth: (7) 12-30
Grass rooting depth: 7-16 (24)
Percent stone: (6) 23-51
Surface texture: Sandy loam and silty loam
Special: Relocated ash occasionally dominates toe slopes. Rocks through all horizons. Subsurface horizons composed of strongly structured clay or clay loam. Well drained.

VEGETATION

Dominants	% Canopy Cover	Constancy	Status
Western juniper	2-25	100	Increaser/climax
Big sagebrush[1]	(0) 8-30	100	Increaser/climax
Bitterbrush	1-15	50	Decreaser/palatable
Bluebunch wheatgrass	8-35	100	Decreaser/palatable
Sandberg bluegrass	1-15	100	Increaser/palatable
Cheatgrass brome	1-22	93	Invader/palatable spring
Arrowleaf balsamroot	1-3	57	Increaser/unpalatable
Phlox	1-2	86	Increaser/unpalatable

Good Condition: Bunchgrass is the dominant herbaceous cover. Western juniper and big sagebrush common, each generally less than 15 percent cover. Gray and green rabbitbrush scattered. Bitterbrush scattered climax status unclear. Cheatgrass common on loose soils associated with these sites.

Poor Condition: Decreaser bunchgrasses subordinant to herbaceous cover, interspaces large. Cheatgrass and sixweeks fescue dominate the grass cover. Annual forbs, especially alyssum, chickweed, and spring draba abundant. Gray and green rabbitbrush more common. Juniper and big sagebrush will increase in cover with continued overuse and absence of fire. Sandberg bluegrass will decrease in cover on heavily overgrazed sites. Generally less than 10 percent decreaser bunchgrasses.

Revegetation: Prescribed burning will not result in increased bunchgrass cover without additional treatment and protection on highly disturbed sites. Use crested or beardless bluebunch if bluebunch wheatgrass is not available. Rest the site for several years. Burn cheatgrass before the seedheads have fallen for successful control. Complete brush control is questionable as big sagebrush and bitterbrush are important big game winter habitat species.

Indicators: Bluebunch wheatgrass dominant. Thurber needlegrass occurs below 3700 feet elevation.

Problems Associated with Management: Moderately low potential for bunchgrass production. Heavy hoof action can result in significant displacement of soil. Slopes too steep for mechanical equipment to operate.

CHARACTERISTICS (14 plots in good condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover: Decreaser Bunchgrass	% Canopy Cover: Juniper/ Shrubs
MEAN	266	24	50	10	23	27
5% C.I.	104	16	20	10	6	12

[1]Big sagebrush: low sage dominates three sample stands on Gray Butte. low sage lumped with big sage in this association.

WESTERN JUNIPER/BIG SAGEBRUSH/IDAHO FESCUE-
BLUEBUNCH WHEATGRASS, N SLOPE
CJS2-12

CJS2-12

WESTERN JUNIPER/BIG SAGEBRUSH/IDAHO FESCUE-BLUEBUNCH WHEATGRASS, N SLOPE

ENVIRONMENT

Location: All of CRNG
Elevation: 2750-5000 ft.
Aspect: WNW to ESE
Percent slope: 20-40
Slope position: Toe to shoulderslopes
Topography: Northerly slopes of hills, buttes, and ridges.

SOILS

Geology: Residuum and ash on buttes and hills of John Day and Clarno sediments, basalts
Total depth: 14-36 (84)
Grass rooting depth: 8-22
Percent stone: (0) 24-60 (90)
Surface texture: Sandy loam and silt loam
Special: Lower slopes occasionaly with deep stoneless wind-deposited ash. Rocks usually through all horizons. Subsurface soils weak subangular sandy loam to strong subangular or massive clays.

VEGETATION

Dominants	% Canopy Cover		Constancy	Status
Western juniper		1-12 (43)	100	Increaser/climax
Big sagebrush[1]		1-25	100	Increaser/unpalatable
Gray rabbitbrush	(0)	1-10	70	Increaser/unpalatable
Bluebunch wheatgrass	(0)	5-30	96	Decreaser
Idaho fescue	(3)	10-25	100	Decreaser
Cusick bluegrass	(0)	2-30	38	Decreaser
Sandberg bluegrass	(0)	4-18	96	Increaser/palatable
Western yarrow	(0)	1-3 (10)	91	Increaser/unpalatable
Nineleaf lomatium	(0)	1-5	78	Increaser/unpalatable
Phlox	(0)	1-3 (10)	74	Increaser/unpalatable

Good Condition: Idaho fescue and bluebunch wheatgrass the dominant herbaceous cover. Cusick bluegrass occasionally codominant between 3000 and 4000 feet in elevation. Western juniper and big sagebrush common, usually less than 10 percent and 20 percent cover, respectively. Gray rabbitbrush more common than on south slopes. Green rabbitbrush scattered. Bitterbrush apparently not well adapted to these cooler sites. Big sagebrush and juniper of shorter stature in comparison to south aspects.

Poor Condition: Decreaser bunchgrasses subordinant to herbaceous cover, interspaces relatively large. Cheatgrass and sixweeks fescue dominate the grass cover. Annual forbs abundant. Big sagebrush and juniper increasing in cover in the absence of fire. Rabbitbrush increasing in cover on heavily grazed sites. Generally less than 15 percent decreaser bunchgrass cover.

Revegetation: These sites are more resiliant than other sites on the Grassland. Higher bunchgrass cover and density, coupled with a cooler and more moist site, leads to higher resistance and quicker recovery from grazing impacts. Prescribed fire may result in higher bunchgrass cover although additional treatment such as seeding and resting may be desirable when density of bunchgrasses is less than 3-5 bunches per 9.6-foot diameter hoop. Complete brush control using chemicals and fire may be more acceptable as these sites are less important for winter range.

Problems Associated with Management: Moderate potential for bunchgrass production. Slopes are too steep for good cattle distribution and limit equipment options.

CHARACTERISTICS (14 plots in good condition)

	Herbage	Surface Rock	BG + P	Moss	% Canopy Cover: Decreaser Bunchgrass	% Canopy Cover: Juniper/ Shrubs
MEAN	375	16	39	22	39	25
5% C.I.	77	13	20	17	14	14

[1]Big sagebrush: one plot with low sagebrush lumped into this association.

PONDEROSA PINE/BITTERBRUSH/IDAHO FESCUE
CPS2-11

CPS2-11

PONDEROSA PINE/BITTERBRUSH/IDAHO FESCUE

ENVIRONMENT

Location: Southwest edge of CRNG
Elevation: 2900-3100 ft.
Aspect: All aspects
Percent slope: 0-25
Slope position: Flats to ridges
Topography: Variable

SOILS

Geology: Air-laid or flow pumice/lava, alluvium, pumice
Total depth: 21-60 in.
Grass rooting depth: 15+ in.
Percent stone: Variable
Surface texture: Loamy sand
Special: Profile well mixed. Moist in spring, but without water by mid-June.

VEGETATION[1]

Dominants	% Cover	Constancy	Status
Ponderosa pine	10-40	100	Climax
Western juniper	1-35	100	Minor climax/increaser
Bitterbrush	6-35	100	Decreaser
Idaho fescue	6-24	100	Decreaser

Ground Vegetation: Bitterbrush is the dominant shrub species. Western juniper occurs along the shrub/steppe fringe and where soils are shallower. Idaho fescue is the dominant herbaceous species. Other common herbaceous plants are squirreltail, Sandberg bluegrass, yarrow, and balsamroot.

Indicators: Bitterbrush near absent where root zone is water-saturated in the growing season.

Silviculture: Low to Moderately low site productivity. Natural regeneration usually common. Overstory removal or shelterwood treatment is best with interplanting where regeneration is sparse and thinning where the understory is in stagnated thickets. Highly disturbed sites may require the control of fescue. Compaction may be a hazard if heavy equipment is operated on moist soils in spring.

Revegetation: Bitterbrush palatable to deer and livestock; provides protective cover for regeneration. Grass seeding success is fair to good with mixtures of crested and intermediate wheatgrass, hard fescue, and Russian wildrye. Use native Idaho fescue if available.

Range Management: Spring, summer, and fall mule deer habitat. Must force livestock onto fescue to receive adequate utilizaton. Most of community requires water hauling.

PRODUCTIVITY (3 Plots)[1]

	Site Index (PP)	TBA (PP)	GBA (PP)	Ft^3/YR Index (PP)
Mean	70	120	73	43
5% C.I.	2	17	18	7

[1] Vegetation and Productivity: information presented for this association is approximate--borrowed from Volland, 1976, from three plots in the vicinity of the CRNG.

SPECIES LIST--LINE DRAWINGS

This species list is a composite of the major plant species found on the Crooked River National Grassland. Also included are some of the important pathogens, insects, birds, and mammals. The following lists are alphabetized first by common name and then by scientific name. The line drawings are alphabetized by scientific name and grouped by lifeform. The lifeform groups are presented in colored sections:

Trees . . . . . Blue
Shrubs . . . . . Green
Grasses & Sedges. . Pink
Forbs. . . . . Yellow

Each species illustrated is accompanied by a general statement of its indicator value on the Crooked River National Grassland and when known a note as to this species economic or medicinal use. The source for most of the line drawings was:

Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J.W. Thompson, 1969. Vascular plants of the Pacific Northwest, Part 1: Vascular cryptograms, gymnosperms, and monocotyledons. Univ. Wash. Press, Seattle, 914 p.

Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J.W. Thompson, 1964. Vascular plants of the Pacific Northwest, Part 2: Salicaceae to Saxifragaceae, Univ. Wash. Press. Seattle, 597 p.

Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J.W. Thompson, 1961. Vascular plants of the Pacific Northwest, Part 3: Saxifragaceae to Ericaceae. Univ. Wash. Press, Seattle, 614 p.

Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J.W. Thompson, 1959. Vascular plants of the Pacific Northwest, Part 4: Ericaceae to Camplanulaceae. Univ. Wash. Press, Seattle, 510 p.

Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J.W. Thompson, 1955. Vascular plants of the Pacific Northwest, Part 5: Composite Univ. Wash. Press, Seattle, 343 p.

Portions of the note sections were extracted from:

Angier, B. 1978. Field guide to medicinal wild plants. Stackpole Books, Harrisburg, PA 320 p.

Benoliel, D. 1974. Northwest Foraging. Signpost Pub., Lynwood, WA. 173 p.

Strickler, G.S. Personal communication. PNW Range and Wildlife Habitat Lab., LaGrande, OR

USDA Forest Service, 1937, Range Plant Handbook, USDA, Wash., D.C.

SPECIES LIST

Common Name	Alpha Code	Scientific Name
TREES		
Bittercherry	PREM	*Prunus emarginata*
Black Cottonwood	POTR2	*Populus trichocarpa*
Ponderosa pine	PIPO	*Pinus ponderosa*
Quaking aspen	POTR	*Populus tremuloides*
Western juniper	JUOC	*Juniperus occidentalis*
SHRUBS		
Antelope bitterbrush	PUTR	*Purshia tridentata*
Big sagebrush	ARTRT	*Artemisia tridentata tridentata*
Common snowberry	SYAL	*Symphoricarpos albus*
Curlleaf mountain-mahogany	CELE	*Cercocarpus ledifolius*
Dogwood	COST	*Cornus stolonifera*
Granite gilia	LEPU2	*Leptadactylon pungens*
Gray rabbitbrush	CHNA	*Chrysothamnus nauseosus*
Green rabbitbrush	CHVI	*Chrysothamnus visidiflorus*
Horsebrush	TECA	*Tetradymia canescens*
Low sagebrush	ARAR	*Artemisia arbuscula*
Mockorange	PHLE2	*Philadelphus lewsii*
Rabbitbrush goldenweed	HABL	*Haplopappus bloomeri*
Rock spirea	HODU	*Holodiscus dumosus*
Saskatoon serviceberry	AMAL	*Amerlanchier alnifolia*
Stiff sagebrush	ARRI	*Artemisia rigida*
Wax current	RICE	*Ribes cereum*
Willow	SALIX	*Salix spp.*
Woods rose	ROWO	*Rosa woodsii*
SEDGES AND RUSHES		
Baltic rush	JUBA	*Juncus balticus*
Rush	JUNCUS	*Juncus spp.*
Sedge	CAREX	*Carex spp.*
Threadleaf sedge	CAFI	*Carex filifolia*
GRASSES		
Alaska oniongrass	MESU	*Melica subulata*
Beardless wheatgrass	AGIN	*Agropyron inerme*
Bentgrass	AGROST	*Agrostis spp.*
Big bluegrass	POAM	*Poa ampla*
Bottlebrush squirreltail	SIHY	*Sitanion hystrix*
Bluebunch wheatgrass	AGSP	*Agropyron spicatum*
Bulbous bluegrass	POBU	*Poa bulbosa*
California brome	BRCA	*Bromus carinatus*
Cheatgrass brome	BRTE	*Bromus techtorum*
Crested wheatgrass	AGCR	*Agropyron cristatum*
Cusick bluegrass	POCU	*Poa cusickii*
Foxtail barley	HOJU	*Hordeum jubatum*
Foxtail barley	HOLE	*Hordeum leporinum*
Foxtail barley	HOPU	*Hordeum pusillum*
Giant wildrye	ELCI	*Elymus cinereus*
Indian ricegrass	ORHY	*Oryzopsis hymenoides*
Idaho fescue	FEID	*Festuca idahoensis*
Intermediate wheatgrass	AGIN2	*Agropyron intermedium*
Medusahead wildrye	ELCA2	*Elymus caput-medusae*
Needle and thread	STCO2	*Stipa comata*
Praire junegrass	KOCR	*Koleria cristata*
Sandberg bluegrass	POSA3	*Poa sandbergii*
Sixweeks fescue	FEOC2	*Festuca octaflora*
Quack grass	AGRE	*Agropyron repens*
Thurber needlegrass	STTH	*Stipa thurberiana*
Western needlegrass	STOC	*Stipa occidentalis*

Common Name	Alpha Code	Scientific Name
FORBS		
Agoseris	AGGR	*Agoseris grandiflora*
Alyssum	ALDE	*Alyssum desertorium*
Annual agoseris	AGHE	*Agoseris heterophylla*
Arrowleaf balsamroot	BASA	*Balsamorhiza sagittata*
Ballhead waterleaf	HYCA	*Hydrophyllum capitatum*
Bighead clover	TRMA	*Trifolium macrocephalum*
Bigseed lomatium	LOMA	*Lomatium macrocarpum*
Birdrafe	BRNI	*Brassica nigra*
Bitterroot lewisia	LERE	*Lewisia rediviva*
Blazingstar	MENTZ	*Mentzelia spp.*
Blepharipappus	BLSC	*Blepharipappus scaber*
Branching phacelia	PHRA	*Phacelia ramosissima*
Bristlehead	RILE	*Rigiopappus leptocladus*
Brittle bladderfern	CYFR	*Cystopteris fragilis*
Broom eriogonum	ERVI	*Eriogonum vimineum*
Broomrape	ORUN	*Orobanche uniflora*
Canby biscuitroot	LOCA4	*Lomatium canbyi*
Bulbous fringecup	LIBU	*Lithophragma bulbifera*
Catchweed bedstraw	GAAP	*Galium aparine*
Chickweed	CENU	*Cerastium nutans*
Clasping pepperweed	LEPE	*Lepidium perfoliatum*
Collomia	COGR2	*Collomia grandiflora*
Curvepod locoweed	ASCU2	*Astragalus curvicarpus*
Cryptantha	CRAF	*Crypthantha affinis*
Cranesbill	ERCI	*Erodium cicutarium*
Cusick milkvetch	ASCU4	*Astragalus cusickii*
Cusick rockcress	ARCU	*Arabis cusickii*
Dandelion	TAOF	*Taraxacum officinale*
Desert paintbrush	CACH2	*Calochortus macrocarpus*
Donnel biscuitroot	LODO	*Lomatium donnellii*
Douglas chaenactis	CHDO	*Chaenactis douglasii*
Douglas silene	SIDO2	*Silene douglasii*
Elkhorns clarkia	CLPU	*Clarkia pulchella*
Flannel mullein	VETH	*Verbascum thapsus*
Fernleaf lomatium	LODI2	*Lomatium dissectum*
Fleabane	ERPO	*Erigeron poliospermus*
Gland cinquefoil	POGL	*Potentilla glandulosa*
Goldenrod	SOMI	*Solidago missourensis*
Gorman biscuitroot	LOGO	*Lomatium gormanii*
Gray biscuitroot	LOGR	*Lomatium grayi*
Groundsmoke	GADI	*Gayophytum diffusum*
Hawkweed	HAIL2	*Hieracium albertinum*
Herbaceous sage	ARLU	*Artemisia ludoviciana*
Holboel rockcress	ARHO	*Arabis holboelii*
Iris	IRIS	*Iris spp.*
Larkspur	DELPH	*Delphinium spp.*
Lettuce	LALU	*Lactuca ludoviciana*
Linanthus	LIBA	*Linanthus bakerii*
Lineleaf fleabane	ERLI	*Erigeron linearis*
Littleflower collinsia	COPA	*Collinsia parviflora*
Littleleaf montia	MOPA	*Montia parviflora*
Littlepod falseflax	CAMI3	*Camelian microcarpa*
Little larkspur	DEBI	*Delphinium bicolor*
Longgray eriogonum	ERST	*Eriogonum stellatum*
Longhorn plectritis	PLMA3	*Plectritis macrocarpa*
Low penstemon	PEHU	*Penstemon humilis*
Low pussytoes	ANDI	*Antennaria dimorpha*
Lupine	LUPIN	*Lupinus spp.*
Martindale biscuitroot	LOMA2	*Lomatium martindalei*
Meadow death camas	ZIVE	*Zigadenus veneosus*
Microseris	MITR	*Microseris troximoides*
Milkvetch	ASAT	*Astragalus atratus*

