Scablands - Characterized by thin rocky soils populated by drought-tolerant plants on gentle ridgetops.

1a. Shrubs absent; plant community dominated by grasses 2

2a. Bluebunch wheatgrass is present (usually greater than 25% coverage) with Sandberg's bluegrass and onespike oatgrass . . . . . AGSP-POSA3 scabland (p. 134)

2b. Bluebunch wheatgrass absent (occasionally occurs at coverage of 5% or less). Sandberg's bluegrass and onespike oatgrass dominate . . . . . POSA3-DAUN. (p. 143)

1b. Shrubs present in the plant community 3

3a. Buckwheats absent. Stiff sagebrush dominates a rocky scabland with Sandberg's bluegrass, onespike oatgrass, and bluebunch wheatgrass . . . . . ARRI/POSA3 (p. 138)

3b. Buckwheats dominate a scabland with high coverage by erosion pavement and rock 4

4a. Douglas' buckwheat occurs with Sandberg's bluegrass . . . . . ERDO/POSA3 (p. 148)

4b. Strict buckwheat occurs with Sandberg's bluegrass and bluebunch wheatgrass . . . . . ERST2/POSA3 (p. 152)

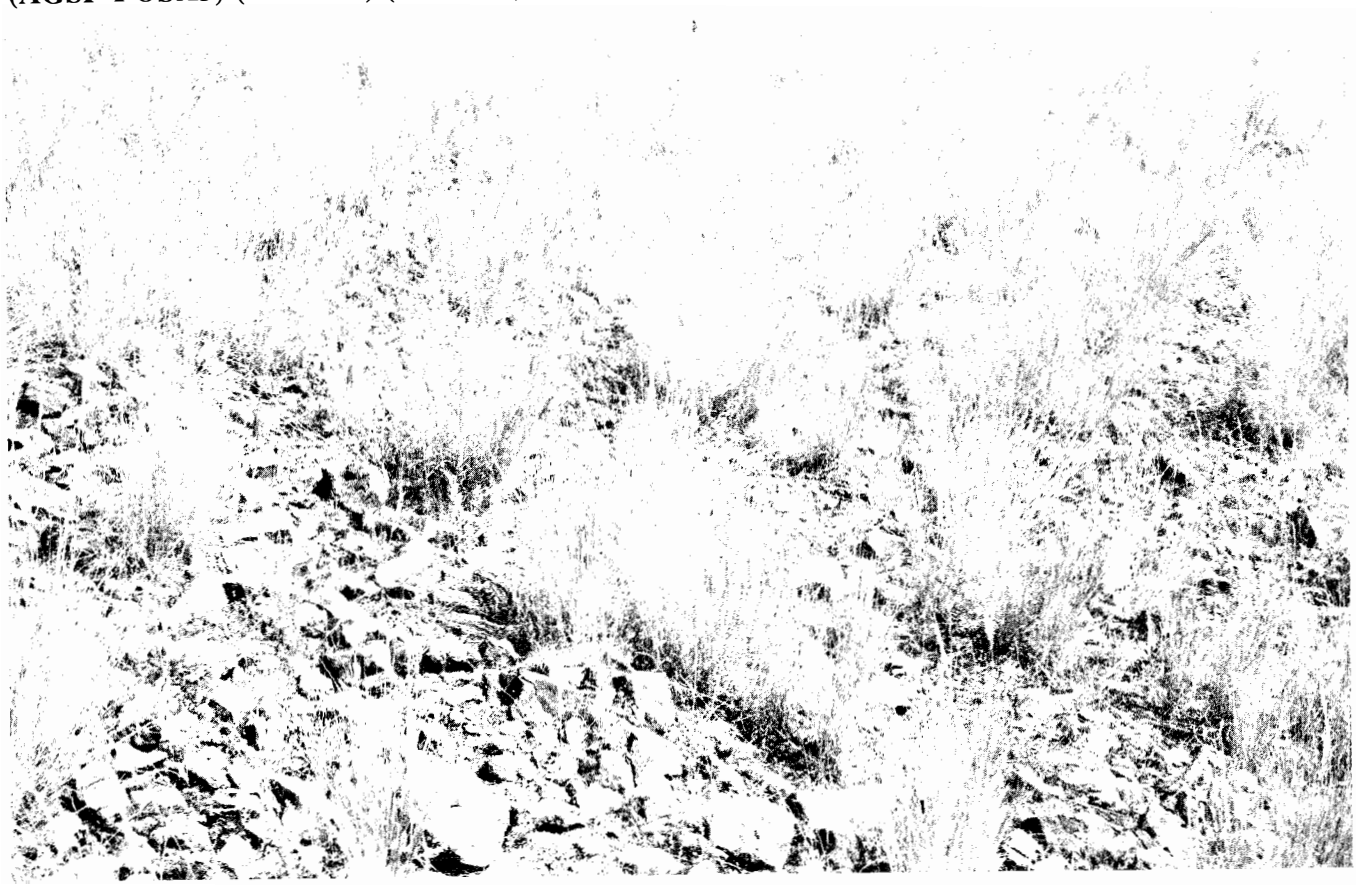
SCABLAND COMMUNITIES

Summary of Plant Association and Community Type Characteristics 1/

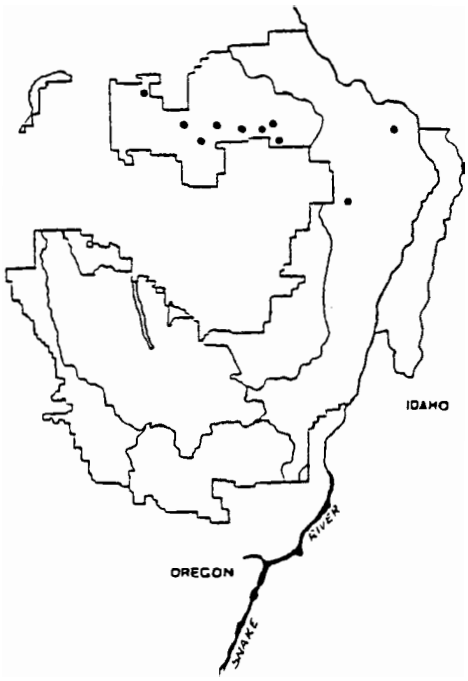
Plant Community Type	Elevation (feet)	Slope Position	Aspect	Slope	Parent Material	(2) Soil Depth Total (in.) Rt. Conc.	Principal Indicators	Principal Increasers/ Invaders	(3) Forage (lbs./acre) dry
AGSP-POSA3 scab	4000-5200 (4400)	tops to upper slope	S-SW	2-32% (22%)	basalt	8-14 (11) 7-9 (8)	AGSP,POSA3 BAIN,LOCO2	TRMA,ANLU/ GRNA,BROMES	(300) 250-350
ARRI/POSA3	3300-5500 (4600)	tops to upper slope	all	1-25% (10%)	basalt	4-8 (6) 3-8 (5)	ARRI,POSA3 DAUN,SEDUM	TRMA,CAOR3/ GRNA,ALLIUM	(260) 110-400
POSA3-DAUN	4000-6000 (4900)	tops to upper slope	all	2-15% (7%)	basalt	4-9 (6) 3-9 (5)	POSA3,DAUN SEDUM,LOLE	ANLU,TRMA/ GRNA,MAGL	(290) 130-350
ERDO/POSA3	4400-5400 (4950)	ridge tops	E-SSW	2-13% (8%)	Loess + basalt	6-9 (8) 3-5 (4)	ERDO,POSA3 SEDUM,LOLE	LOLE,TRMA/ GRNA,ERDI4	(315) 250-390
ERST2/POSA3	4200-5100 (4600)	tops to upper slopes	SE-SW	4-30% (18%)	basalt	2-7 (5) 2-4 (3)	ERST2,POSA3 SIHYH,SEDUM	SEDUM,PODO/ BROMES,CHNA	(110) 100-135