Common Name	Alpha Code	Scientific Name
Milkvetch	ASST	*Astragalus stenophyllus*
Monkeyflower	MIMUL	*Mimulus spp.*
Morning glory	COAR2	*Convolvulus arvensis*
Moth mullein	VEBL	*Verbascum blattaria*
Navarretia	NAVAR	*Navarretia spp.*
Nineleaf lomatium	LOTR	*Lomatium triternatum*
Phacelia	PHHA	*Phacelia hastata*
Phlox	PHMU2	*Phlox muscoides*
Popcornflower	PLHA	*Plagiobothrys harknessii*
Prairieclover	PEOR4	*Petalostemum ornatum*
Prairie lupine	LULE2	*Lupinus lepidus*
Prairiesmoke avens	GETR	*Geum triflorum*
Pursh locoweed	ASPU	*Astragalus purshii*
Richardson penstemon	PERI	*Penstemon richardsonii*
Rock eriogonum	ERSP3	*Eriogonum sphaerocephalum*
Rock lupine	LUSA	*Lupinus saxosus*
Rush pussytoes	ANLU	*Anntennaria luzuloides*
Sagebrush buttercup	RAGL	*Ranunculus glaberrimus*
Sagebrush mariposa	CAMA	*Calochortus macrocarpus*
Scalepod	IDSC	*Idahoa scapigera*
Silky lupine	LUSE	*Lupinus sericeus*
Slender rabbitleaf	LARA	*Lagophylla ramosissima*
Slimpod shootingstar	DOCO	*Dodecatheon conjugens*
Smallflower whiteflax	LIMI	*Linum micranthum*
Smallflower woodlandstar	LIPA	*Lithophragma parviflora*
Smooth hawksbeard	CRBA2	*Crepis barbigera*
Spreading dogbane	APAN	*Apocynum androsaemifolium*
Sulfur eriogonum	ERUM	*Eriogonum umbellatum*
Sulfer lupine	LUSU	*Lupinus sulphureus*
Tailcup lupine	LUCU	*Lupinus caudatus*
Tansymustard	DERI	*Descurainia richardsonii*
Tarweed	MADIA	*Madia spp.*
Tarweed fiddleneck	AMLY	*Amsinckia lycopsiodes*
Thelypody	THIN	*Thelypodium integrifolium*
Threadleaf fleabane	ERFI	*Erigeron filifolius*
Threadleaf phacelia	PHLI	*Phalcelia linearis*
Tumblemustard	SIAL	*Sisymbrium altissium*
Umbellate pussypaws	SPUM	*Sprageua umbellata*
Velvet lupine	LULE	*Lupinus leucophyllus*
Water speedlwell	VEAN	*Veronica anagallis-aquatica*
Wavyleaf thistle	CIUN	*Circium undulatum*
Wayside gromwell	LIRU	*Lithospermum ruderale*
Western virginsbower	CLLI	*Clematis ligusticifolia*
Western yarrow	ACMI	*Achillea millefolium*
Whitney milkvetch	ASWH	*Astragalus whitneyi*
Wild onion	ALPA2	*Allium parvum*
Willow dock	RUSA	*Rumex salicifolius*
Willowweed	EPMI	*Epilobium minutum*
Wolly groundsel	SECA	Senecio canus
Wormleaf stonecrop	*SEST*	Sedum stenopetalum
Wyeth eriogonum	*ERHE*	Eriogonum heracleoides
Yellow fritillary	*FRPU*	Fritillaria pudica
Yellow sweetclover	*MEOF*	Melilotus officinalis
PATHOGENS		
Annosus root disease	*FOAN*	Fomes annosus
Dwarfmistletoe	*ARCA*	Arceuthobium campylopodum
Elytroderma needlecast	*ELDE*	Elytroderma deformans
Juniper pocket rot	*FOJU*	Fomes juniperus
Laminated root rot	*PHWI*	*Phellinus Wierii*
Western gall rust	*PEHA*	Peridermium harknessii

Common Name	Alpha Code	Scientific Name
INSECTS		
Gall wasps	CYNIP	Cynipidae family
Mountain mahogany bark beetle	CHHE	Chaetophloeus heterodoxus
Mountain pine beetle	DEPO	Dendroctonus ponderosae
Western pine beetle	DEBR	Dendroctonus brevicomis
Western shoot borer	EUSO	Eucosma sonomana
MAMMALS		
Badger	TATA	Taxidea taxus
Black-tailed jackrabbit	LECA	Lepus californicus
California ground squirrel	SPBE	Spermophilus beecheyi
Deer mouse	PEMA	Peromyscus maniculatus
Great Basin pocket mouse	PEPA	Peromyscus parvus
Long-tailed weasel	MUFR	Mustela frenata
Mule deer	ODHEH	Odocoileus hemionus hemionus
Nuttall's cottontail	SYNU	Sylvilagus nuttallii
Northern pocket gopher	THTA	Thomomys talpoides
Western jumping mouse	ZAPR	Zapus princeps
Yellow-bellied marmot	MAFL	Marmota flaviventris
BIRDS		
Brewer's sparrow	SPBR	Spizella breweri
California quail	LOCA	Lophortyx californicus
Chukar	ALGR	Alectoris graeca
Marsh hawk	CICY	Circus cyaneus
Pinyon jay	GYCY	Gymnorhinus cyanocephalus
Red-tailed hawk	BUJA	Buteo jamaicensis
Sparrow hawk (kestrel)	FASP	Falco sparverius
Vesper sparrow	POGR	Pooecetes gramineus
Western Meadowlark	STNE	Sturnella neglecta

Scientific Name	Alpha Code	Common Name
Juniperus occidentalis	JUOC	*Western juniper*
Prunus emarginata	PREM	*Bittercherry*
Pinus ponderosa	PIPO	*Ponderosa pine*
Populus tremloides	POTR	*Quaking aspen*
Populus trichocarpa	POTR2	*Black cottonwood*
SHRUBS		
Amelanchier alnifolia	AMAL	*Saskatoon serviceberry*
Artemisia arbuscula	ARAR	*Low sagebrush*
Artemisia rigida	ARRI	*Stiff sagebrush*
Artemisia tridentata tridentata	ARTRT	*Big sagebrush*
Cercocarpus ledifolius	CELE	*Curlleaf mountain-mahogany*
Chrysothamnus nauseosus	CHNA	*Gray rabbitbrush*
Chrysothamnus visidiflorus	CHVI	*Green rabbitbrush*
Cornus stolonifera	COST	*Dogwood*
Haplopappus bloomeri	HABL	*Rabbitbrush goldenweed*
Holodiscus dumosus	HODU	*Rock spirea*
Leptodactylon pungens	LEPU2	*Granite gilia*
Philadelphus lewisii	PHLE2	*Mockorange*
Purshia tridentata	PUTR	*Antelope bitterbrush*
Ribes cereum	RICE	*Wax currant*
Rosa woodsii	ROWO	*Woods rose*
Salix spp.	SALIX	*Willow*
Symphoricarpos albus	SYAL	*Common snowberry*
Tetradymia canescens	TECA	*Horsebrush*
SEDGES AND RUSHES		
Carex spp.	CAREX	*Sedge*
Carex filifolia	CAFI	*Threadleaf sedge*
Juncus spp.	JUNCUS	*Rush*
Juncus balticus	JUBA	*Baltic rush*

Scientific Name	Alpha Code	Common Name
GRASSES		
Agropyron cristatum	AGCR	Crested wheatgrass
Agropyron inerme	AGIN	Beardless wheatgrass
Agropyron intermedium	AGIN2	Intermediate wheatgrass
Agropyron repens	AGRE	Quack grass
Agropyron spicatum	AGSP	Bluebunch wheatgrass
Agrostis spp.	AGROS	Agrostis
Bromus techtorum	BRTE	Cheatgrass brome
Bromus carinatus	BRCA	California brome
Elymus caput-medusae	ELCA2	Medusahead wildrye
Elymus cinereus	ELCI	Giant wildrye
Festuca idahoensis	FEID	Idaho fescue
Festuca octoflora	FEOC2	Sixweeks fescue
Hordeum jubatum	HOJU	Foxtail barley
Hordeum leporinum	HOLE	Foxtail barley
Hordeum pusillum	HOPU	Foxtail barley
Koeleria cristata	KOCR	Prairie junegrass
Melica subulata	MESU	Alaska oniongrass
Oryzopsis hymenoides	ORHY	Indian ricegrass
Poa ampla	POAM	Big bluegrass
Poa bulbosa	POBU	Bulbous bluegrass
Poa cusickii	POCU	Cusick bluegrass
Poa sandbergii	POSA3	Sandberg bluegrass
Sitanion hystrix	SIHY	Bottlebrush squirreltail
Stipa comata	STCO2	Needle and thread
Stipa occidentalis	STOC	Western needlegrass
Stipa thurberiana	STTH	Thurber needlegrass
FORBS		
Achillea millefolium	ACMI	Western yarrow
Agoseris grandiflora	AGGR	Agoseris
Agoseris heterophylla	AGHE	Annual agoseris
Allium parvum	ALPA2	Wild onion
Alyssum desertorum	ALDE	Alyssum
Amsinckia lycopsiodes	AMLY	Tarweed fiddleneck
Antennaria dimorpha	ANDI	Low pussytoes
Antennaria luzuloides	ANLU	Rush pussytoes
Apocynum androsaemifolium	APAN	Spreading dogbane
Arabis cusckii	ARCU	Cusick rockcress
Arabis holboelii	ARHO	Holboel rockcress
Artemisia ludoviciana	ARLU	Herbaceous sage
Astragalus atratus	ASAT	Milkvetch
Astragalus curvicarpus	ASCU2	Curvepod locoweed
Astragalus cusickii	ASCU4	Cusick milkvetch
Astragalus purshii	ASPU	Pursh locoweed
Astragalus stenophyllus	ASST	Milkvetch
Astragalus whitneyi	ASWH	Whitney milkvetch
Balsamorhiza sagittata	BASA	Arrowleaf balsamroot
Blepharipappus scaber	BLSC	Blepharipappus
Brassica nigra	BRNI	Birdrafe
Calochortus macrocarpus	CAMA	Sagebrush mariposa
Camelian microcarpa	CAMI3	Littlepod falseflax
Castilleja chromosa	CACH2	Desert paintbrush
Cerastium nutans	CENU	Chickweed
Chaenactis douglasii	CHDO	Douglas chaenactis
Circium undulatum	CIUN	Wavyleaf thistle
Clarka pulchella	CLPU	Elkhorns clarkia
Clematis ligusticifolia	CLLI	Western virginsbower
Collomia grandiflora	COGR2	Collomia
Convolvulvus arvensis	COAR2	Morning glory
Collinsia parviflora	COPA	Littleflower collinsia
Crepis barbigera	CRBA2	Smooth hawksbeard
Crypthantha affinis	CRAF	Cryptantha

Scientific Name	Alpha Code	Common Name
Cystopteris fragilis	CYFR	Brittle bladderfern
Delphinium spp.	DELPHI	Larkspur
Delphinium bicolor	DEBI	Little larkspur
Descurainia richardsonii	DERI	Tansymustard
Dodecatheon conjugens	DOCO	Slimpod shootingstar
Draba verna	DRVE2	Spring draba
Epilobium minutum	EPMI	Willowweed
Erigeron filifolius	ERFI	Threadleaf fleabane
Erigeron linearis	ERLI	Lineleaf fleabane
Erigeron poliospermus	ERPO	Fleabane
Eriogonum heracleoides	ERHE	Wyeth eriogonum
Eriogonum sphaeracephalum	ERSP3	Rock eriogonum
Eriogonum stellatum	ERST	Longgray eriogonum
Eriogonum umbellatum	ERUM	Sulfur eriogonum
Eriogonum vimineum	ERVI	Broom eriogonum
Eriophyllum lanatum	ERLA	Wooly eriophyllum
Eriodium cicutarium	ERCI	Cranesbill
Fritillaria pudica	FRPU	Yellow fritillary
Galium aparine	GAAP	Catchweed bedstraw
Gayophytum diffusum	GADI	Groundsmoke
Geum triflorum	GETR	Prairiesmoke avens
Hieracium albertinum	HIAL2	Hawkweed
Hydrophyllum capitatum	HYCA	Ballhead waterleaf
Idahoa scapigera	IDSC	Scalepod
Iris spp.	IRIS	Iris
Lagophylla ramosissima	LARA	Slender rabbitleaf
Lactuca ludoviciana	LALU	Lettuce
Lepidium perfoliatum	LEPE	Clasping pepperweed
Lewisia rediviva	LERE	Bitterroot lewisia
Linanthus bakerii	LIBA	Linanthus
Linum micranthum	LIMI	Smallflower whiteflax
Lithophragma bulbifera	LIBU	Bulbus fringecup
Lithophragma parviflora	LIPA	Smallflower woodlandstar
Lithospermum ruderale	LIRU	Wayside gromwell
Lomatium canbyi	LOCA4	Canby biscuitroot
Lomatium dissectum	LODI2	Fernleaf lomatium
Lomatium donnellii	LODO	Donnel biscuitroot
Lomatium gormanii	LOGO	Gorman biscuitroot
Lomatium grayi	LOGR	Gray biscuitroot
Lomatium macrocarpum	LOMA	Bigseed lomatium
Lomatium martindalei	LOMA2	Martindale biscuitroot
Lomatium triternatum	LOTR	Nineleaf lomatium
Lupinus spp.	LUPIN	Lupine
Lupinus caudatus	LUCA	Tailcup lupine
Lupinus lepidus	LULE2	Prairie lupine
Lupinus leucophyllus	LULE	Velvet lupine
Lupinus sericeus	LUSE	Silky lupine
Lupinus saxosus	LUSA	Rock lupine
Lupinus sulphureus	LUSU	Sulfur lupine
Madia spp.	MADIA	Tarweed
Melilotus officinalis	MEOF	Yellow sweetclover
Mentzelia spp.	MENTZ	Blazingstar
Microseris troximoides	MITR	Microseris
Mimulus spp.	MIMUL	Monkeyflower
Montia parvifolora	MOPA	Littleleaf montia
Montia perfoliata	MOPE	Minerlettuce
Navarretia spp.	NAVAR	Navarretia
Orobanche uniflora	ORUN	Broomrape
Penstemon humilis	PEHU	Low penstemon
Penstemon richardsonii	PERI	Richardson penstemon
Petalostemum ornatum	PEOR4	Prairieclover
Phacelia hastata	PHHA	Phacelia
Phacelia ramosissima	PHRA	Branching phacelia

Scientific Name	Alpha Code	Common Name
Phacelia linearis	PHLI	Threadleaf phacelia
Phlox muscoides	PHMU2	Phlox
Plagiobothrys harknessii	PLHA	Popcornflower
Plectritis macrocera	PLMA3	Longhorn plectritis
Potentilla glandulosa	POGL	Gland cinquefoil
Ranunculus glaberrimus	RAGL	Sagebrush buttercup
Rigiopappus leptocladus	RILE	Bristlehead
Rumex salicifolius	RUSA	Willow dock
Sedum stenopetalum	SEST	Wormleaf stonecrop
Senecio canus	SECA	Woolly groundsel
Silene douglasii	SIDO2	Douglas silene
Sisymbrium altissium	SIAL	Tumblemustard
Solidago missourensis	SOMI	Goldenrod
Spraguea umbellata	SPUM	Umbellata pussypaws
Taraxacum officinale	TAOF	Dandelion
Thelypodium integrifolium	THIN	Thelypody
Trifolium macrocephalum	TRMA	Bighead clover
Verbascum blattaria	VEBL	Moth mullein
Verbascum thapsus	VETH	Flannel mullein
Veronica anagallis-aquatica	VEAN	Water speedwell
Zigadenus veneosus	ZIVE	Meadow death camas
PATHOGENS		
Arceuthobium camylopodum	ARCA	Dwarfmistletoe
Elytroderma deformans	ELDE	Elytroderma needlecast
Fomes annosus	FOAN	Annosus root disease
Fomes juniperus	FOJU	Juniper pocket rot
Peridermium harknessii	PEHA	Western gall rust
Phellinus wierii	PHWI	Laminated root rot
INSECTS		
Chaetophloeus heterodoxus	CHHE	Mountain mahongany bark beetle
Cynipidae family	CYNIP	Gall wasps
Dendroctonus brevicomis	DEBR	Western pine beetle
Dendroctonus ponderosae	DEPO	Mountain pine beetle
Eucosma sonomana	EUSO	Western shoot borer
MAMMALS		
Lepus californicus	LECA	Black-tail jackrabbit
Marmota flaviventris	*MAFL*	Yellow-bellied marmot
Mustela frenata	MUFR	Long-tailed weasel
Odocoileus hemionus hemionus	ODHEH	Mule deer
Peromyscus maniculatus	PEMA	Deer mouse
Peromyscus parvus	PEPA	Great Basin pocket mouse
Spermophilus beecheyi	SPBE	California ground squirrel
Sylvilagus nuttallii	SYNU	Nuttal's cottontail
Taxidea taxus	TATA	Badger
Thomomys talpoides	THTA	Northern pocket gopher
Zapus princeps	ZAPR	Western jumping mouse
BIRDS		
Alectoris graeca	ALGR	Chukar
Buteo jamaicensis	BUJA	Red-tailed hawk
Circus cyaneus	CICY	Marsh hawk
Falco sparverius	FASP	Sparrow hawk
Gymnorhinus cyanocephalus	GYCY	Pinyon jay
Lophortyx californicus	LOCA	California quail
Pooecetes gramineus	POGR	Vesper sparrow
Spizella breweri	SPBR	Brewer's sparrow
Sturnella neglecta	STNE	Western meadowlark

Bittercherry
(*Prunus emarginata*) (PREM)

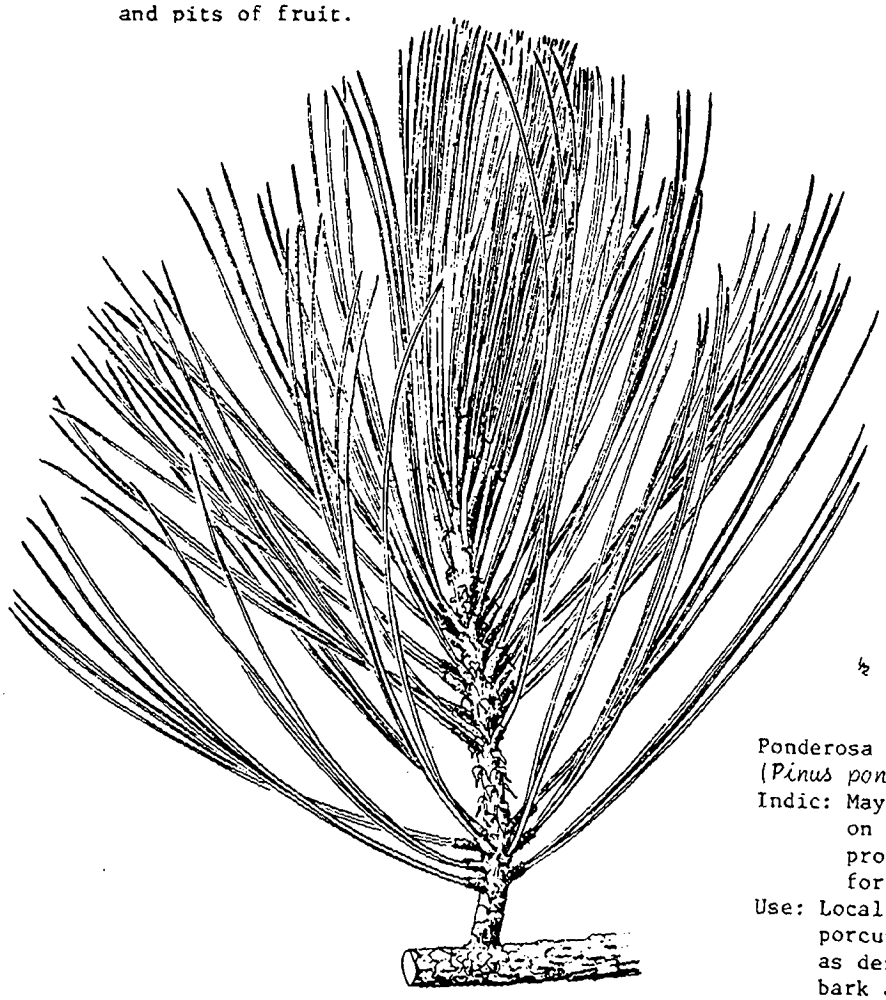
Indic: Grows along edge of forest or in sheltered rocky areas.

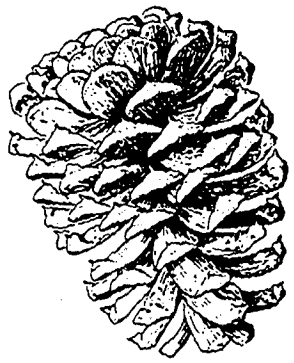
Use: Fruits edible but somewhat sour; POISONOUS hydrocyanic acid in leaves and pits of fruit.

Western Juniper
(*Juniperus occidentalis*) (JUOC)

Indic: Shallow rocky to deep soils; widespread and will increase in absence of fire.

Use: Berries edible raw, best when dried, used in flavoring; moderate palatability for birds in winter.

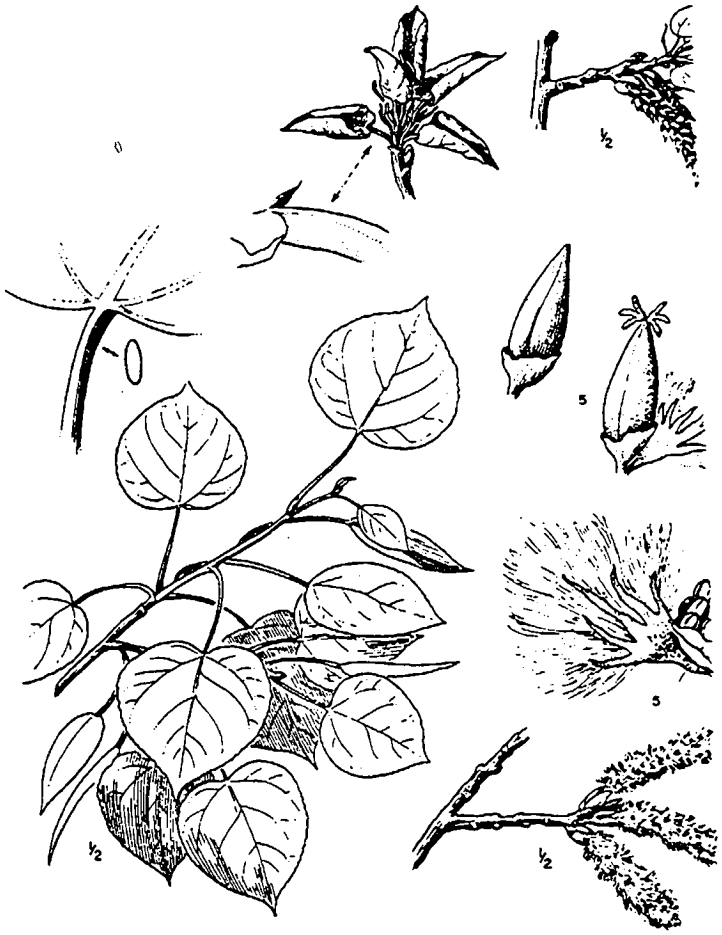




Ponderosa Pine
(*Pinus ponderosa*) (PIPO)

Indic: May be climax or successional on given site; savanna, protected streamsides, or forest.

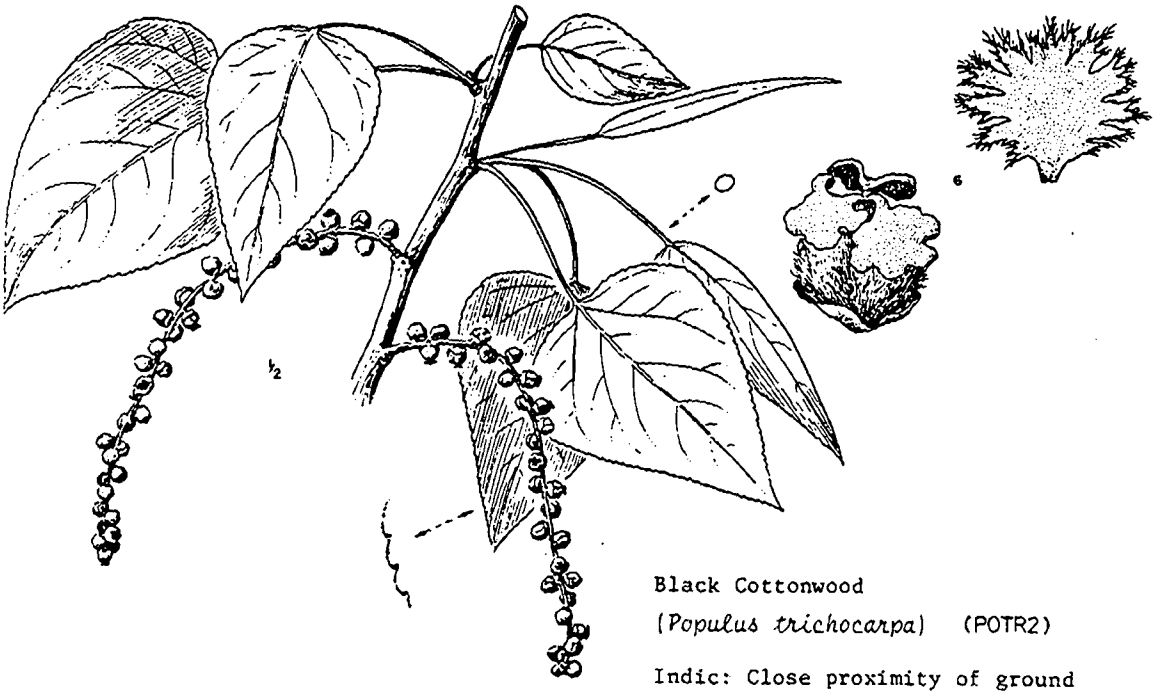
Use: Local severe damage from porcupine, tree often used as den tree. Indians pealed bark and used cambium for medicinal purposes.



Quaking Aspen
(*Populus tremuloides*) (POTR)

Indic: Dry to wet meadows and along streams; occurs as cloes by root sprouts which gradually enlarge the clump under light light to moderate grazing; decreases under heavy grazing; palatable

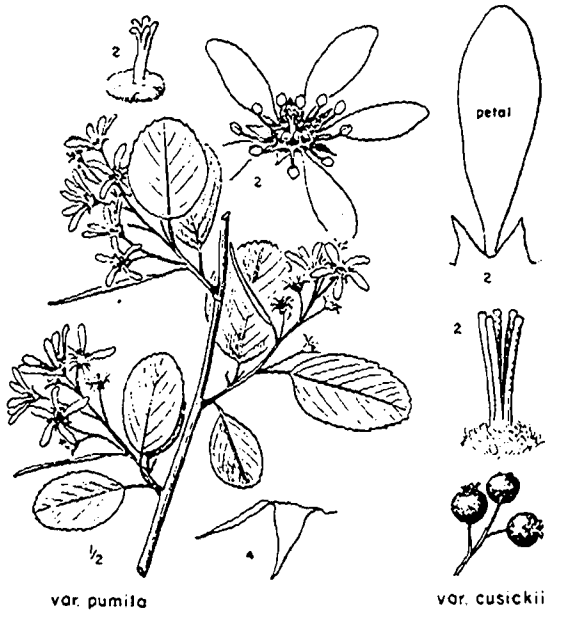
Use: Cree indians used cambium for food and used an infusion of cambium as a remedy for coughs



Black Cottonwood
(*Populus trichocarpa*) (POTR2)

Indic: Close proximity of ground water; usually along streams and near old homesteads.

Use: Good windbreak but becomes somewhat brittle with age. Roots will intertwine.



Saskatoon Serviceberry
(*Amelanchier alnifolia*) (AMAL)

Indic: Usually found in forest zone or along forest edge.

Use: Berries edible raw, cooked, dried, and made into wine. Indians dried berries and pounded them with meat into 10-15 lbs. pemmican loaves for storage and use in cooking. Highly palatable to game and livestock.

Stiff Sagebrush
(*Artemisia rigida*) (ARRI)

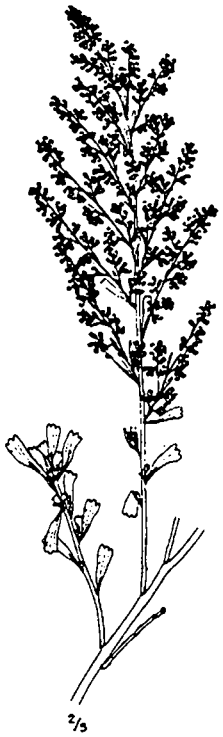
Indic: Very shallow soil 4-8 inches and commonly referred to as scablands; very low herbage production and looks like poor to very poor big sage; soil surface commonly covered with gravel.

Use: Highly palatable to game and livestock; flowering heads most palatable.

Low Sagebrush
(*Artemisia arbuscula*) (ARAR)

Indic: Shallow, non-forest soils; often has some gravel and large boulders on surface. Looks like to fair to poor condition big sagebrush.

Use: Moderate palatability

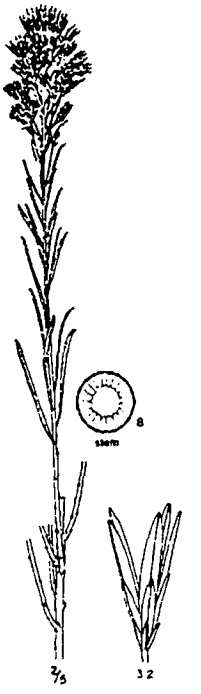


Big Sagebrush
(*Artemisia tridentata*) (ARTRT)

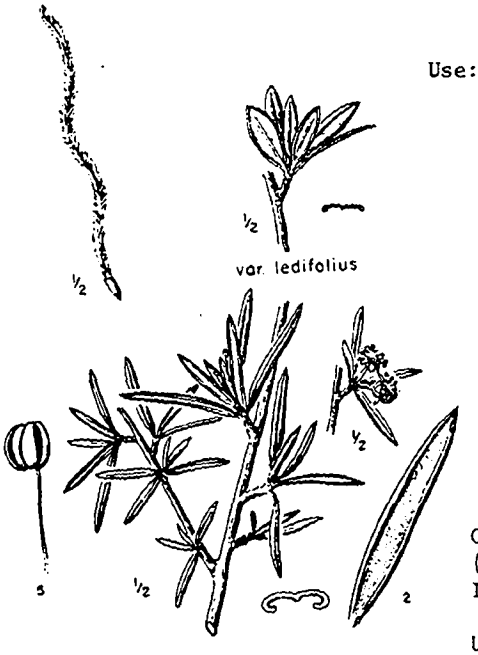
Indic: Good site for grass and shrub production; wheatgrass and/or Idaho fescue dominant in good range condition; deep well-drained soils.

Use: Moderate to low palatability. Three varieties recognized on CRNG: A. *tridentata tridentata* (basin big sagebrush); some A. *tridentata vaseyana* (mountain big sagebrush); and A. *tridentata wyomingensis* (Wyoming big sagebrush) have been reported on the CRNG. Indians used plants for covering their huts and used the bark for making ropes and baskets.

Green Rabbitbrush (CHVI)
(*Chrysothamnus visidiflorus*)
Indic: See Gray Rabbitbrush
Use: See Gray Rabbitbrush

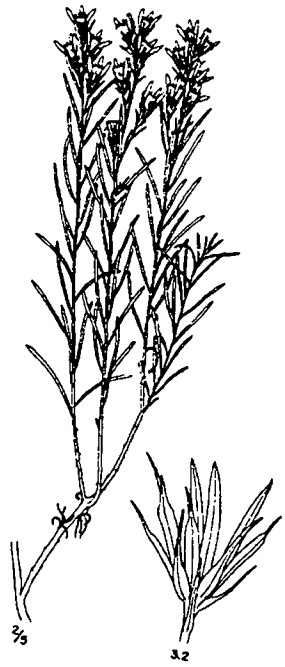


Gray Rabbitbrush
(*Chrysothamnus nauseosus*) (CHNA)
Indic: Occasional plants occur in most big sagebrush associations; dominance suggest past fire, or overgrazing.
Use: Leaf tea was used to treat fevers, constipation, colds, and stomach problems. Toothaches were treated by putting mashed leaves in cavity. Indians used plant for a yellow-orange dye. Contains rubber but not enough for commercial value.

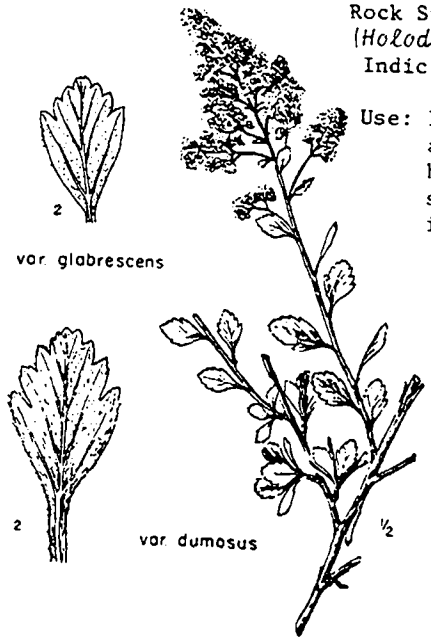


Curlleaf Mountain Mahogany
(*Cercocarpus ledifolius*) (CELE)
Indic: Found on top of Buttes in rock outcrops.
Use: Highly palatable to game and livestock.

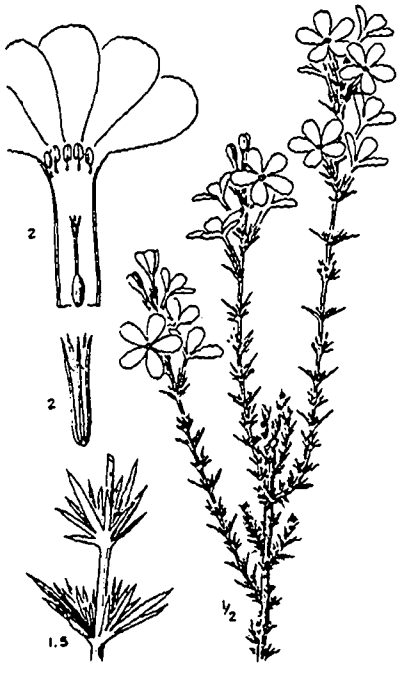
Dogwood
(*Cornus stolonifera*) (COST)
Indic: Found along streams in conjunction with other wet land shrubs.
Use: Bark contains tannin and cornine which is a substitute for quinine. Wood is very hard and excellent for making handles and wedges.



Rabbitbrush Goldenweed
(*Haplopappus bloomeri*) (HABL)
Indic: Increases in areas which are highly disturbed either by fire or overgrazing.

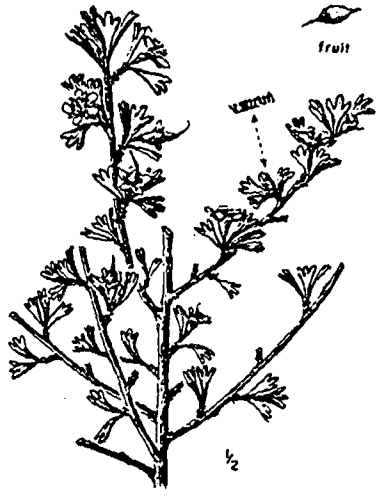


Rock Spirea
(*Holodiscus dumosus*) (HODU)
Indic: Grows in rocky outcrops on Buttes and escarpments.
Use: Indians used wood for making arrow shafts; wood is very hard and was used for digging sticks. Pioneers made pegs in place of nails from wood.

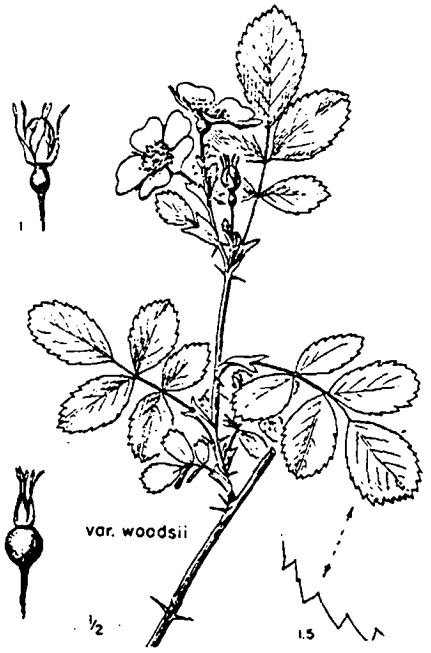


Granite Gilia
(*Leptodactylon pungens*) (LEPU2)
Indic: Sweetly aromatic shrub. Dry places from desert to high elevations in drier mountains. Dry, open often sandy or rocky places.