1/ Range and mean (no.)
2/ Total soil depth and depth of root concentration (80% of roots)
3/ Forage production in mid and late seral communities

Bluebunch wheatgrass - Sandberg's bluegrass scabland plant community type
Agropyron spicatum - Poa sandbergii
(AGSP-POSA3) (scabland) (GB49 11)



23. Red Hill Ridge near Sumac Creek Canyon (Wallowa Valley Ranger District) ***Plot 77***



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: WVRD,HCNRA	Parent Material: basalt bedrock, minor loess
Elevation: (4400 ft.) 4000-5200	Solum depth: (11 in.) 8-14 in.
Aspect: S-SW	Loess depth: loess mixed
Slope (22%) 2-32%	Root conc: (8 in.) 7-9 in.
Position: ridge brows	Depth to GT 35% rock frag./size: rock to surface/ cobbles
Other: transition between scablands and AGSP-POSA3 communities	Surface soil/subsoil texture: loam,silt loam/loam silt loam

Table of Principal Species

AGSP-POSA3 scabland (n = 10)

Species	Code	Mean foliar cover (%)/Constancy (%) Late Seral (n=4)	Mid Seral (n=3)	Early Seral (n=3)	Late to Mid Seral Range
Grasses					
*bluebunch wheatgrass	AGSP	35/100	25/100	12/100	15-40
*Sandberg's bluegrass	POSA3	11/100	5/100	6/100	1-15
onespike oatgrass	DAUN	1/25	4/67	-	0-5
rattlesnake brome	BRBR	1/75	2/100	3/33	0-5
soft chess	BRMO	-	1/67	5/33	0-1
cheatgrass	BRTE	-	1/33	3/33	0-1
Perennial Forbs					
*Cous biscuitroot	LOCO2	2/75	-	3/67	0-3
swale desert parsley	LOAM	1/25	1/67	-	0-1
bighead clover	TRMA	1/25	1/33	13/67	0-1
narrowleaf skullcap	SCAN	2/50	1/33	-	0-3
*dwarf yellow fleabane	ERCH	1/50	1/33	-	0-1
*hoary balsamroot	BAIN	5/100	1/33	3/67	0-15
woodrush pussytoes	ANLU	1/25	10/33	1/33	0-10
*stonecrops	SEST,SELA2	1/50	5/67	1/33	0-10
sticky phlox	PHVI3	1/25	6/67	3/33	0-10
yarrow	ACMIL	2/100	2/100	2/67	1-3
yellow salsify	TRDU	-	1/67	1/33	0-1
gumweed	GRNA	3/50	1/33	1/33	0-3
Annual Forbs					
tall annual willowweed	EPPA	1/75	1/100	1/33	0-1
blepharipappus	BLSC	6/75	3/67	3/33	0-15
narrow leaved collomia	COLI2	1/50	1/67	-	0-1
Douglas' knotweed	PODO	3/75	5/100	3/33	0-3
purslane	VEPE	2/50	1/33	-	0-3
Surface Features					
rock		49/100	55/100	42/100	35-65
pavement		2/75	13/67	48/67	0-15
bare ground		2/100	8/100	12/100	1-20
moss		16/100	3/67	4/100	0-30
litter		1/100	1/67	2/100	0-1

* Principal Indicator Species

This plant community is transitional between Sandberg's bluegrass - onespike oatgrass lithosolic communities with their inability to support either Idaho fescue or bluebunch wheatgrass and the deeper soil sites capable of Idaho fescue and bluebunch wheatgrass production. In late seral stands, bluebunch wheatgrass always dominates with Sandberg's bluegrass over a rocky surface (mean: 49%) with high coverage by mosses (mean: 16%). Onespike oatgrass (DAUN) may be present on moist microsites. Perennial forbs are dominated by the typical scabland members. Examples are - hoary balsamroot (BAIN), Cous bisquitroot (LOCO2), dwarf yellow fleabane (ERCH), and stonecrops (SELA2, SEST). Annuals that commonly occur are Douglas' knotweed (PODO), tall annual willowweed (EPPA), and blepharipappas (BLSC).

Degraded sites in early seral stages are characterized by lower coverages of bluebunch wheatgrass (17% vs. 35% in late seral stands) and Sandberg's bluegrass (6% vs. 11% in late seral stands). Moss is reduced while bare ground and erosion pavement increase in surface cover. Annuals generally increase (especially annual bromes) as do several perennial forbs -- gumweed, bighead clover, pussy-toes, and stonecrops. Showy forbfields may dominate in early and very early seral communities with domination by showy penstemon, yarrow, gumweed, and hoary balsamroot. Pedestalled bunchgrasses, lichen lines on rocks, and erosion pavement increase with the severity of degradation.

Distribution and Environmental Features - The AGSP-POSA3 scabland communities occur throughout the dissected plateau. Sites are usually limited to a few acres or less in size. Communities are typically on exposed convex ridgebrows within a few hundred feet from plateau or ridge summits. Elevations range from 4,000 to 5,000 feet (mean: 4,500 ft.). Slopes are gentle to moderately steep (range: 2-32%, mean: 22%). Soils are less than 12 inches deep, have loam or silt loam textures, and are rocky. Cobble and gravel-sized rock is predominant. They are similar in character to soils supporting FEID-AGSP ridgetop communities. Erosion, however, has removed much of the fine-textured surface material leaving only a thin darkened surface layer. Soil depth is still greater than that in other scabland communities and therefore capable of supporting bluebunch wheatgrass.