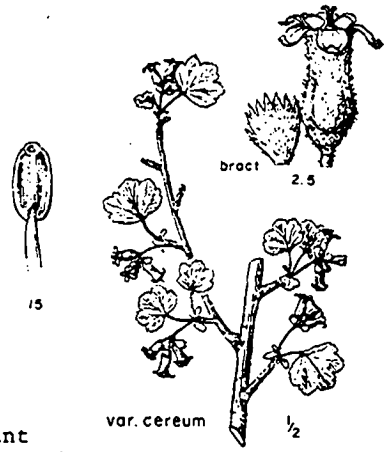
Mockorange
(*Philadelphus lewsii*) (PHLE2)
Indic: Along watercourses and rocky wet areas.
Use: Several species used an ornamental shrubs.



Antelope Bitterbrush
(*Purshia tridentata*) (PUTR)
Indic: Widespread across Grassland and usually associated a good forage producing site.
Use: High palatability for both livestock and wildlife.



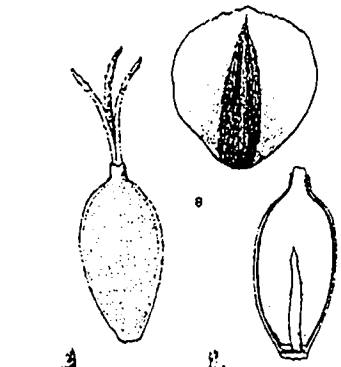
Woods Rose
(*Rosa woodsii*) (ROWO)
Indic: Normally associated with forest zone.
Use: Rose hips are high in vitamin C.



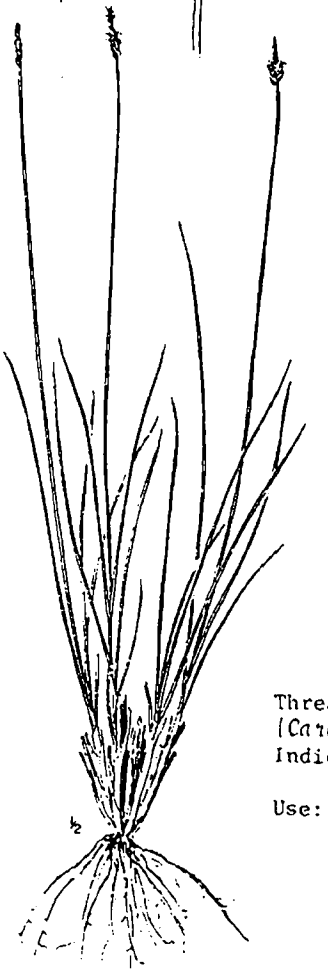
Wax Currant
(*Ribes cereum*) (RICE)
Indic: Normally in rocky areas on edge of Grassland and forest zone.
Use: Berries edible, used by Hopi Indians for stomach ache.

Common Snowberry
(*Symphoriacrpos albus*) (SYAL)
Indic: Usually found in forest zone but may be occassionally found in protected areas on Grassland.
Use: Berries edible raw or cooked.

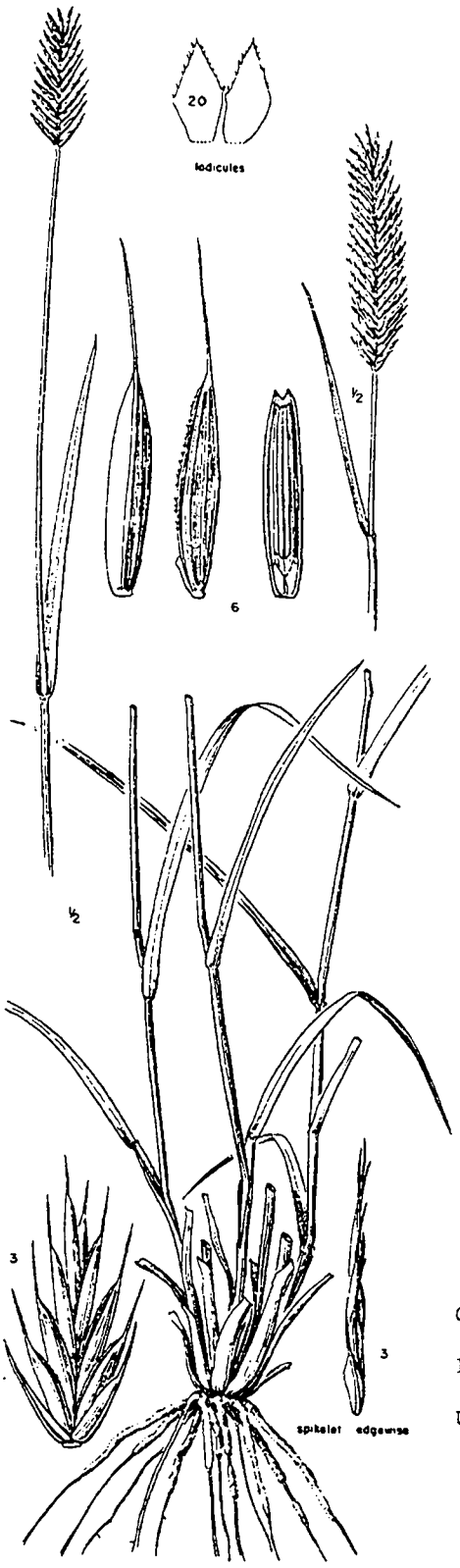
Horsebrush (TECA)
(*Tetradymia canescens*)
Indic: Increases with overgrazing.



Baltic Rush
[Juncus balticus] (JUBA)
Indic: Prefers moist or wet, deep organic soils. Found with sedges, bluegrasses and other rushes. Common in shallow ponds or other wet places.
Use: Indians made baskets and mats from stems.



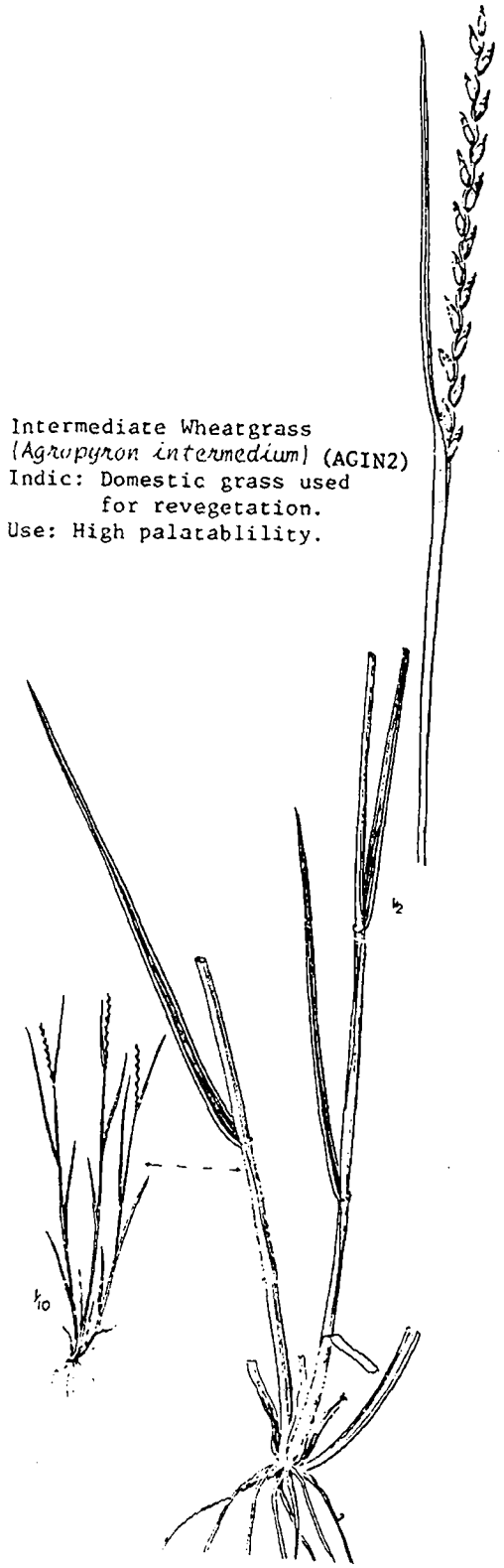
Threadleaf Sedge
[Carex filifolia] (CAFI)
Indic: Fairly widespread in dry sagebrush and bunchgrass associations.
Use: Occasionally grazed by livestock.



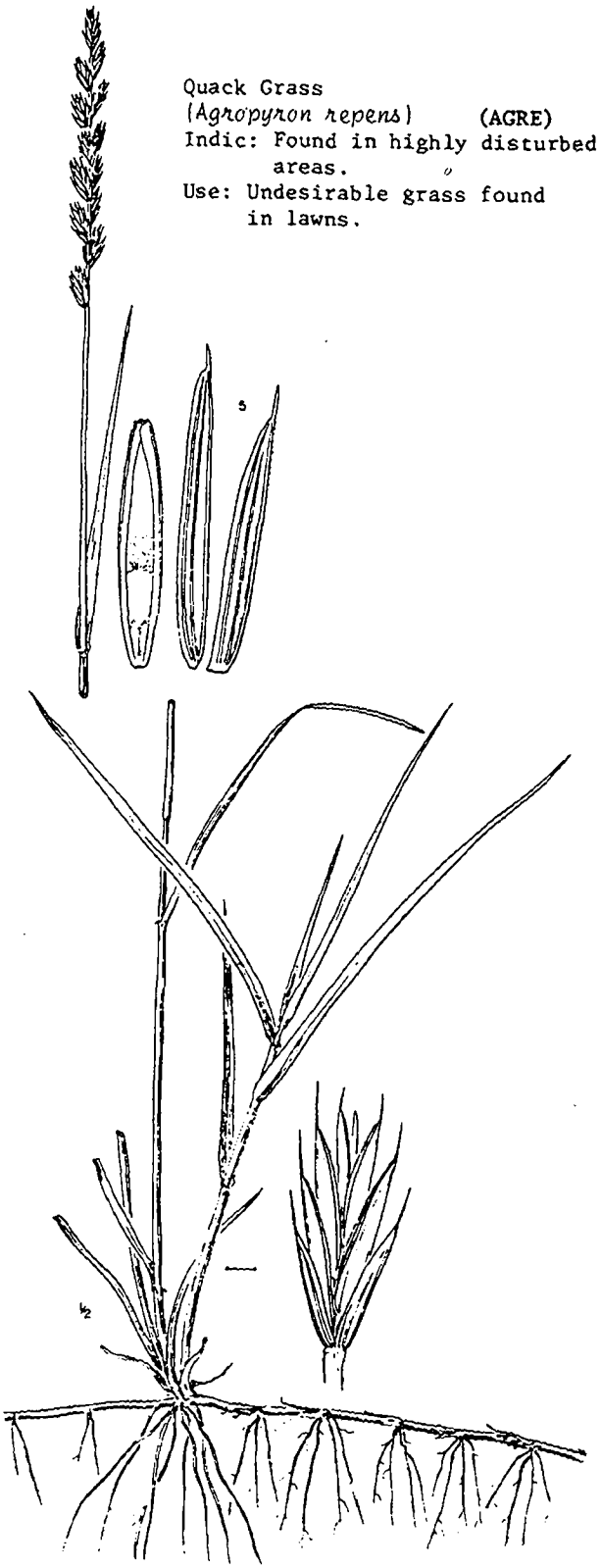
Beardless Wheatgrass
(*Agropyron inerme*) (AGIN)
Indic: Native PNW bunchgrass but not native to Grasslands. Used in pure plantings in late 30's and 40's. Found on flat former farmland.
Use: Highly palatable bunchgrass for livestock.

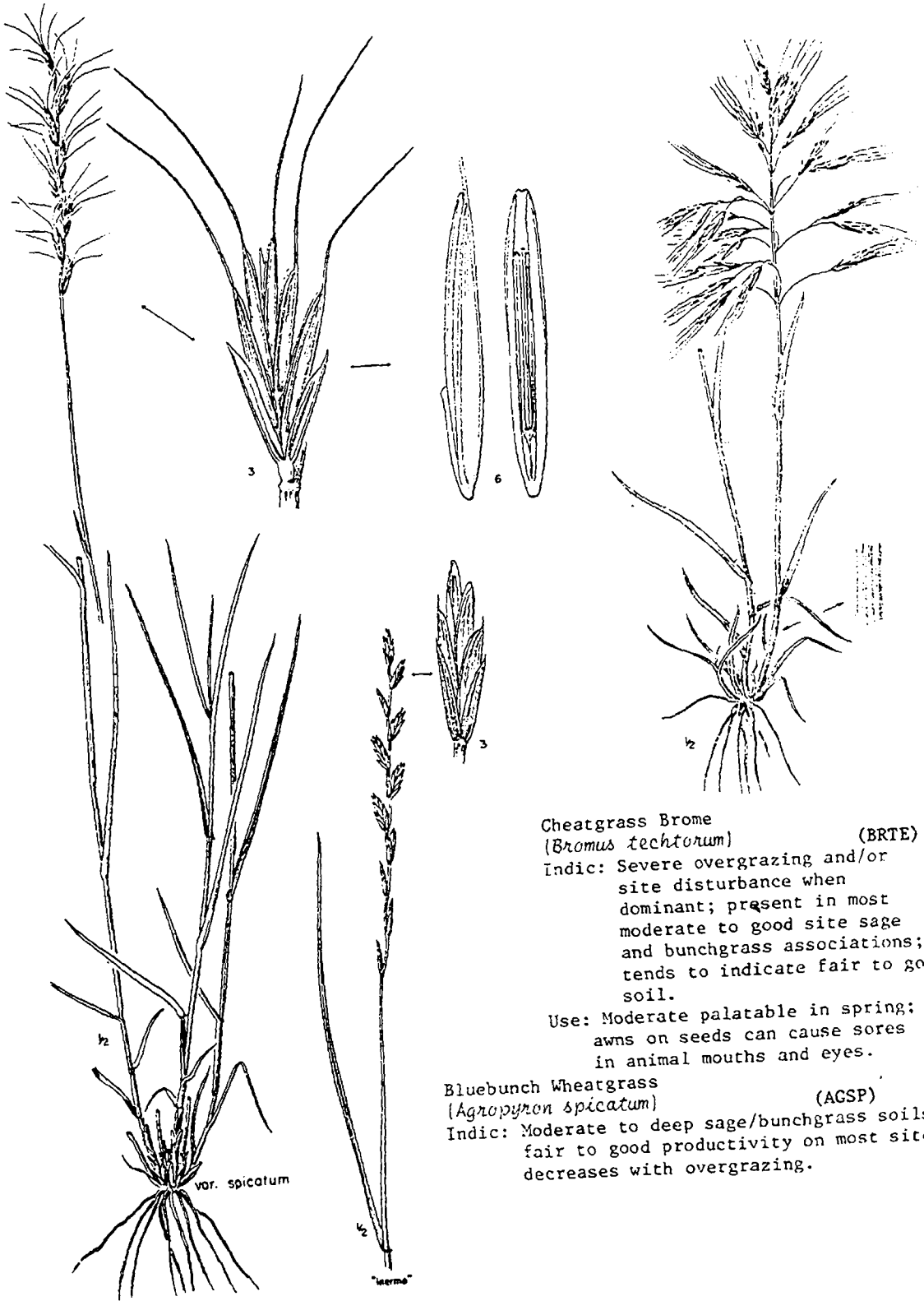
Crested Wheatgrass
(*Agropyron cristatum*) (AGCR)
Indic: Introduced bunchgrass covering vast acerages on Grassland.
Use: Crested wheatgrass is used primarily to seed rangeland in poor condition. Highly palatable to livestock.

Intermediate Wheatgrass
(*Agropyron intermedium*) (AGIN2)
Indic: Domestic grass used
for revegetation.
Use: High palatablility.



Quack Grass
(*Agropyron repens*) (AGRE)
Indic: Found in highly disturbed
areas.
Use: Undesirable grass found
in lawns.

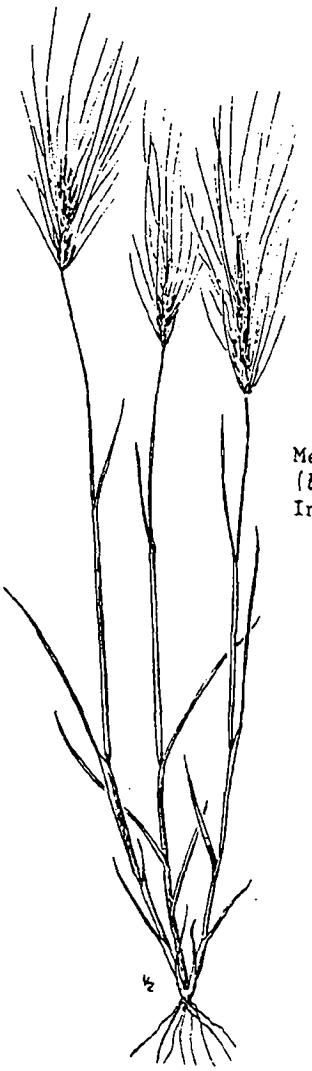




Cheatgrass Brome
(*Bromus techtorum*) (BRTE)
Indic: Severe overgrazing and/or site disturbance when dominant; present in most moderate to good site sage and bunchgrass associations; tends to indicate fair to good soil.
Use: Moderate palatable in spring; awns on seeds can cause sores in animal mouths and eyes.

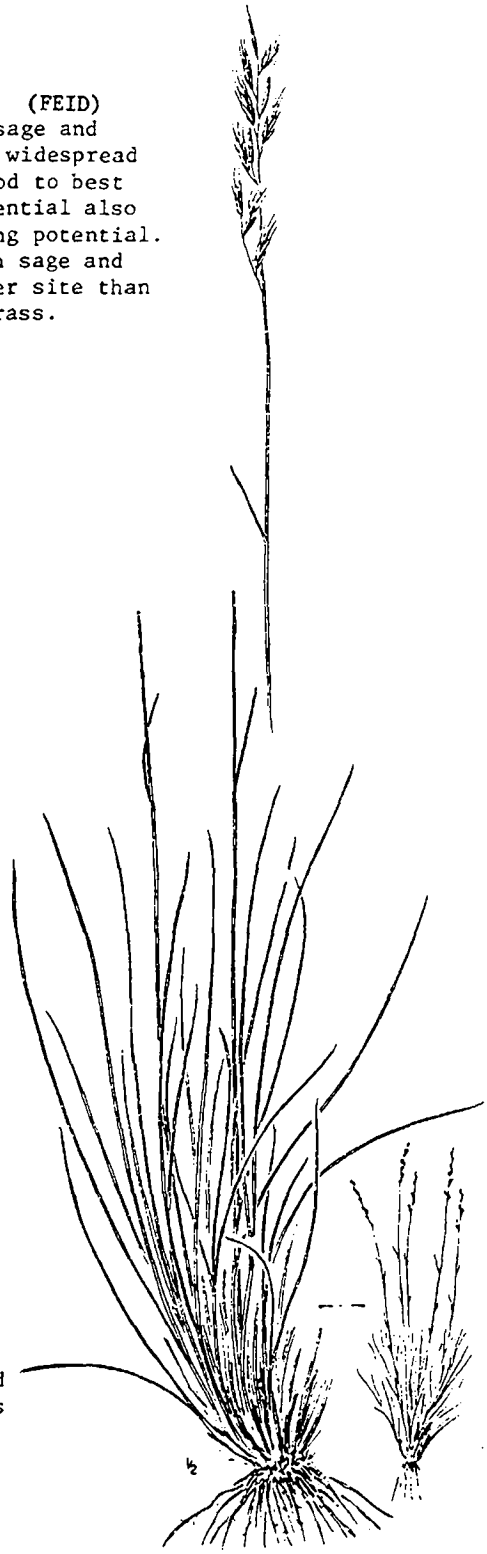
Bluebunch Wheatgrass
(*Agropyron spicatum*) (AGSP)
Indic: Moderate to deep sage/bunchgrass soils; fair to good productivity on most sites; decreases with overgrazing.

California Brome
(*Bromus carinatus*) (BRCA)
Indic: When abundant, past overgrazing and or moderate to severe site disturbance; fairly good soils, often non-forest at mid and higher elevation; also open forest zone.



Medusahead Wildrye
(*Elymus caput-medusae*) (ELCA2)
Indic: Noxious grass found in highly disturbed rangeland. Once established it will rapidly expand over good rangeland.

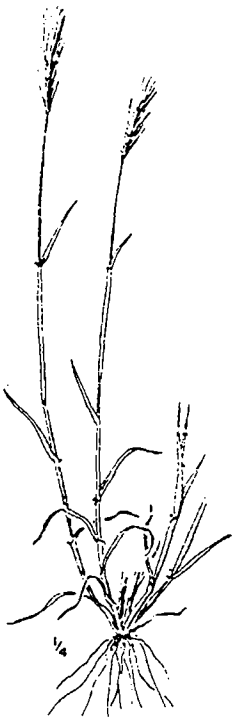
Idaho Fescue
(*Festuca idahoensis*) (FEID)
Indic: Moderately deep sage and bunchgrass soil; widespread on Grassland. Good to best productivity potential also good range seeding potential. When growing with sage and bitterbrush better site than bluebunch wheatgrass.



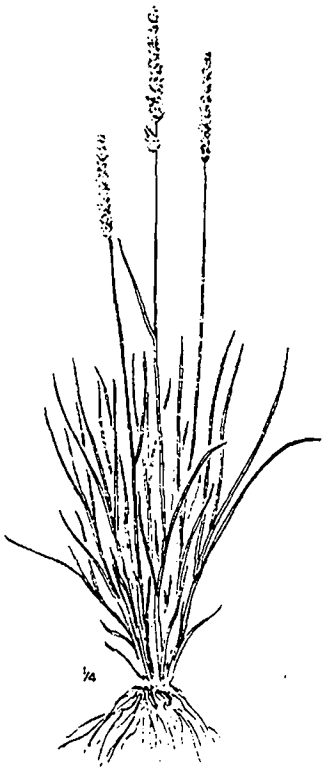
Giant wildrye
(*Elymus cinereus*) (ELCI)
Indic: Usually grows in moist or wet places; bottomlands, along streams and ditch-banks; also in moderately rich, dry soils. Grazed by cattle and horses.
Use: Cut for wild hay, may become ergot infested which can poison livestock. Fruits used as food by indians.

Sixweeks Fescue
(*Festuca octoflora*) (FEOC2)
Indic: Widespread on Grassland; found in both native and introducted bunchgrass associations.
Use: Unpalatable annual grass.

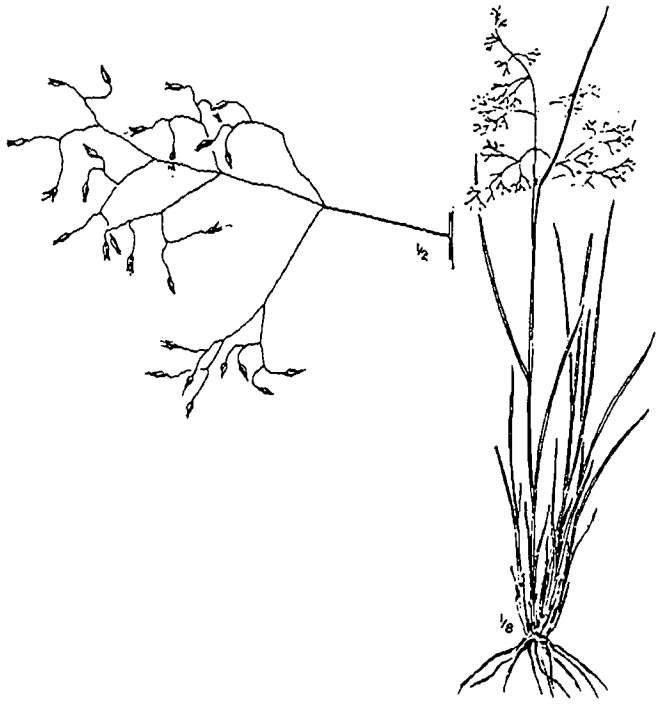
Foxtail Barley
(*Hordeum jubatum*) (HOJU)
Indic: Low growing perennial; widespread on Grassland.
Use: Increases with overgrazing and/or site disturbance.



Wall Barely
(*Hordeum leporinum*) (HOLE)
Indic: Low growing annual that increases with disturbance.

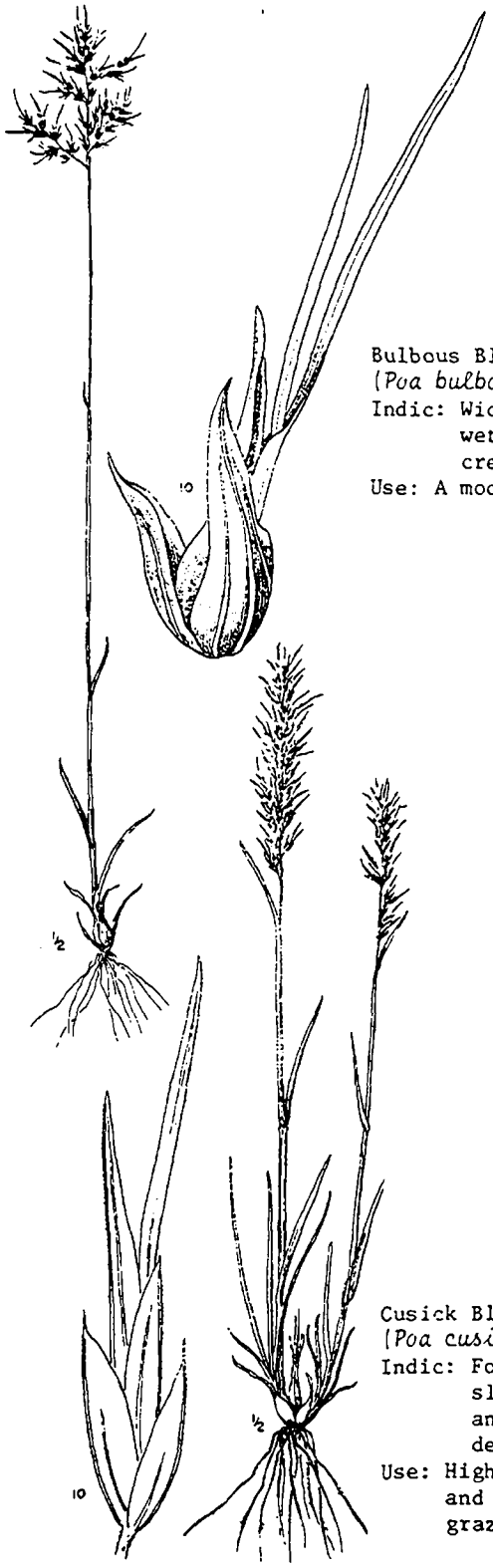


Prairie Junegrass
(*Koleria cristata*) (KOCR)
Indic: Shallow to moderately deep soils with sage/bunchgrass types.
Use: Palatable perennial; decreaser

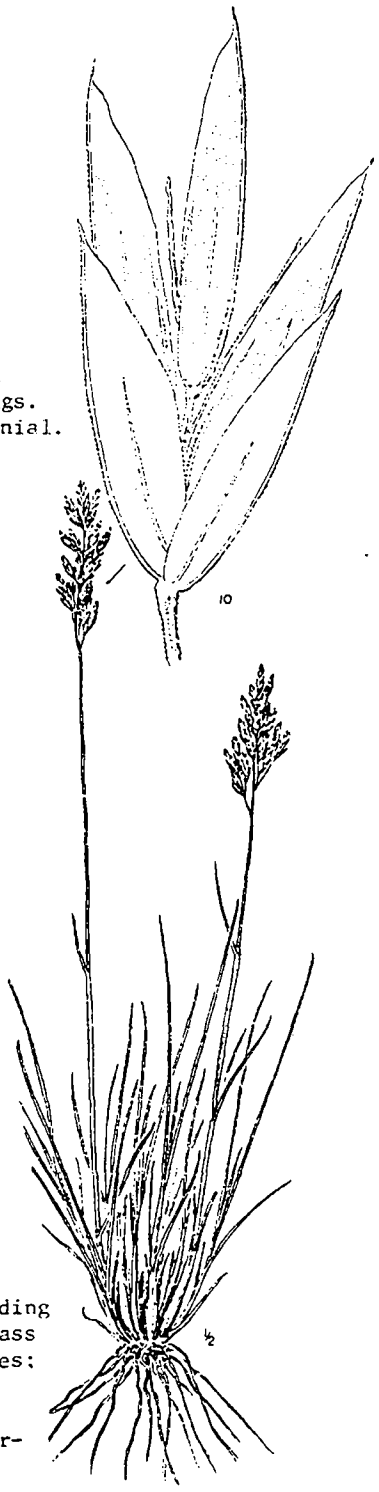


Indian Ricegrass
(*Oryzopsis hymenoides*) (ORHY)
Indic: Usually found on steep south-facing slopes growing in sandy soil.
Use: Palatable decreaser with overgrazing.

Big Bluegrass
(*Poa ampla*) (POAM)
Indic: Planted in pure stands on old farmlands; long-lived perennial.
Use: Very palatable bunchgrass; native to western US.

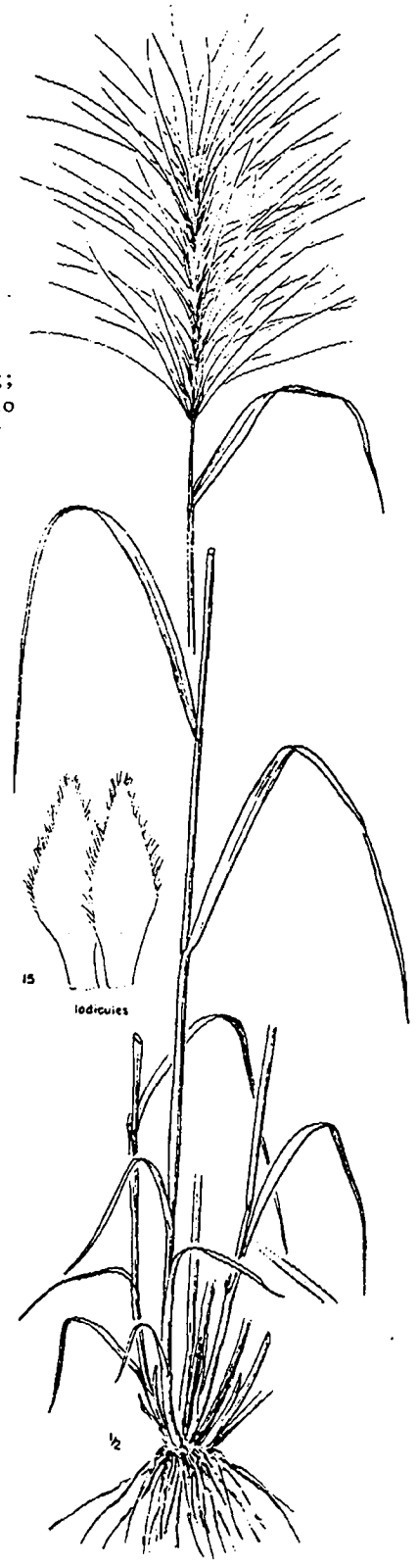


Bulbous Bluegrass
(*Poa bulbosa*) (POBU)
Indic: Widespread especially in wet years; found mainly in crested wheatgrass plantings.
Use: A moderatley palatable perennial.



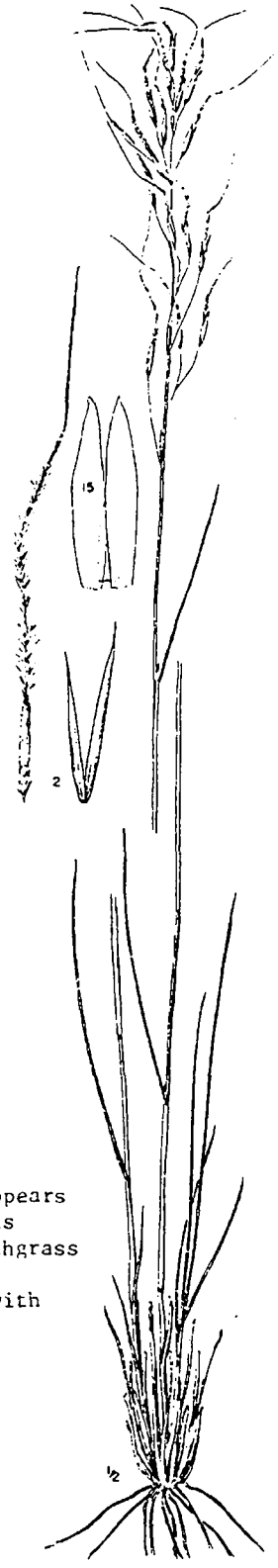
Cusick Bluegrass
(*Poa cusickii*) (POCU)
Indic: Found mainly on north-tending slopes; bluebunch wheatgrass and Idaho fescue associates; deep soils.
Use: Highly palatable bunchgrass and will decrease under overgrazing

Bottlebrush Squirreltail
(*Sitanion hystrix*) (SIHY)
Indic: Increaser with overgrazing; abundance indicates fair to poor range condition; fair to good sage/bunchgrass sites.



Sandberg Bluegrass
(*Poa sandbergii*) (POSA3)
Indic: Probably one of the most common grasses found on the Grassland. Wide range of sites.
Use: Tends to increase with livestock overgrazing, decrease with game over grazing.

Needle and Thread
(*Stipa comata*) (STCO2)
Indic: Found generally on northern portion of Grassland on "Palouse" appearing prairie vegetation; favors dry sandy soil.



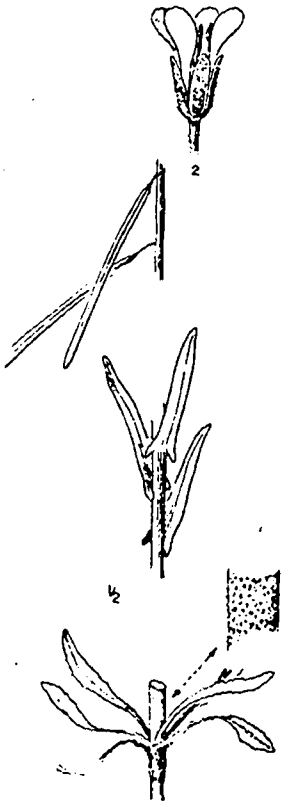
Thurber Needlegrass
(*Stipa thurberiana*) (STTH)
Indic: Never abundant widespread bunchgrass; tends to favor well-drained sandy soil; appears to be edge of range for this grass; found with sage/bunchgrass type.
Use: Highly palatable; decreases with over-grazing.

Western Needlegrass
(*Stipa occidentalis*) (STOC)
Indic: Tends to increase with overgrazing and site disturbance; moderate to deep soils in sage, bunchgrass and forest types.
Use: Palatable increaser.

Alyssum
(*Alyssum desertorum*) (ALDE)
Indic: Very common in spring and early summer; increases with overgrazing and site disturbance.
Use: An introduced weed from the old world.

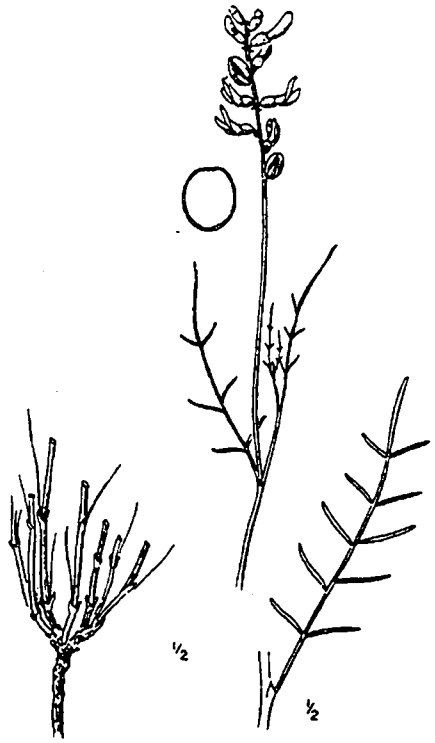
Low Pussytoes
(*Antennaria dimorphia*) (ANDI)
Indic: Widely scattered, forms very low small mats.
Use: Flowering heads palatable.

Western Yarrow
(*Achillea millefolium*) (ACMI)
Indic: Widely distributed over all communities; increases with overgrazing and/or site disturbance. Heads palatable to game.
Use: Entire plant dried, ground, boiled to remedy run-down disorders; leaves make pleasant smoke.