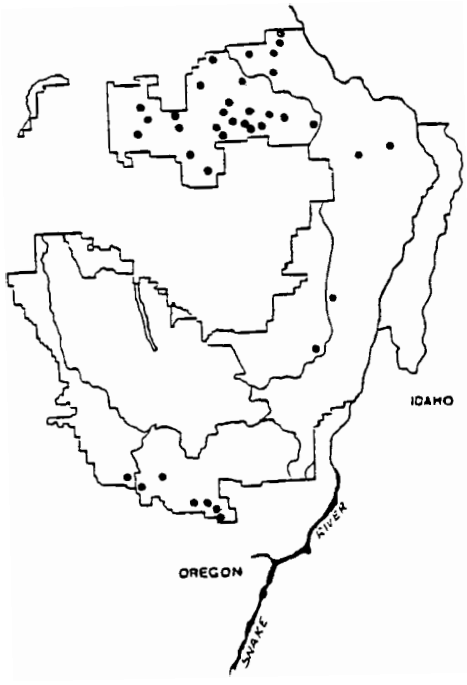
Synecological Relationship - Some of the poorer condition vegetation sampled may have been classified into the deeper soil bluebunch wheatgrass association (i.e., AGSP-POSA3 (basalt)). It is conceivable that some sites may have contained fescue at one time and were more like the FEID-KOCR or FEID-AGSP types. Soil loss has now created a drier growing medium incapable of supporting these higher productivity stands of bunchgrass. Undoubtedly, some of the better condition vegetation has always been transitional between ridgetop plant communities (i.e., FEID-KOCR, POSA3-DAUN) and steeper slope steppe vegetation (i.e., FEID-AGSP, FEID-KOCR). The eroded ridge brow is perhaps the most illustrative of sites where the AGSP-POSA3 scabland community is found.

Management Considerations - Ungulates grazing too severely on ridgetops may induce this community through subsequent soil loss from wind and surface water erosion. Maintenance of the bunchgrasses is important. Trampling may reduce the moss-plant ratio and promote increased pavement from compaction and surface water movement resulting in a higher rock-plant ratio. Use on these higher elevation ridges should initiate after the flowering stage of bluebunch wheatgrass and after the soil has dried in early summer. Although an ecotonal community by definition, the AGSP-POSA3 scabland community may be increasing. Where range and

wildlife management permits dual usage at sensitive seasons, and where ungulate numbers are either too great or animal traffic too frequent, deeper-soil grasslands sustaining this impact may be losing their potential through subsequent wind and water erosion. This would enable AGSP-POSA3 scablands to increase as these sites become shallower, hotter, and drier.

Stiff sagebrush/Sandberg's bluegrass plant association
Artemisia rigida/Poa sandbergii (ARRI/POSA3) (SD91 11)

24. Fire Ridge (Wallowa Valley Ranger District) *Plot 616*



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: all districts	Parent Material: basalt bedrock
Elevation: (4600 ft.) 3300-5500 ft.	Solum depth: (6 in.) 4-8 in.
Aspect: all	Loess depth: (0)
Slope (10%) 1-25%	Root conc: (5 in.) 3-8 in.
Position: ridge and plateau tops, ridge brows	Depth to GT 35% rock frag./size: rock to surface/cobbles,gravels
Other: may form mosaic with FEID-KOCR types; often adjacent POSA3-DAUN	Surface soil/subsoil texture: silt loam,loam/loam

Table of Principal Species

ARRI/POSA3 (n = 40)

Species	Code	Mean foliar cover (%)/Constancy (%) Late Seral (n=9)	Mid Seral (n=16)	Early Seral (n=12)	Very Early Seral (n=3)	Late to Mid Seral Range Range
Shrubs						
*stiff sagebrush	ARRI	25/100	22/100	20/100	20/100	10-50
Grasses						
*Sandberg's bluegrass	POSA3	12/100	11/100	5/92	2/100	1-20
*onespike oatgrass	DAUN	6/67	6/44	3/42	1/33	0-20
bluebunch wheatgrass	AGSP	5/33	3/69	1/50	1/100	0-10
bottlebrush squirreltail	SIHYH	1/22	2/31	1/42	1/33	0-3
soft chess	BRMO	1/22	1/31	2/25	-	0-3
rattlesnake brome	BRBR	1/44	1/38	1/17	-	0-1
Perennial Forbs						
Holboell's rockcress	ARHO	1/33	2/31	1/58	2/67	0-3
*stonecrops	SELA2,SEST	5/78	8/100	6/100	5/100	0-15
hoary balsamroot	BAIN	3/22	3/56	2/67	-	0-10
slenderfruit biscuitroot	LOLE	2/33	2/50	3/58	10/33	0-3
Cous biscuitroot	LOCO2	2/33	3/69	3/50	3/33	0-10
woodrush pussytoes	ANLU	1/22	1/44	6/25	1/67	0-1
low pussytoes	ANDI	7/22	3/6	15/8	-	0-10
dwarf yellow fleabane	ERCH	2/33	2/44	1/25	-	0-3
bighead clover	TRMA	4/44	6/69	3/67	7/67	0-20
gumweed	GRNA	1/22	3/25	1/8	1/33	0-10
*pale Wallowa paintbrush	CAOR3	4/33	3/50	2/33	1/33	0-10
onions	ALLIU	2/44	2/75	3/42	8/67	0-5
yarrow	ACMIL	1/22	1/50	1/17	3/33	0-3
Annual Forbs						
Douglas' knotweed	PODO	5/67	5/75	2/75	8/67	0-15
tall annual willowweed	EPPA	2/44	1/19	1/25	1/33	0-3
blepharipappus	BLSC	2/33	1/44	1/17	-	0-3
Surface Features						
rock/gravel		34/100	32/100	33/100	31/100	3-80
*pavement		12/67	17/94	21/92	23/100	0-40
*bare ground		5/100	9/94	11/75	16/100	0-30
*moss		23/100	21/100	8/92	2/100	1-60
litter		1/89	1/94	1/75	1/67	0-5
Herbage Production (lbs./acre dry wt.)						
Sandberg's bluegrass		65	35	30	-	40-200
other palatable plants		210	210	180	-	100-300
total		315	245	210	-	150-500

* Principal Indicator Species

Vegetative Composition - This type is characterized by stiff sagebrush dominating a Sandberg's bluegrass - onespike oatgrass community. The major native bunchgrasses (AGSP, FEID) are generally absent and appear only occasionally from adjacent FEID-AGSP or FEID-KOCR communities. Stonecrops (SELA2, SEST), onions, (ALTO, ALAC, ALTE2), pussytoes (ANLU, ANDI), biscuitroots (LOLE, LOCO2), bighead clover (TRMA), and dwarf yellow fleabane (ERCH) are commonly found in late seral stages. The pale Wallowa paintbrush (CAOR3), although uncommon in most rangeland communities, shows an affinity to the ARRI/POSA3 plant association. High moss coverage on rocky sites, coupled with little bare ground and erosion pavement, defines a late seral stage capable of withstanding summer drought through good moisture retention capability. Frost boils are usually present even in this stable successional stage.

Most of the roots of stiff sagebrush are concentrated in rock fractures. Moderate grazing can stimulate leader growth; however, the shrub may eventually succumb to heavy and frequent hedging. Sandberg's bluegrass and onespike oatgrass are more fragile and will decline following even moderate disturbance resulting in an increase in bare ground. Frost heaving is accelerated with the increased soil exposure and a corresponding loss of mosses. Erosion pavement increases as wind and water erosion removes finer surface soils from the sites. At this stage in the erosion process, Sandberg's bluegrass becomes pedestalled. Species known to increase with degradation of ARRI/POSA3 sites are bighead clover, pale Wallowa paintbrush, lovely penstemon, hoary balsamroot, and stonecrops. Gumweed (GRNA) or onions may invade highly disturbed ARRI/POSA3 sites in heavy concentrations. Annual bromes occur, but do not increase dramatically on ARRI/POSA3 sites. The annual which consistently occupies harsh sites is Douglas' knotweed (PODO).

Hedging of stiff sagebrush is significant in the inter-forest clearings of the Wallowa-Snake Province. This is probably attributable to deer in late fall and early winter when protein contents of the shrubs are highest. Elk and cattle may also browse these plants but to a lesser degree.

Distribution and Environmental Features - ARRI/POSA3 sites occur on exposed flat-to-undulating ridgetops of the dissected plateau between the Snake and Imnaha Rivers and on basalt flows along the southern flank of the Wallowa Mountains. These communities are especially prominent on ridgetops of the Wallowa Valley Ranger District north of the Wallowa River Valley. Sites range from 3,300 to 5,500 feet in elevation (mean: 4,600 feet) on gentle slopes (mean: 10%). The type occurs on Upper Yakima Basalt flows and is commonly adjacent to deeper soil FEID-KOCR ridgetop communities.

Soils - Soils are typically dark reddish brown to dark brown in color in surface layers, less than 8 inches in depth, and formed in basalt bedrock and loess. Surface layers have silt loam or loam textures with greater than 35% rock fragments by volume. Clay concentrations are rare, but may occur in bedrock fractures. Rock fragments are gravel and cobble-sized throughout the soil layers. Surface rock usually exceeds 40% cover.

Soils are fairly uniform and reflect the uniformity of sites on plateau and ridge areas. Rates of weathering and the fracturing nature of parent rock influence rock fragment size which may vary more than other soil characteristics. Rock ranges from gravel to boulder-sized and occasionally exceeds 60% of the total soil volume. Fracturing of bedrock is greater than in sites supporting POSA3-DAUN communities and allows for establishment and maintenance of shrubs.

Some soils may contain surface layers with less than 35% rock fragments, although these layers are thin and often discontinuous. They appear to be due to displacement of fine soil particles from slightly elevated portions of the site or from trapping of wind-borne particles by the shrubs. Along with other scabland types, these sites have the shallowest soils of all plant communities in the Province.

Summary of Soil and Site Characteristics (all samples) - ARRI/POSA3

Solum Depth*	Rooting Depth**	Loess Depth	Surface Soil depth	Site Stability	*** Summer Temp.	Depth to 35% rock fragments	%Surface rock frag.
4 in. to 9 in.	2 in. to 9 in.	0	2 in. to 8 in.	stable	---	0 to 3 in.	15% to 70%

* Depth to bedrock, paralithic contact, or unconsolidated rock material.
** Depth that includes 80% of all roots. *** Temperature at 20 in. depth.

Synecological Relationships - Many ARRI/POSA3 communities may have resulted from severe site degradation, where soil loss has occurred, allowing sagebrush to invade these bunchgrass sites with fractured basalt bedrock. Evidence of relict bluebunch wheatgrass and Idaho fescue on some areas suggest that they may be degraded FEID-KOCR or FEID-AGSP sites. Whether ARRI/POSA3 has always been climax on these sites, is speculative. On many ridges of the Wallowa Valley Ranger District, ARRI/POSA3 has probably increased from excessive sheep overgrazing at the turn of the century. Certainly ARRI/POSA3 communities predate this period as naturally occurring communities on this soil site. Types often adjacent to ARRI/POSA3 scabland are FEID-KOCR mounds, ARTRV mounds, POSA3-DAUN, and ERST2 scablands.

Role of Fire - Generally the intershrub distances coupled with discontinuous grass cover make fire a difficult tool to use. Stiff sagebrush is susceptible to fire during mid summer to late fall and can be controlled by prescribed burning where it is invading deeper soil grasslands. Sandberg's bluegrass and onespike oatgrass both are resistant to fire and may in fact respond favorably. Burning of frost-heaved Sandberg's bluegrass or onespike oatgrass sites may inflict higher damage to the grasses because of root crown exposure to the heat (Tisdale-1959).

Management Considerations - Reseeding should not be attempted for the following reasons: (1) the saturated soils coupled with severe frost heaving make seed germination and establishment very tenuous; (2) ARRI/POSA3 usually is part of a shallow soil-deep soil mosaic which can create difficulties in cultural management practices; (3) surface soil erosion may be high in many ARRI/POSA3 stands causing loss of established seedlings; (4) soil depths are too shallow; (5) sites are too rocky for mechanized equipment. Stiff sagebrush has a high value to wildlife and should not be eradicated.

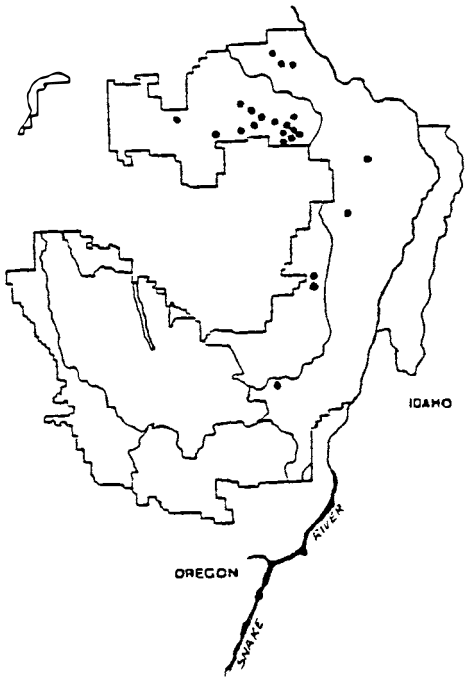
Productivity - Forage production is among the lowest of all rangeland types in the Province including those at low elevations. Among the ridgetop communities, at moderate to high elevations, ARRI/POSA3 and POSA3-DAUN produce the least amount of herbage. If shrubs are included, the total biomass production in ARRI/POSA3 is nearly equivalent to total herbage production of adjacent bunchgrass communities. The importance of these communities to grazing animals is significant despite their low production of herbage species. Because of their

position along exposed ridges where snow-melt occurs rapidly, these communities may supply the only available forage in the early spring months for big-game ungulates. Sample results indicate that total herbaceous production of about 300 lbs/acre (dry wt.) varies only slightly between late and early seral stages. Herbage production tends to increase with reduced shrub cover and frequency probably as a result of decrease in shrub competition.