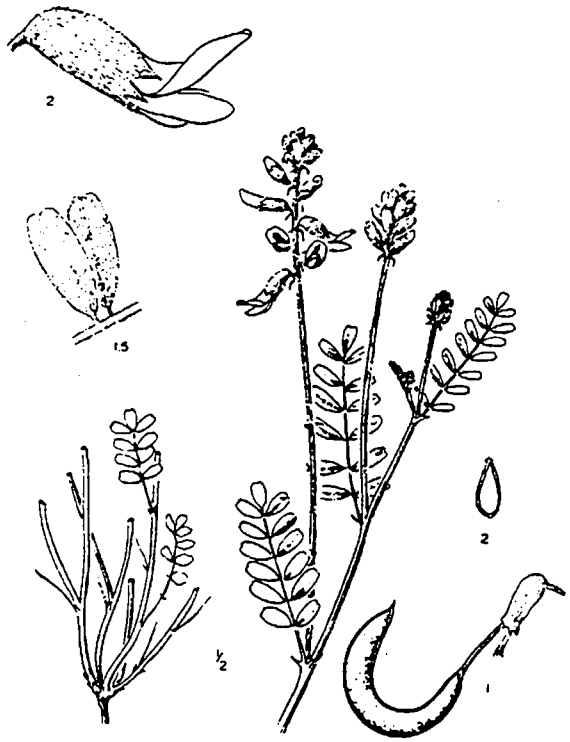


Holboel Rockcress
(*Arabis holboellii*) (ARHO)
Indic: Widely scattered in all CRNG communities; increaser but never abundant.

Milkvetch
(*Astragalus atratus*) (ASAT)
Indic: Uncommon on most native vegetation plots, but somewhat common on areas that were revegetated.
Use: Some species of locoweed and milkvetch are poisonous to animals.



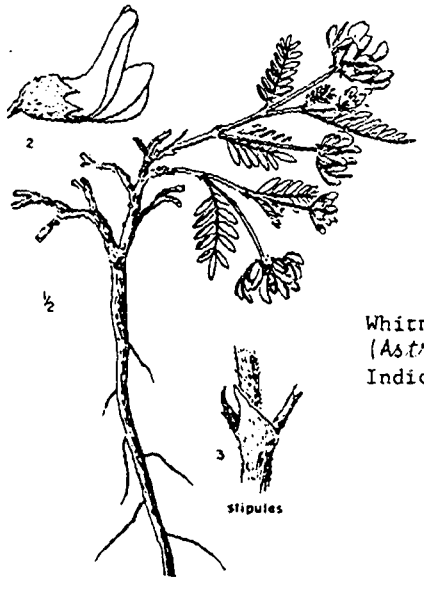
Curvepod Locoweed
(*Astragalus curvicarpus*) (ASCU2)
Indic: Scattered throughout introduced communities, but rare in native communities.
Use: Some species of locoweed are poisonous to livestock.



Cusick Milkvetch
(*Astragalus cusickii*) (ASCU4)
Indic: Scattered throughout CRNG but never common.

Pursh Locoweed
(*Astragalus purshii*) **(ASPU)**
Indic: Scattered throughout native and introduced communities.

Milkvetch
(*Astragalus stenophyllus*) **(ASST)**
Indic: Common in native somewhat disturbed communities; rare in introduced communities.

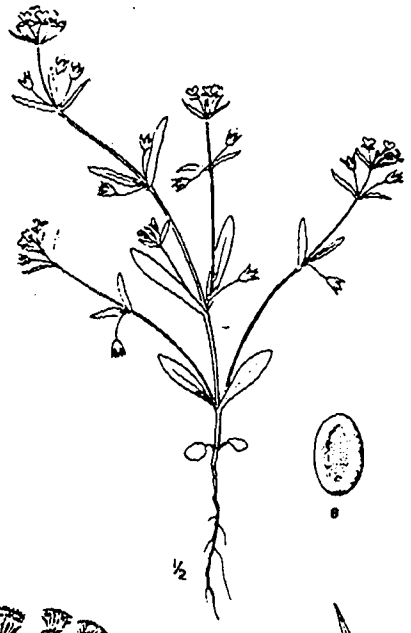


Whitney Milkvetch
(*Astragalus whitneyi*) **(ASWH)**
Indic: Uncommon in both native and introduced communities.

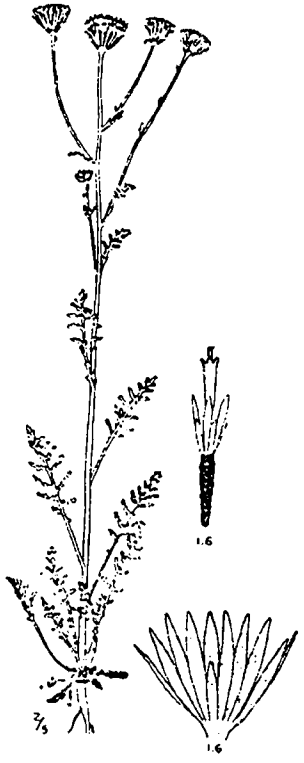
Arrowleaf Balsamroot
(*Balsamorhiza sagittata*) (BASA)
Indic: Common on all native associations except scablands; absent on areas that have been treated with introduced bunchgrasses; decreases with overgrazing and disturbance. Heads palatable to big game and livestock.
Use: Entire plant edible; roots may be collected all year, best cooked; young stems used in salads or potherbs, older stems cooked; roasted seeds excellent, make good flour.

Sagebrush Mariposa
(*Calochortus macrocarpus*) (CAMA)
Indic: Common in both native and introduced communities; highly palatable to game and livestock.

Chickweed
(*Cerastium nutans*) (CENU)
Indic: Widespread in all of CRNG; increases with disturbance.



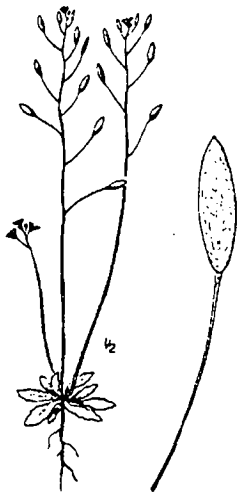
Littleflower Collinsia
(*Collinsia parviflora*) (COPA)
Indic: Somewhat showy spring annual with blue and white flower; common throughout the CRNG.



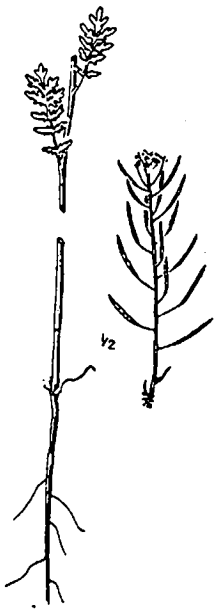
Douglas Chaenactis
(*Chaenactis douglasii*) (CHDO)
Indic: Found mostly in the broad valleys or flats, especially on introduced communities.

Smooth Hawksbeard
(*Crepis barbigera*) (CRBA2)
Indic: Fairly common throughout Grassland.

Cryptantha
(*Cryptantha affinis*) (CRAF)
Indic: Widespread early annual.
Increases with disturbance.



Spring Draba
(*Draba verna*) (DRVE2)
Indic: Widespread spring annual; increases with disturbance.



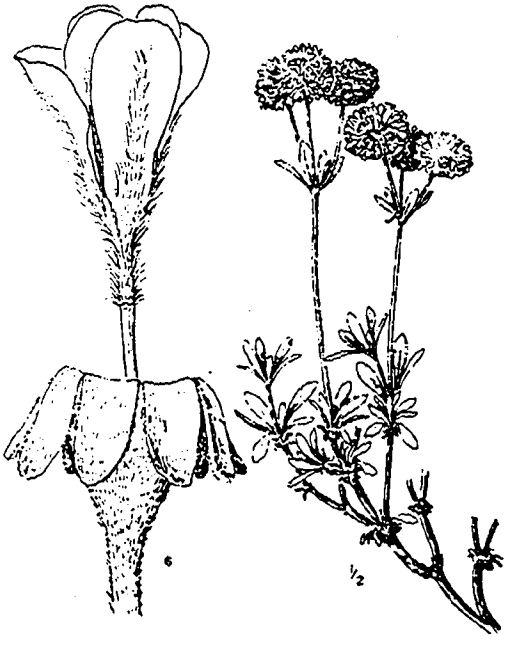
Tansymustard
(*Descurainia richardsonii*) (DERI)
Indic: Widespread annual; individual plants appearing in June-August; increases with disturbance.

Willowweed
(*Epilobium minutum*) (EPMI)
Indic: Widespread summer annual, increases with disturbance.
Use: Probably a good potherb as its larger cousin *E. angustifolium* but small size would make harvest difficult. Boil entire plant for emetic.

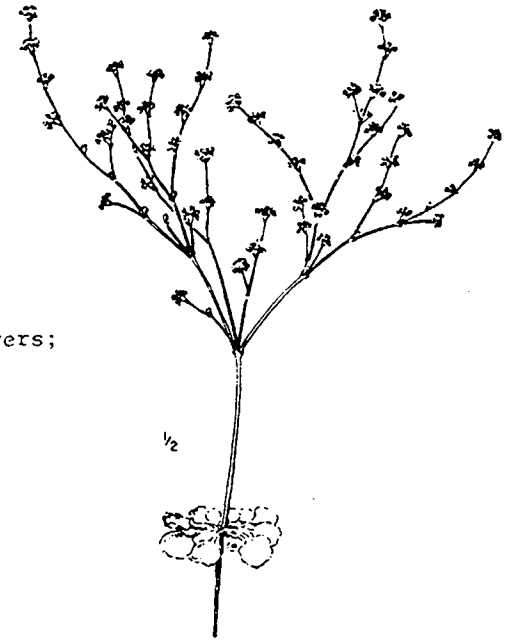
Fleabane
(*Erigeron poliospermus*) (ERPO)
Indic: Common blue-rayed perennial found throughout the CRNG.

Threadleaf Fleabane
(*Erigeron filifolius*) (ERFI)
Indic: Common blue-rayed perennial throughout the CRNG.

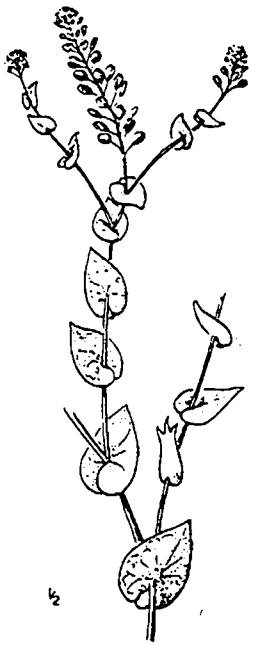
Lineleaf Fleabane
(*Erigeron linearis*) (ERLI)
Indic: Common yellow-rayed perennial throughout the CRNG.



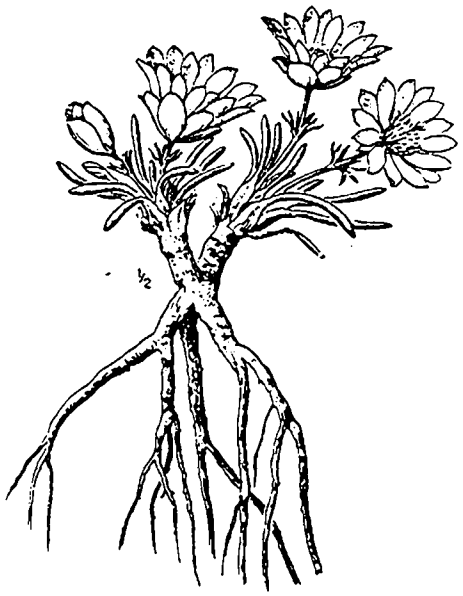
Rock Eriogonum
(*Eriogonum spaeracephalum*) (ERSP3)
Indic: Subsrhrub common on native associations, especially scablands; increaser. Mostly absent on introduced communities.



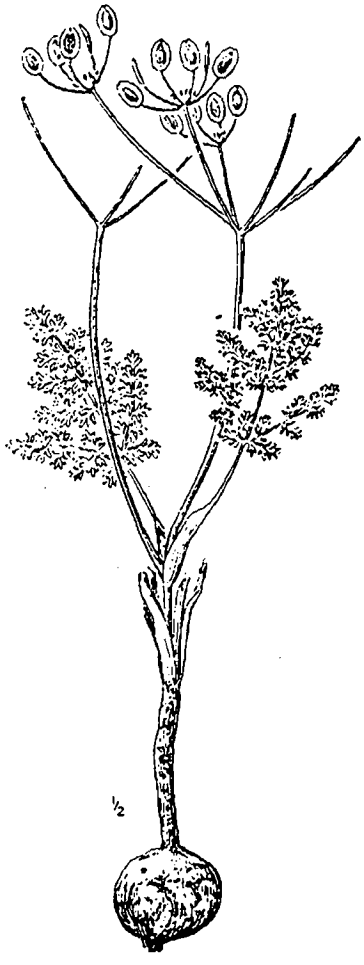
Broom Eriogonum
(*Eriogonum vimineum*) (ERVI)
Indic: Late summer annual that is missed by most observers; common throughout CRNG.



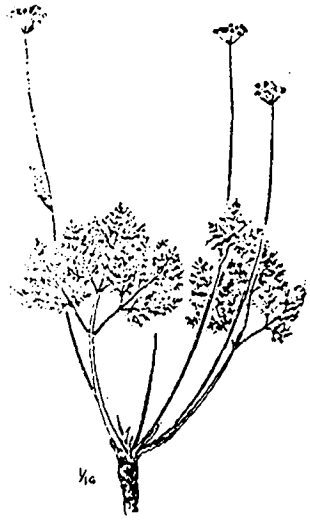
Clasping Pepperweed
(*Lepidium perfoliatum*) (LEPE)
Indic: Mid to late summer annual found on most introduced communities.



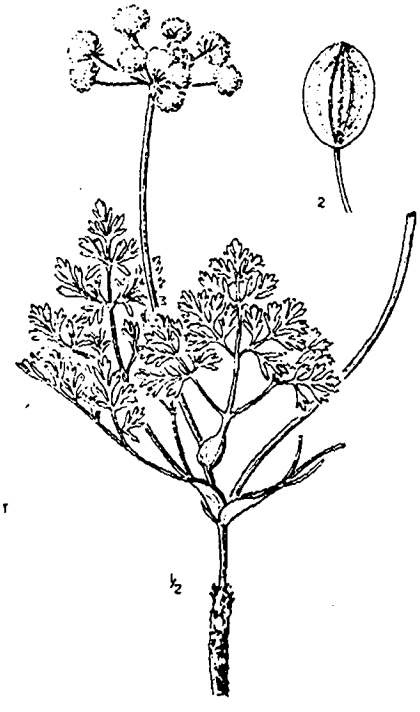
Bitterroot Lewisia
(*Lewisia rediviva*) (LERE)
Indic: Common in dry sandy soils found on scablands.
Use: Roots peeled and boiled, eaten immediately or dried for later use. Roots chewed for sore throat, emetic or purgative.



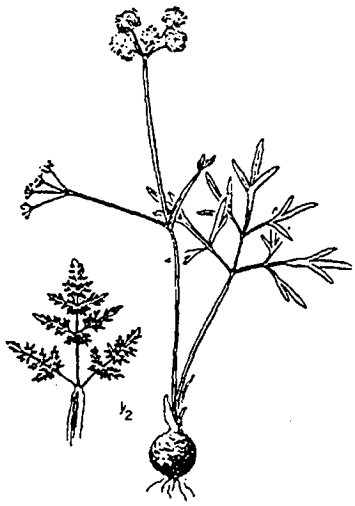
Canby Biscuitroot
(*Lomatium canbyi*) (LOCA4)
Indic: Open rocky sites; infrequent over most of CRNG.



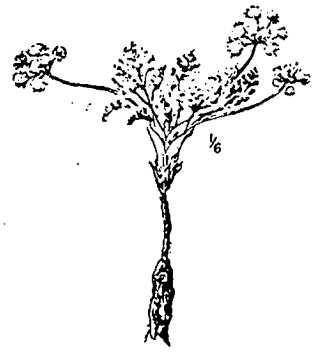
Fernleaf Lomatium
(*Lomatium dissectum*) (LODI2)
Indic: Open rocky slopes; infrequent over most of CRNG.



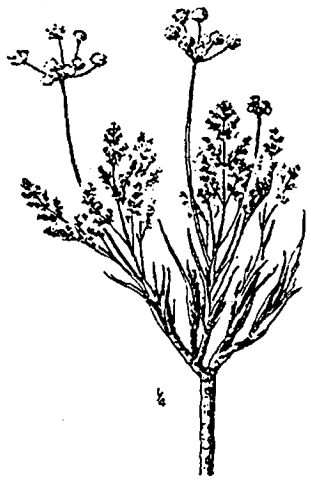
Donnel Biscuitroot
(*Lomatium donnellii*) (LODO)
Indic: Open, gravelly or rocky sites and dry meadows; infrequent.



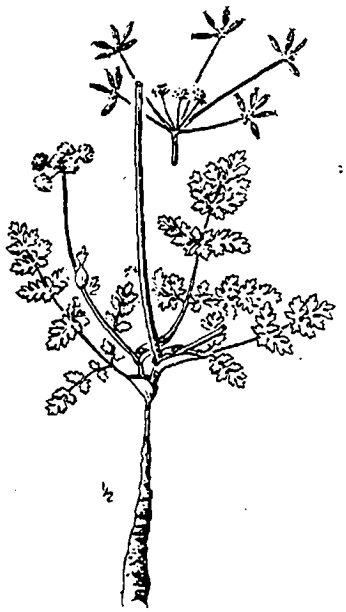
Gorman Biscuitroot
(*Lomatium gormanii*) (LOGO)
Indic: Widely scattered on native communities.
Infrequent on introduced communities.



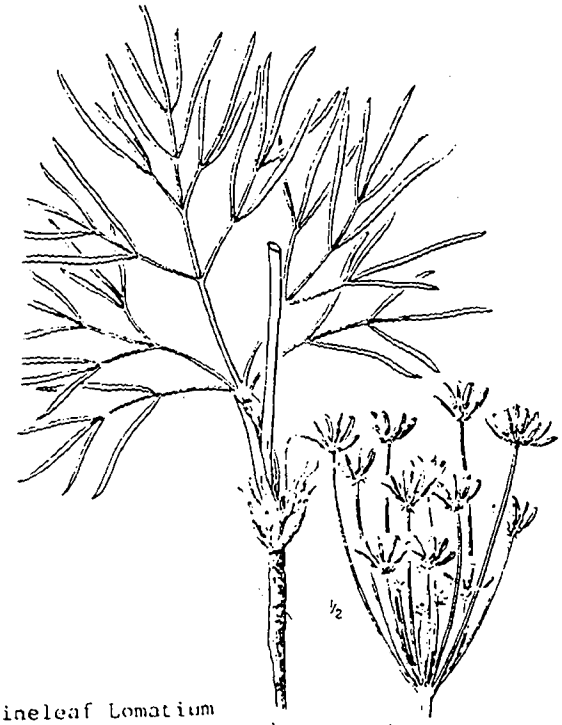
Bigseed Lomatium
(*Lomatium macrocarpum*) (LOMA)
Indic: Common plant on both native and introduced communities.



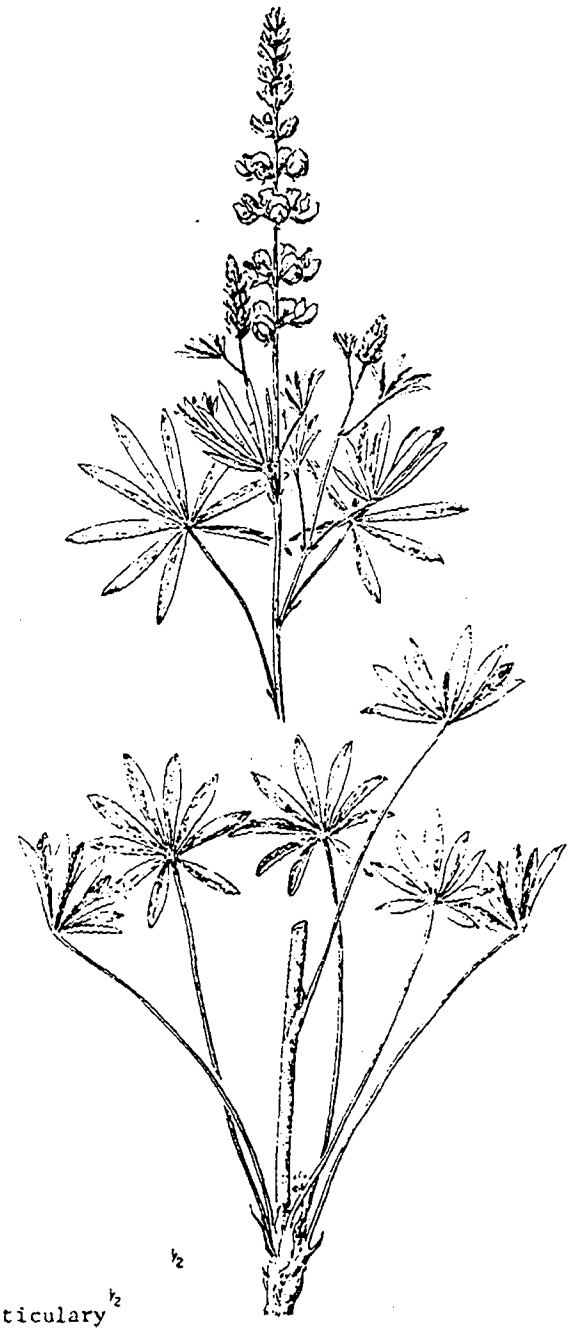
Gray Biscuitroot
(*Lomatium grayi*) (LOGR)
Indic: Widely scattered; somewhat rare.



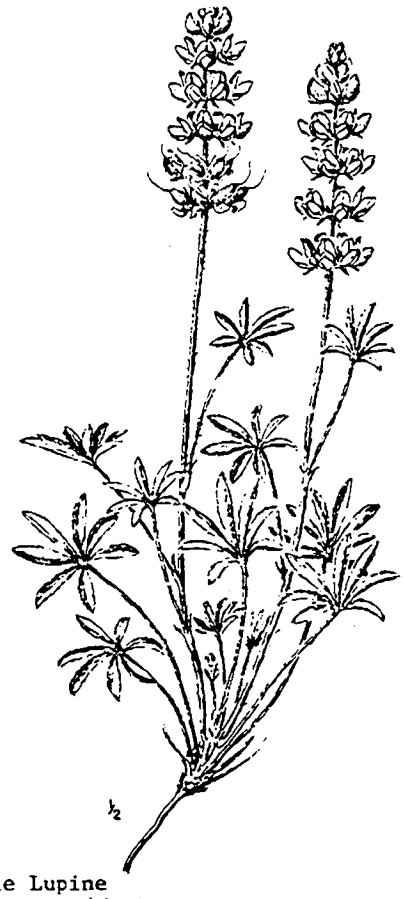
Martindale Biscuitroot
(*Lomatium martindalei*) (LOMA2)
Indic: Dry rocky sites, especially tallus slopes, otherwise rare.



Nineleaf Lomatium
(*Lomatium triternatum*) (LOTR)
Indic: Common throughout the CRNC on both native and introduced communities.
Use: Roots raw, cooked as a vegetable, or dried and ground into flour for bread.



Tailcup Lupine
(*Lupinus caudatus*) (LUCA)
Indic: Widespread on CRNG.
Use: Highly palatable, and particulary poisonious to cattle and horses; indians made tea from seeds to help kidney function; pocket gopher forage.



Prairie Lupine
(*Lupinus lepidus*) (LULE2)
Indic: Widespread in the valleys and flats.
Use: Quite distinctive from other lupines because of its short stature.

Velvet Lupine
(*Lupinus leucophyllus*) (LULE)
Indic: Scattered over CRNG principally in valleys and flats.

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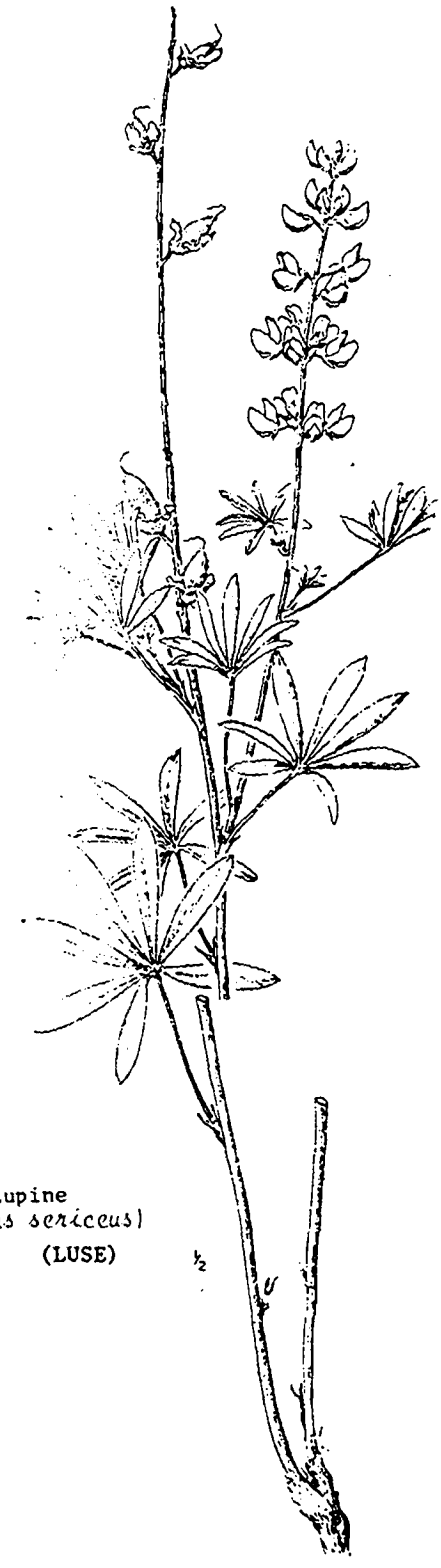
Rock Lupine
(*Lupinus saxosus*) (LUSA)



Silky Lupine
(*Lupinus sericeus*)
(LUSE)

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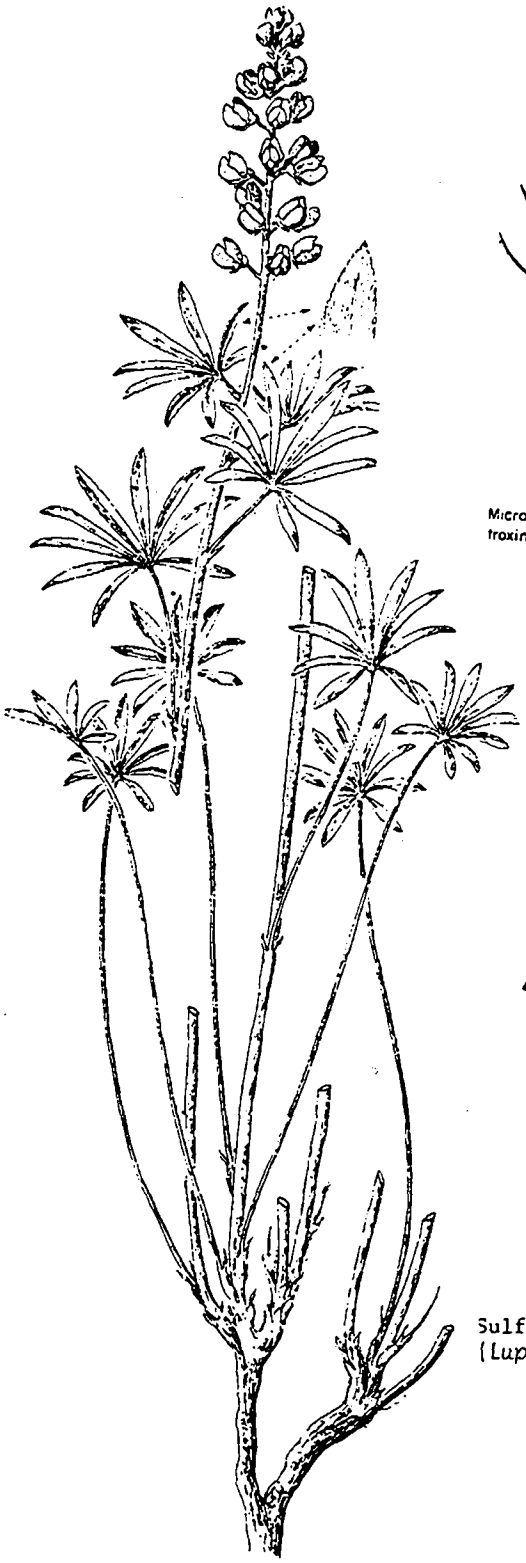
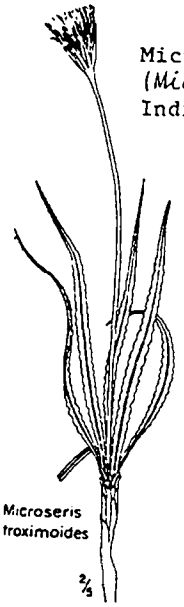
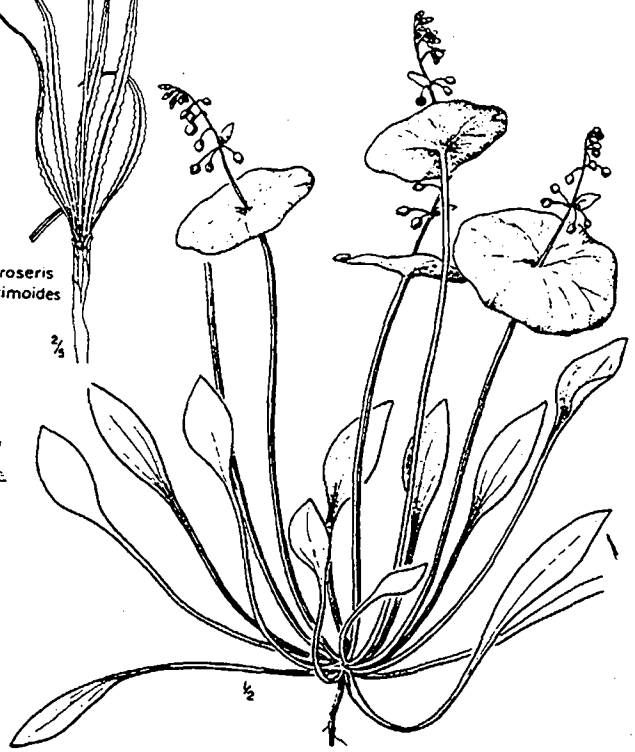


Microseris
(*Microseris troximoides*) (MITR)
Indic: Widespread in native communities.

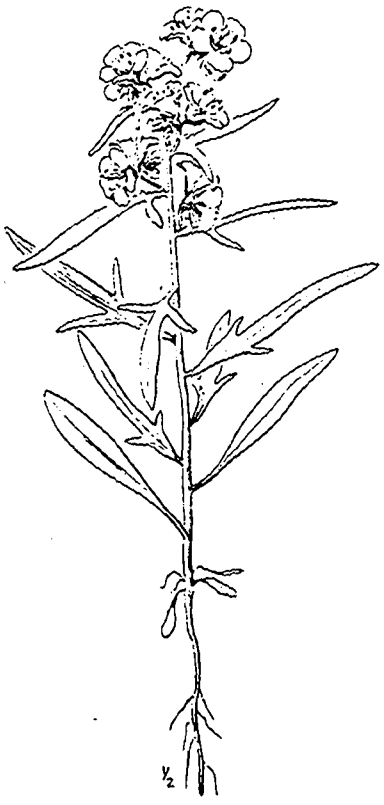




Minerslettuce
(*Montia perfoliata*). (MOPA)
Indic:Widespread in spring in
moist places especially
under juniper or shrubs.
Use: Leaves, stems, and flowers
used in salads, cooked green.

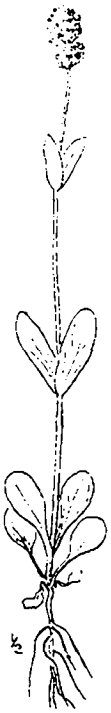
Sulfur Lupine
(*Lupinus sulphureus*) (LUSU)

Phacelia
(*Phacelia hastata*) (PHHA)
Indic: Infrequent in introduced and native and communities.

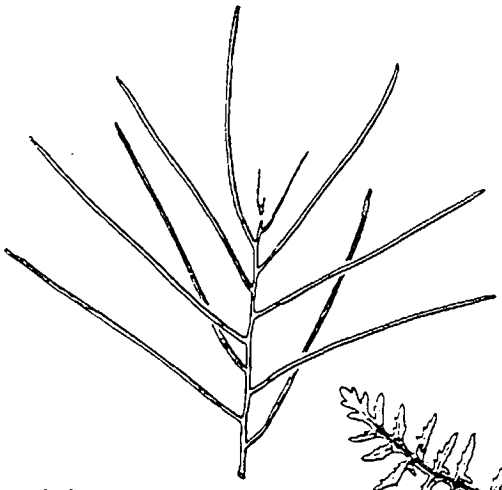


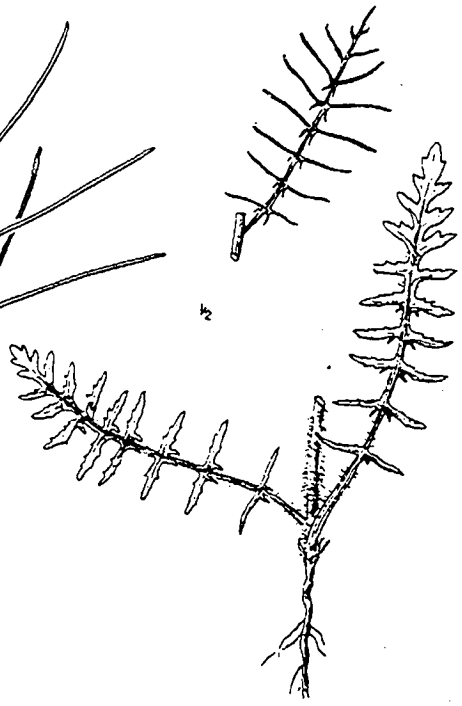
Branching Phacelia
(*Phacelia linearis*) (PHLI)
Indic: Common annual on native and introduced communities.

Phlox
(*Pholx muscoides*) (PHMU2)
Indic: Common mat-forming perennial of native associations but absent on introduced communities
Use: Pholx are highly desirable additions to the rock gardens.

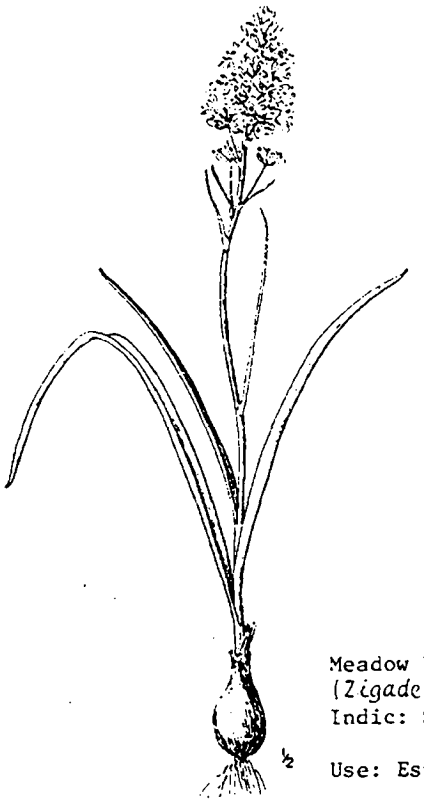


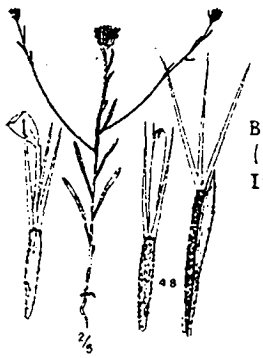
Longhorn Plectritis
(*Plectritis macrocera*) (PLMA3)
Indic: Common spring annual of both native and introduced communities; favors moist conditions.





Tumblemustard
(*Sisymbrium altissimum*) (SIAL)
Indic: Eurasian weed well established on introduced communities.





Bristlehead
(*Rigiopappus leptoclaudus*) (RILE)
Indic: Summer annual on introduced communities; increases with disturbance.

Meadow Death Camas
(*Zigadenus venenosus*) (ZIVE)
Indic: Scattered perennial lilly in native associations; infrequent in introduced communities.
Use: Especially poisonous to sheep.