Comparison with Other Studies - Daubenmire (1942-1970) first identified an ARRI/POSA3 habitat type as the most widespread scabland of the east-central Washington steppe. He described communities containing a higher average cover of stiff sagebrush and Sandberg's bluegrass than was found in the Wallowa-Snake Province. He noted that cheatgrass was the primary increaser in those stands. Cheatgrass is a poor competitor on Wallowa-Snake scablands. Hall's (1973) Blue Mountain ARRI/POSA3 is very similar to this type. Bighead clover and bottlebrush squirreltail were more common in his type than in AGSP/POSA3 stands of this study. Hironaka (1983) found a similar ARRI/POSA3 habitat type in north and west central Idaho restricted to basaltic soils. Tisdale (1986) describes a similar ARRI/POSA3 community as a minor type in the Snake River steppe of Idaho. His scabland balsamroot is Hosker's balsamroot instead of hoary balsamroot found in Wallowa County on these sites. Otherwise, his description matches the ARRI/POSA3 of this study.

Sandberg's bluegrass - onespike oatgrass plant association
Poa sandbergii - Danthonia unispicata (POSA3-DAUN) (GB91 11)

25. Vance Knoll (Wallowa Valley Ranger District) ***Plot 173***



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: all districts	Parent Material: basalt bedrock
Elevation: (4900 ft.) 4000-6000 ft.	Solum depth: (6 in.) 4-9 in.
Aspect: all	Loess depth: (0)
Slope (7%) 2-15%	Root conc: (5 in.) 3-9 in.
Position: ridge and plateau tops, ridge brows	Depth to GT 35% rock frag./size: rock to surface/ cobbles
Other: may form mosaic with FEID-KOCR types; often adjacent ARRI	Surface soil/subsoil texture: silt loam,loam/ loam, silt loam

Table of Principal Species

POSA3-DAUN (n = 23)

Species	Code	Mean foliar cover (%)/Constancy (%) Late Seral (n=6)	Mid Seral (n=9)	Early Seral (n=8)	Late to Mid Seral Range
Grasses					
*Sandberg's bluegrass	POSA3	21/100	13/100	9/100	5-30
*onespike oatgrass	DAUN	19/100	9/100	5/88	1-40
bottlebrush squirreltail	SIHYH	-	1/33	1/13	0-1
bluebunch wheatgrass	AGSP	1/33	1/56	5/38	0-1
Perennial Forbs					
hoary balsamroot	BAIN	1/17	3/78	13/50	0-5
*stonecrops	SELA2,SEST	2/100	3/100	5/88	0-10
*slenderfruit biscuitroot	LOLE	3/83	3/67	5/75	0-5
Cous biscuitroot	LOCO2	2/50	4/89	9/50	0-15
*dwarf yellow fleabane	ERCH	3/67	4/67	1/38	0-10
bighead clover	TRMA	9/33	8/44	13/63	0-25
yarrow	ACMIL	2/67	4/44	1/75	0-10
onions	ALLIU	1/33	3/67	9/63	0-5
woodrush pussytoes	ANLU	1/33	1/11	10/63	0-1
low gumweed	GRNA	1/33	1/11	1/25	0-1
Holboell's rockcress	ARHO	-	2/33	1/38	0-3
Annual Forbs					
Douglas' knotweed	PODO	8/33	7/67	6/75	0-1
white margined knotweed	POPO	8/33	10/11	-	0-1
cluster tarweed	MAGL	1/17	1/11	-	0-1
burnet	SAOC	-	-	1/50	0-1
Surface Features					
rock		48/100	52/100	36/100	15-90
*pavement		10/17	5/33	15/75	0-10
*bare ground		5/67	2/33	18/63	0-15
*moss		32/100	26/100	16/100	5-60
litter		1/100	1/89	1/88	0-3
Herbage Production (lbs/acre, dry wt.)					
Sandberg's bluegrass		120	60	55	10-210
other palatable plants		200	160	235	120-300
total		320	220	290	130-350

* Principal Indicator Species

Vegetative Composition - This type is characterized by plant communities on gentle sloping scablands of broad ridges and in mounded topography where Sandberg's bluegrass and onespike oatgrass dominate very shallow soils with a stable surface moss-rock-plant matrix. Bluebunch wheatgrass and Idaho fescue may only be associated when fractures in the underlying bedrock permit their occupation. Stonecrops (SEST, SELA2), biscuitroots (LOLE, LOCO2), dwarf yellow fleabane (ERCH), and hoary balsamroot (BAIN) are common forb members. The moss (mean: 32%) and rock (mean: 48%) coverage in late seral stages, coupled with little bare ground and pavement, defines a site which can withstand summer drought by retaining moisture within the closed plant-rock-moss surface mantle.

Onespike oatgrass (DAUN) often occurs in patches in Sandberg's bluegrass stands in areas where additional soil moisture is retained for longer periods into the summer. Sandberg's bluegrass is the more tolerant of drought and will outcompete oatgrass to form pure stands on drier sites. Shallow fractures, where seepage occurs in the basalt bedrock, often permit oatgrass to colonize downslope from water sources while only bluegrass occurs above the fracture. Vernal pools may be common in the type. These often contain a pure oatgrass bottom fringed by white marginal knotweed (POPO) and annual hairgrass (DEDA).

With disturbance, the moss-rock-plant mantle is broken resulting in exposed bare ground, loosened surface rock, and a decline in the principal grass species (POSA3, DAUN). Frost heaving increases because of the resulting increase in surface soil exposure. Bunchgrasses are often pedestalled from a combination of soil loss and frost heaving during the spring freeze-thaw period. In general, as deterioration increases toward replacement of the bunchgrass, aggressive occupation occurs by one or more of the following perennial species -- pussytoes, hoary balsamroot, bighead clover, lomatiums, stonecrops, and onions. Douglas' knotweed (PODO), gumweed (GRNA), and tarweed (MAGL) dominate in very early seral stages. Burnet, an introduced annual, has invaded aggressively on extremely degraded sites. Annual bromes have difficulty populating these disturbed scablands.