AVERAGE CANOPY COVER AND CONSTANCY* OF IMPORTANT PLANTS IN THE CROOKED RIVER NATIONAL GRASSLAND INTRODUCED COMMUNITIES (CONSTANCY IN PARENTHESES)

Community	Excl. JUOC/ CHNA-ARTR/ AGCR CJS2-91	Good JUOC/ CHNA-ARTR/ AGCR CJS2-91	Fair JUOC/ CHNA-ARTR/ AGCR CJS2-91	Poor JUOC/ CHNA-ARTR/ AGCR CJS2-91	Good JUOC/ CHNA-ARTR/ AGIN CJS2-92	Fair JUOC/ CHNA-ARTR/ AGIN CJS2-92	Poor JUOC/ CHNA-ARTR/ AGIN CJS2-92
No. of Plots	7	22	26	14	10	11	8
TREES							
Western Juniper	1 (10)	2 (6)	2 ( )	3 ( )	2 (8)	2 ( )	2 ( )
SHRUBS							
Big sagebrush	3 (10)	2 (8)	7 (8)	12 (9)	6 (8)	7 (7)	8 (9)
Gray rabbitbrush	10 (10)	5 (10)	8 (10)	7 (10)	7 (9)	5 (5)	13 (10)
Green rabbitbrush	5 (10)	3 (9)	6 (10)	6 (8)	3 (10)	2 (6)	8 (10)
Bitterbrush	t (1)	t (1)	1 (3)	3 (6)		t (1)	
GRASSES							
Crested wheatgrass	37 (10)	26 (10)	23 (10)	10 (10)	2 (6)	1 (5)	1 (6)
Beardless wheatgrass	t ( )	t (0)	t (1)	1 (1)	28 (10)	13 (10)	9 (10)
Bulbous bluegrass	1 (4)	3 (4)	3 (5)	2 (4)	1 (2)	2 (2)	3 (2)
Sandberg bluegrass	2 (7)	2 (8)	4 (8)	8 (9)	4 (8)	8 (10)	7 (9)
Squirreltail	1 (7)	1 (5)	2 (8)	3 (9)	1 (3)	3 (8)	3 (9)
Sixweek fescue	1 (4)	1 (10)	1 (8)	4 (8)	1 (9)	3 (9)	3 (9)
Cheatgrass brome							
FORBS							
Western yarrow	3 (10)	1 (7)	2 (9)	1 (9)	1 (7)	2 (8)	3 (10)
Milkvetch (A. atratus)	1 (4)	2 (3)	2 (4)	t (2)	2 (3)	t (4)	1 (1)
Bigseed lomatium	t (3)	t (3)	t (3)	1 (4)	t (3)	1 (5)	t (4)
Lupine spp.	2 (9)	2 (6)	2 (6)	1 (5)	2 (6)	1 (5)	4 (8)
Prairieclover	t (3)	t (5)	2 (4)	1 (3)	1 (7)	1 (3)	1 (2)
Desert alyssum	1 (9)	1 (--)	1 (5)	1 (8)	1 (8)	1 (9)	t (4)
Nodding chickweed	1 (10)	2 (--)	1 (9)	2 (10)	1 (10)	2 (10)	1 (10)
Littleflower collinsia	1 (8)	t (5)	1 (7)	1 (7)	t (3)	1 (6)	t (4)
Dragonhead	1 (10)	1 (--)	1 (10)	1 (9)	1 (10)	1 (9)	1 (10)
Willowweed	1 (10)	1 (9)	1 (10)	1 (9)	1 (10)	1 (9)	1 (10)
Cranesbill	t (4)	1 (6)	1 (7)	1 (7)	1 (9)	1 (9)	t (2)

*Code to Constancy Values: + = 0-5%, 1 = 6-15%, 2 = 16-25%, 3 = 26-35%, 4 = 36-45%, 5 = 46-55%, 6 = 56-65%
7 = 66-75%, 8 = 76-85%, 9 = 86-95%, 10 = 96-100%

AVERAGE CANOPY COVERAGE AND CONSTANCY* OF IMPORTANT PLANTS ON THE CROOKED RIVER NATIONAL GRASSLAND NATIVE ASSOCIATIONS

Association	ARRI/ POSA-LOMA SCABLAND SD91-31	JUOC/ ARTR/ AGSP-FEID FLAT CJS2-26	JUOC/ ARTR/ FEID-AGSP N SLOPE CJS2-12	JUOC/ ARTR/ AGSP-POSA S SLOPE CJS2-13	JUOC/ ARTR-HODU/ AGSP-BASA STEEP S CANYON CJS2-31	JUOC/ ARTR-CHVI/ FEID-BASA STEEP N CANYON CJS2-32	PIPO/ PUTR/ FEID CPS2-11
No. of Plots	7	14	23	33	4	5	3
TREES							
Western Juniper	2 (7)	10 (10)	7 (10)	9 (9)	6 (7)	17 (10)	15 (7)
Ponderosa pine		t (1)	t (+)		t (2)		25 (10)
SHRUBS							
Low sagebrush		2 (2)	1 (+)				
Stiff sagebrush	12 (9)		t (+)				
Big sagebrush		10 (9)	12 (10)	13 (10)	13 (10)	9 (10)	
Gray rabbitbrush		1 (5)	2 (7)	2 (7)	1 (10)	1 (8)	
Green rabbitbrush		1 (4)	1 (3)	2 (7)	1 (5)	2 (10)	1 (7)
Rock eriogonum	2 (4)	t (1)	1 (3)	t (3)			
Rock spirea			t (+)		6 (10)	1 (6)	
Bitterbrush	t (1)	3 (5)	1 (2)	2 (3)	2 (7)	2 (8)	22 (10)
GRASSES							
Bluebunch wheatgrass	t (3)	20 (10)	15 (10)	16 (10)	16 (10)	11 (10)	2 (10)
Idaho fescue	t (1)	1 (5)	18 (10)	11 (9)	1 (2)	21 (10)	15 (10)
Prairie junegrass		t (3)	t (3)	1 (4)			t (3)
Cusick bluegrass	t (1)		6 (4)	1 (2)			
Thurber needlegrass	t (3)	1 (4)	t (1)	3 (6)	t (2)	t (2)	
Sandberg bluegrass	16 (10)	4 (10)	8 (10)	7 (10)	3 (7)	3 (8)	1 (10)
Squirreltail	3 (7)	1 (4)	t (1)	1 (5)		1 (7)	1 (10)
Sixweek fescue	1 (6)	2 (8)	t (4)	1 (9)	5 (10)	4 (8)	
Cheatgrass brome	1 (10)	6 (9)	1 (5)	3 (8)	21 (10)	2 (10)	5 (7)
FORBS							
Western yarrow		1 (8)	2 (9)	1 (9)	2 (10)	1 (6)	2 (10)
Threadstalk milkvetch		t (4)	3 (6)	2 (3)			
Arrowleaf balsamroot		1 (6)	1 (5)	1 (5)	11 (10)	1 (10)	1 (7)
Lineleaf fleabane	1 (7)	t (1)	1 (5)	1 (5)	t (2)	t (4)	
Longgrey eriogonum	t (1)	t (3)	1 (5)	t (3)	1 (2)	1 (8)	
Bigseed lomatium	1 (10)	1 (5)	t (4)	t (7)			
Nineleaf lomatium		t (3)	1 (8)	1 (5)			1 (7)
Lupine spp.		1 (3)	2 (6)	1 (4)		t (4)	t (3)
Moss phlox	1 (4)	1 (9)	2 (7)	3 (7)	t (2)	t (2)	
Desert alyssum	1 (6)	1 (4)	t (+)	t (3)	t (2)		
Nodding chickweed	1 (6)	2 (9)	1 (7)	2 (8)	1 (5)	1 (10)	
Littleflower collinsia	1 (6)	1 (6)	2 (8)	1 (6)	t (2)	t (4)	t (3)
Dragonhead	1 (10)	1 (9)	2 (8)	1 (10)	1 (5)	1 (10)	
Willowweed	t (4)	t (4)	t (2)	t (4)	t (2)	1 (6)	
Cranesbill	2 (4)	1 (4)	t (1)	t (1)			
Longhorn plectritis	t (3)	1 (4)	t (2)	1 (5)	t (2)	t (4)	

*Code to constancy Values: + = 0-5%, 1 = 6-15%, 2 = 16-25%, 3 = 26-35%, 4 = 36-45%, 5= 46-55%, 6 = 56-65%
7 = 66-75%, 8 = 76-85%, 9 = 86-95%, 10 = 96-100%

EFFECTS OF FIRE ON SOME PACIFIC NORTHWEST PLANT SPECIES 1/

GRASSES

Species	Prefire Regeneration Mode	Mode, Post-fire Regeneration Response 2/	Degree of of fire Resistance 3/	Comment	References
Bluebunch Wheatgrass	Warm season bunchgrass. Seed dependent.	Seed germination or weakly rhizomatous, moderate to rapid.	Moderate	Response variable with season of burn, intensity and past graze mgmt.	Willms et al. 1980b; Uresk et al. 1976 Wright et al. 1979
Bottlebrush Squirreltail	Cool season bunchgrass. Wind dispersed seed.	Seed germination, residual plant survival, rapid burning.	Resistant	More resistant to mid-summer than spring.	Wright 1971
Cheatgrass	Annual, heavy seed, prolific seeder.	Seed germination, very rapid.	Very resistant	Very hot burn with litter consumption reduces post-burn density	Daubenmire 1968 Young et al. 1976
Crested Wheatgrass	Warm season bunch grass, seed dependent.	Moderate to slow.	Susceptible to moderate.	Response variable with season of burn intensity and past graze management.	Anderson & Baily 1979 Wright et al. 1979
Idaho fescue	Cool season bunchgrass, heavy seed.	Seed germination, residual plant survival, moderate slow	Susceptible to moderate.	Resistance variable due to season of burn, plant moisture and fire intensity.	Conrad & Poulton 1966 Wright et al. 1979
Kentucky bluegrass	Cool season, rhizomatous.	Rhizome elongation, rapid.	resistant	Most damage from hot, spring burning.	Daubenmire 1968
Needle and thread	Warm season bunchgrass, heavy seed.	Moderate to rapid.	Susceptible	Autumn burns least detrimental, prevent high fuel loads prior to burn.	Wright 1971
Prairie Junegrass	Cool season bunchgrass, heavy seed.	Residual plant survival, rapid to moderate.	Susceptible to moderate		Wright et al. 1979
Sandberg bluegrass	Cool season bunchgrass, heavy seed.	Residual plant survival, rapid.	Moderate to resistant.		Wright et al. 1979
Thurber needlegrass	Warm season bunchgrass, heavy seed.	Slow	Susceptible	Autumn burns least detrimental, prevent high fuel loads prior to burn.	Uresk et al. 1976

1/Volland, L. A., and J. D. Dell, 1981. Fire Effects on Pacific Northwest Forest and Range Vegetation, R6 Rm 067 1981. 23 pp., Illus.

2/Postfire Regeneration Response (Based on number of years to approximate preburn frequency or coverage):

Slow	10 years	Rapid	2-5 years
Moderate	5-10 years	Very Rapid	1-2 years

3/Degree of Fire Resistance (Probability that at least 50 percent of species population will survive or reestablish after passage of a fire):

Resistant	65 percent chance	Susceptible	10-34 percent chance
Moderate	35-64 percent chance	Very susceptible	10 percent chance

EFFECTS OF FIRE ON SOME PACIFIC NORTHWEST PLANT SPECIES (Cont.)

HERBS

Herb Species	Prefire Regeneration Mode	Mode, Post-fire Regeneration Response 1/	Degree of of fire Resistance 2/	Comment	References
Balsam root	Windborne seed, thick caudex.	Caudex regrowth, rapid.	Resistant		Wright et al. 1979
Bedstraw	Sticky seed, animal dispersed.	Seed germination, moderate.	Moderate	Resistant to light underburns.	Anderson & Bailey 1980 Anderson & Bailey 1979
Death camas	Deep underground Corm.	Corm regrowth, rapid.	Resitant		Wright et al. 1979
Indian paintbrush	Deep taproot	Caudex regrowth, moderate.	Moderate		McLean 1969
Lupine	Heavy seed, deep taproot	Candex regrowth, heat scarified seed, rapid	Resistant		Lyon & Stickney 1976 McLean 1969
Western yarrow	Seed dependent, airborne.	Seed germination, moderate.	Resistant to moderate.		McLean 1979 Anderson & Bailey 1980

EFFECTS OF FIRE ON SOME PACIFIC NORTHWEST PLANT SPECIES (Cont.)

SHRUBS

Species	Prefire Regeneration Mode	Mode, Post-fire Regeneration Response 1/	Degree of of fire Resistance 2/	Comment	References
Antelope bitterbursh	Heavy seed, animal dispersed.	Basal stem sprouts, seed germination, rapid to slow.	Very susceptible to moderate.	Variable results with post-burn sprouting based on season of burn, plant vigor and soil moisture situation.	Wright 1972 Blaisdell & Muggler 1956
Big sagebrush	Windborn seed.	Seed germination, slow.	Very susceptible.	Burning commonly used to control species.	Wright et al. 1979
Bitter & Chokecherry	Heavy seed, animal dispersed	Stem budding, rapid to moderate.	Resistant	Establishes on hot, midsummer burns.	Anderson & Baily 1980
Common snowberry	Rhizomes, seed.	Vigorous sprouter, rapid to moderate	Resistant		McLean 1969
Curleaf mountain mahogany	Heavy, wind dispersed seed.	Seed germination, slow.	Very susceptible.	Underburn when shrub moisture high, but understory grasses cured.	Wright et al. 1979
Currant	Heavy fleshy seed, animal dispersed.	Seed scarified, basal stem sprout, rapid	Moderate	Common pioneer on hot burns xeric sites.	Wright 1972
Green and Gray Rabbitbrush	Airborne seed.	Stem sprouting, rapid.	Moderate to resistant	Complete mortality by burning rarely documented.	Wright 1972
Horsebrush	Windborne seed.	Basal stem sprouts, rapid.	Resistant		Wright 1972
Ocean Spray	Windborne seed.	Basal stem sprouts, moderate.	Moderate		Wright 1972
Rabbitbrush goldenweed	Light, airborne seed.	Stem sprouts rapid.	Resistant	Common pioneer in conflageration burns.	Volland 1976
Rose	Heavy fleshy fruit, animal dispersed.	Basal stem sprouts, moderate	Moderate		Wright 1972
Serviceberry	Heavy, fleshy seed animal dispersed.	Basal stem sprouting, moderate	Moderate	Damage from burning varies with intensity and season of burn.	Wright 1972 Lyon & Stickney 1976
Spirea	Light weight seed.	Rhizome and basal stem sprouts, moderate	Moderate		Lyon & Stickney 1976 Wright 1972 Tiedemann & Klock 1976 Wright 1978

EFFECTS OF FIRE ON SOME PACIFIC NORTHWEST PLANT SPECIES (Cont.)

TREES

Species	General Response to Fire	Comments	References
Ponderosa pine	Probably most resistant to fire of any western tree.	Often killed by crown damage from intense fires.	Weaver 1968; Hall 1977; Wright 1978; Soeriaatmadja 1966
Quaking aspen	Top readily killed by all but light surface fire.	The species root-suckers profusely after fire.	Bartos 1979; Bailey and Anderson 1980
Western Juniper	Trees under 6 feet tall readily killed. As trees get larger, need more intense fires.	Heavy seed dispersed by birds. Rapid reinvasion of highly disturbed sites.	Martin 1978

AVERAGE CHARACTERISTICS ON CROOKED RIVER NATIONAL GRASSLAND INTRODUCED COMMUNITIES

Community	Excl. JUOC/ CHNA-ARTR/ AGCR CJS2-91	Good JUOC/ CHNA-ARTR/ AGCR CJS2-91	Fair JUOC/ CHNA-ARTR/ AGCR CJS2-91	Poor JUOC/ CHNA-ARTR/ AGCR CJS2-91	Good JUOC/ CHNA-ARTR/ AGIN CJS2-92	Fair JUOC/ CHNA-ARTR/ AGIN CJS2-92	Poor JUOC/ CHNA-ARTR/ AGIN CJS2-92
Herbage (lb/acre)[1]	529 ± 69[2]	318 ± 23	280 ± 28	166 ± 39	363 ± 69	240 ± 51	156 ± 61
Surface rock (%)	22 ± 2	3 ± 1	5 ± 2	5 ± 3	10 ± 5	4 ± 4	6 ± 6
Bare ground + pavement (%)	42 ± 9	63 ± 7	66 ± 6	69 ± 9	64 ± 8	70 ± 10	66 ± 9
Moss (%)	40 ± 8	28 ± 6	20 ± 5	19 ± 7	19 ± 7	19 ± 8	21 ± 7
Decreaser bunchgrasses (%)	37 ± 4	31 ± 2	26 ± 2	14 ± 5	32 ± 5	22 ± 4	12 ± 5
Juniper + shrubs (%)	19 ± 7	14 ± 3	24 ± 3	31 ± 7	18 ± 7	16 ± 5	32 ± 2

1 Herbage is all above ground herbaceous plant materials in lb/acre dry weight.

2 5% CI

AVERAGE CHARACTERISTICS ON CROOKED RIVER NATIONAL GRASSLAND NATIVE ASSOCIATIONS

Community	ARRI/ POSA-LOMA Scabland SD91-31	JUOC/ ARTR/ AGSP-FEID Flat CJS2-26	JUOC/ ARTR/ FEID-AGSP S Slope CJS2-13	JUOC/ ARTR/ AGSP-POSA N Slope CJS2-12	JUOC/ ARTR-HODU/ AGSP-BASA Steep S Canyon CJS2-31	JUOC/ ARTA-CHVI/ FEID-BASA Steep N Canyon CJS2-32	PIPO/ PUTR/ FEID CPS2-11[1]
Herbage (lb/acre)	30 ± 9[2]	388 ± 74	266 ± 104	375 ± 77	238 ± 75	400 ± 203	121 ± 19
Surface rock (%)	48 ± 12	8 ± 8	24 ± 16	16 ± 13	39 ± 14	21 ± 11	not available
Bareground + pavement (%)	32 ± 19	59 ± 10	50 ± 20	39 ± 20	29 ± 18	43 ± 24	not available
Moss (%)	18 ± 13	20 ± 10	10 ± 10	22 ± 17	16 ± 8	25 ± 15	not available
Decreaser bunchgrass (%)	1 ± 2	33 ± 8	23 ± 6	39 ± 14	18 ± 6	33 ± 15	18[3]
Juniper + shrubs (%)	16 ± 9	29 ± 13	27 ± 12	25 ±14	31 ± 7	34 ± 5	53[3]

1 Juniper + shrubs includes ponderosa pine in community CPS2-11.

2 5% CI

3 Data too variable to compute a reasonable CI.

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