Distribution and Environmental Features - The type occurs across the flat to undulating exposed ridgetops of the dissected plateau between the Snake and Imnaha Rivers; on the north-trending ridges of the Grande Ronde River watershed north of Wallowa Valley; and on basalt flows at lower elevations along the southern flank of the Wallowa Mountains.

Sample plots range from 4,000 to 6,000 feet in elevation (mean: 4,900 feet) on gentle slopes (mean: 7%). The type occurs on very shallow soils of Upper Yakima basalt flows and is commonly associated with deeper soil FEID-KOCR communities.

Soils - Soils are typically dark brown in color in surface layers, less than 9 inches in depth; and formed in basalt bedrock and loess. Surface layers are thin and have silt loam or loam textures with greater than 35% rock fragments by volume. Subsoils may occur in some deeper soils. They are thin, have silt loam or loam textures and contain greater than 35% to occasionally greater than 60% rock fragments by volume. Clay concentrations are rare in all soil layers. Rock fragments are predominently cobble and stone-sized throughout. Surface rock usually exceeds 40% cover.

These soils are relatively uniform reflecting their limited range of sites on plateau and ridgetops. Sites above 5,000 feet in elevation may have slightly deeper soils (i.e., greater than 8 inches, but less than 10 inches). Loess influence is greatest nearer mounded topography or on areas that may once have

had deeper soils supporting more mesic plant communities. Sites supporting POSA3-DAUN, along with other scabland plant communities have the shallowest soils of all plant communities in the Province. Surface soil layers are often directly underlain by basalt bedrock.

Summary of Soil and Site Characteristics (all samples) - POSA3-DAUN

Solum Depth*	Rooting Depth**	Loess Depth	Surface Soil depth	Site Stability	*** Summer Temp.	Depth to 35% rock fragments	%Surface rock frag.
3 in. to 11 in.	2 in. to 10 in.	0	3 in. to 8 in.	stable	---	Surface	25% to 90%

* Depth to bedrock, paralithic contact, or unconsolidated rock material.
** Depth that includes 80% of all roots. *** Temperature at 20 in. depth.

Synecological Relationship - Whether POSA3-DAUN communities are climax or have resulted from severe site degradation of FEID-KOCR communities over time is speculative. Surely soil loss has occurred in some instances with invasion by the more drought-tolerant Sandberg's bluegrass and oatgrass onto these sites. The fact remains that the POSA3-DAUN sites described cannot support deeper rooted bunchgrasses. Also, POSA3-DAUN scablands have surely been a feature of the Wallowa-Snake Province steppe prior to severe degrading by sheep at the turn of the century. Thin soil sites supporting POSA3-DAUN communities are a native vegetation covering geomorphic topography of minimal soil development and deposition.

A mosaic is often found with ARRI/POSA3 and POSA3-DAUN communities. The POSA3/DAUN plant association is restricted to sites with non-fractured basalt bedrock and slight concave areas where moisture collects, or to flats with increased moisture-holding opportunities. On the other hand, ARRI/ POSA3 communities occur on sites with convex surfaces that tend to have slow percolation rates.

Role of Fire - It is difficult for fire to spread in this type based on insufficient fuel availability and typically high rock cover. In early seral stages the ability of fire to proceed is lessened by the increase in exposed soil. Sandberg's bluegrass is moderately resistant to fire following burning (Volland and Dell 1981). Onespike oatgrass would probably be more resistant to fire based on its slowness to desiccate and higher moisture content throughout the summer period.

Management Considerations - Revegetation should not be attempted as frost heaving of disturbed soil is certain. Soils are too shallow and rocky for equipment.

Sandberg's bluegrass is drought-resistant with an ability to withstand trampling. It is available early in the spring, to deer and elk, often before other plants. Sandberg's bluegrass is again available when the onset of late summer storms and early fall rains allow it to green-up. Its ability to grow, flower, and set seed early in the season while moisture is available permits the relatively shallow-rooted plants to occupy and persist on these harsh sites where summer drought is severe.

Spring use of highly saturated soils on POSA3/DAUN sites may result in trampling damage. Avoidance of these communities until after the saturation period will involve less site damage from plant displacement. Scablands are usually soft from spring moisture saturation until late June in the Wallowa-Snake Province.

Productivity - Herbage production is among the lowest of all grassland plant associations, especially in comparison to other ridgetop communities. The total herbage production of approximately 300 lbs/acre (dry wt.) in the late seral stage may remain the same in earlier successional stages, although the type of forage differs. Production of Sandberg's bluegrass is significantly less in mid and early seral communities while other forage species show a slight increase.

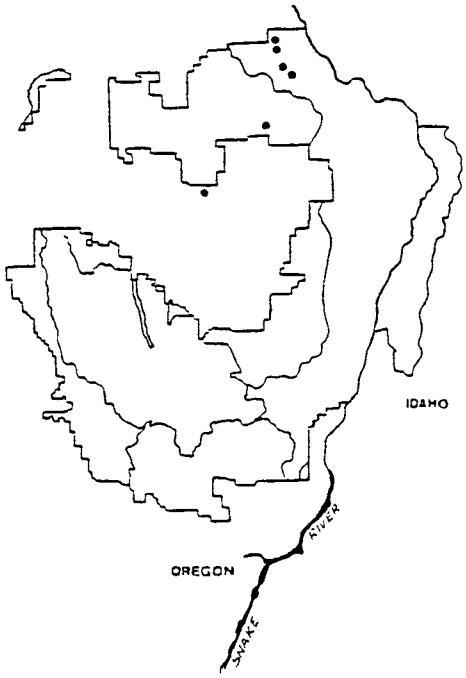
Comparison with Other Studies - Hall's (1973) "bluegrass scabland" plant association is similar to the type described here. He also recognized that unfractured bedrock prevents the occurrence by stiff sagebrush on the bluegrass-dominated scabland. His reporting of higher coverage by pussytoes (ANST), toothed balsamroot (BASE), bighead clover (TRMA), and bare ground suggests more highly disturbed samples in the Blue Mountains. Winward and Youtie (1978), in north central Oregon, identified a POSA3/LOCO2 type without onespike oatgrass. Volland (1976) described a "bluegrass scabland" in the central Oregon pumice zone synonymous with these types except for substrate and increaser species differences (i.e., barestem lomatium (LONU), small fescue (FEMI)).

"Many scientists use statistics in the way
that drunkards use lampposts, that is, they use
them more for support than for illumination."

Vogl

Douglas' buckwheat/Sandberg's bluegrass plant community type
Eriogonum douglasii/Poa sandbergii (ERDO/POSA3) (FM91 11)

26. Cold Spring Ridge (Oregon) (Hells Canyon NRA) Plot 679



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: WVRD,HCNRA	Parent Material: basalt bedrock + loess
Elevation: (4950 ft.) 4400-5400	Solum depth: (8 in.) 6-9 in.
Aspect: (SE) E-SSW	Loess depth: (0)
Slope (8%) 2-13%	Root conc: (4 in.) 3-5 in.
Position: ridge and plateau tops	Depth to GT 35% rock frag./size: rock to surface/gravels,cobbles
Other: highest elevation buckwheat type; centers on Cold Springs ridge	Surface soil/subsoil texture: silt loam,loam/loam, clay loam

Table of Principal Species

ERDO/POSA3 (n = 6)

Mean foliar cover (%)/Constancy (%)

Species	Code	Late Seral (n=2)	Mid Seral (n=2)	Early Seral (n=2)	Late to Mid Seral Range Range
Shrubs					
*Douglas' buckwheat	ERDO	20/100	30/100	9/100	10-40
Grasses					
*Sandberg's bluegrass	POSA3	18/100	13/100	9/100	10-20
*bottlebrush squirreltail	SIHYH	3/50	1/50	-	0-3
Perennial Forbs					
*stonecrops	SEST,SELA2	4/100	7/100	3/100	3/10
*slenderfruit biscuitroot	LOLE	1/100	15/50	40/50	0-15
Cous biscuitroot	LOCO2	1/50	4/100	9/100	0-5
woodrush pussytoes	ANLU	1/50	-	3/50	0-1
low pussytoes	ANDI	1/100	-	15/50	0-1
bighead clover	TRMA	-	3/50	40/50	0-3
gumweed	GRNA	-	-	1/50	-
*lovely penstemon	PEEL	1/50	1/100	-	0-3
yarrow	ACMIL	-	1/50	1/50	0-1
hoary balsamroot	BAIN	5/50	3/50	2/100	0-5
*Snake River daisy	ERDI4	-	13/100	3/50	0-15
Holboell's rockcress	ARHO	1/50	2/100	2/100	0-3
sticky phlox	PHVI3	1/50	2/100	-	0-3
Surface Features					
rock		30/100	18/100	40/100	15-40
erosion pavement		20/50	15/50	15/100	0-20
bare ground		1/50	1/100	3/100	0-1
moss		35/100	27/100	9/100	3/50
litter		1/100	1/100	1/50	1-1
Herbage Production (lbs/acre dry wt.)					
Sandberg's bluegrass		70	60	40	30-95
other species		180	290	350	180-360
total		250	350	390	250-390

* Principal Indicator Species

Vegetative Composition - Shallow soil ridgetop communities dominated by Douglas' buckwheat (ERDO) with Sandberg's bluegrass (POSA3) define this plant community type. Perennial forbs usually associated with these communities are stonecrops (SEST, SELA2), biscuitroots (LOLE, LOCO2), big-head clover (TRMA), lovely penstemon (PEEL), sticky phlox (PHVI3), Holboell's rockcress (ARHO), hoary balsamroot (BAIN), and Snake River daisy (ERDI4). As with many buckwheat communities, the ERDO/POSA3 type may be a product of past soil loss resulting from overgrazing and subsequent soil and wind erosion. With disturbance, erosion pavement and bare ground increase with a marked decline in moss cover. Forbs tending to increase are pussytoes, biscuitroots, bighead clover, lovely penstemon, and sticky phlox.

Distribution and Environmental Features - Sites supporting ERDO/POSA3 plant communities are restricted to Columbia River basalts exposed on the ridgetops of Hells Canyon NRA and the Wallowa Valley Ranger District north of Wallowa Valley. Sampled sites were on slopes less than 15% between 4,400 to 5,400 feet in elevation.

This is the highest elevation buckwheat type of the canyon steppe. It occurs conspicuously on Cold Springs Ridge as a possible reflection of higher precipitation in that area. Storms lift across the northern end of Wallowa Valley Ranger District toward Buckhorn and Mt. Wilson before resting on Cold Spring Ridge on the lip of Snake River Canyon.

Soils - Soils are typically dark brown in color in surface layers, less than nine inches in depth, and formed in basalt bedrock and loess. Bedrock fracturing permits rooting beyond the apparent solum depth. Surface layers have silt loam or loam texture with greater than 35% rock fragments by volume. Subsoils have loam or silty clay loam texture and contain greater than 35% rock fragments. Rock fragments are predominantly gravel-sized in surface layers and cobble to boulder-sized in subsoil layers. Exposed surface rock usually exceeds 30% cover.

Uniformity of soils and site is typical in this type although rock fragment size may vary considerably depending upon weathering and nature of fracturing of the parent rock. The soil is only slightly deeper than that found in ARRI/POSA3 and POSA3/DAUN communities, but development may be greater. This is indicated by the presence of clay concentrations or development of a subsoil in most soils.

Synecological Relationship - ERDO/POSA3 thin-soil communities were generally surrounded by a mosaic of plant communities located on deeper soils derived from loess deposition (i.e., FEID-KOCR, ARTRV/FEID and ARTRV-SYOR mounds). ERDO/POSA3 differs from the other scabland buckwheat type (ERST2/POSA3) by having twice the average soil depth, occurring at a higher average elevation, and having a more abundant species composition.

Stiff sagebrush apparently cannot colonize ERDO/POSA3 sites because of the underlying fracture pattern of basalt bedrock. Fissures, although present, were too few or too shallow to permit ARRI/POSA3. ARRI/POSA3 occurs on bedrock which is highly fractured allowing the sagebrush roots to penetrate to greater depths.

Role of Fire - As with other scabland types, fire will not carry well through these rocky sites where plants are arranged spatially, forming a discontinuous plant-rock-soil-moss matrix.

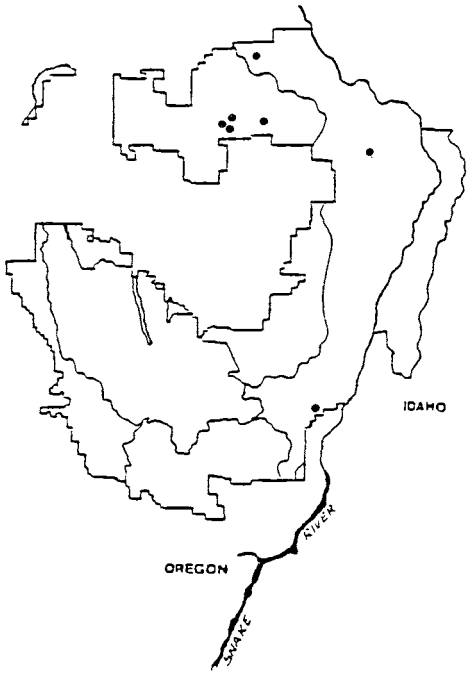
Management Guidelines - These sites are too rocky and too severe for consideration in revegetation efforts. Frost heaving potential and surface erosion increase with soil disturbance. Avoid impacting these communities when soils are saturated with water in late spring and early summer. Season of domestic livestock use should be after early July when the higher elevation ridges are open and range vegetation is phenologically ready.

Productivity - Production of Sandberg's bluegrass is less than in POSA3-DAUN communities, but greater than in ERST2/POSA3 and ARRI/POSA3 communities. On sample plots, Douglas' buckwheat averaged 665 lb/acre biomass of herbage and browse (range: 63-1,275 lbs) and Sandberg's bluegrass averaged 65 lbs/acre (range: 30-95 lbs.). ERDO/POSA3 communities produce 1,000 lbs/acre biomass vs 170 lbs/acre in ERST2/POSA3 communities. Total herbage production is similar to other scabland communities.

Comparison with Other Studies - Daubenmire (1970) described an ERDO/POSA3 habitat type flanking the Cascades in the basin big sagebrush and bitterbrush zones in Washington. However, only three perennial plants other than Douglas' buckwheat and Sandberg's bluegrass were in common with the ERDO/POSA3 of northeast Oregon.

Strict buckwheat/Sandberg's bluegrass plant community type
Eriogonum strictum/Poa sandbergii (ERST2/POSA3) (FM91 12)

27. Red Hill Ridge Near Sumac Creek Canyon (Wallowa Valley Ranger District) *Plot 75*



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA,WVRD	Parent Material: basalt bedrock
Elevation: (4600 ft.) 4200-5100	Solum depth: (5 in.) 2-7 in.
Aspect: (SW) SW to SW	Loess depth: (0)
Slope: (18%) 4-30	Root conc: (3 in.) 2-4 in.
Position: (ridgebrows) upper 1/3 slopes, to ridgebrows	Depth to GT 35% rock frag./size: rock to surface/gravels
Other: shallowest mean soil depth of all bunchgrass types	Surface soil/subsoil texture: sandy loam/rock silty clay loam

Table of Principal Species

ERST2/POSA3 (n = 7)

Species		Mean Foliar Cover (%)	Constancy (%)	Range
Shrubs				
*strict buckwheat	ERST2	14	100	3-40
gray rabbitbrush	CHNA	2	57	0-3
Grasses				
bluebunch wheatgrass	AGSP	4	71	0-10
*Sandberg's bluegrass	POSA3	9	100	1-15
bottlebrush squirreltail	SIHYH	2	43	0-3
rattlesnake brome	BRBR	1	71	0-3
cheatgrass	BRTE	1	71	0-1
Perennial Forbs				
dwarf yellow fleabane	ERCH	2	57	0-3
*stonecrops	SEST,SELA2	2	71	0-3
clustered broomrape	ORFA2	1	43	0-1
common eriophyllum	ERLA	1	57	0-1
Holboell's rockcress	ARHO	1	57	0-1
yarrow	ACMIL	1	71	0-3
Annual Forbs				
Douglas' knotweed	PODO	5	71	0-15
Surface Features				
rock		18	100	3-50
pavement		48	86	0-90
moss		13	86	0-40
litter		1	86	0-1

Herbage Production (lb/acre dry wt.)	All Plots
bluebunch wheatgrass	40
Sandberg's bluegrass	35
other species	35
total	110

* Principal Indicator Species

Vegetative Composition - Strict buckwheat often occurs where soil has been severely eroded leaving an erosion pavement and where underlying fractures in the basalt favor a deep-rooted species. Vegetation cover in these communities is minimal; usually less than 10%. Strict buckwheat (ERST2) in association with Sandberg's bluegrass (POSA3) defines the type. Bluebunch wheatgrass is often present on deeper soil inclusions. Bottlebrush squirreltail (SIHYH) may occur and Henderson's ricegrass (ORHE), a plant with specific affinities to this type, is occasionally present. Perennial forbs often associated are dwarf yellow fleabane (ERCH), stonecrops (SEST, SELA2), Holboell's rockcress (ARHO), yarrow (ACMIL), and clustered broomrape (ORFA2). The broomrape is apparently parasitic on stonecrops. Annuals occurring frequently, but with low coverage, are Douglas' knotweed (PODO) and annual bromes (BRBR, BRTE).

Distribution and Environmental Features - ERST2/POSA3 communities occur on ridge brows, windswept saddles and other eroded portions of the dissected plateau throughout Hells Canyon NRA and Wallowa Valley Ranger District. Elevations range from 4,200 to 5,100 feet (mean: 4,600 feet) on southerly aspects. Slopes are moderately steep (mean: 18%). The slope and exposure coupled with the shallow soils equate to a harsh environment for growing plants. Erosion pavement and surface rock predominate without interruption in this type. Moss coverage is low.

Soils - Soils are typically dark brown to dark reddish brown in color in surface layers, less than 7 inches deep, and formed in basalt bedrock. Surface layers have sandy loam textures with greater than 35% rock fragments by volume. Rock fragments are predominantly gravel-sized. Subsoil layers are usually absent. Surface rock usually exceeds 45% cover. These soils are among the shallowest of all bunchgrass types.

Basalt bedrock fracturing is high with resultant platy configuration. Strict buckwheat roots penetrate between the plates in a vertical plane. Fracture depth apparently does not permit stiff sagebrush to invade these sites.

Successional Relationship - Strict buckwheat communities have probably resulted from retrogression of more mesic grasslands. This has been hastened by poor distribution and overgrazing by domestic stock over time. Strict buckwheat was probably an occasional component of grasslands on the ridgetops before heavy degradation. As the grasses were eliminated, the buckwheat was able to colonize on fractured basalt locations. With continued surface soil loss, the grass component was gradually lost with only Sandberg's bluegrass able to persist as the dominant shallow-rooted, drought-resistant species among the strict buckwheat plants.

Synecological Relationship - ERST2/POSA3 sites are generally surrounded by a mosaic of deeper soil, loess-derived communities (i.e., FEID-KOCR) or by other thin soil types (i.e., AGSP/POSA3, ARRI/POSA3). ERST2/POSA3 differs from ERDO/POSA3 by having shallower soils, a generally lower mean elevation, and a more restricted species list. ERIOG/PHOR communities occur lower in elevation than the typical ridgetop orientation of ERST2/POSA3 community.

Management Guidelines - ERST2/POSA3 sites are generally too restricted and too severe for intensive management considerations. The biggest problem in this type is rill erosion initiated by animal trafficking across the erosion pavement surface. Many ERST2/POSA3 communities occur in areas of concentrated animal use and are eroding badly. The community is too rocky with insufficient foliar cover to carry fire. These communities are effective natural fire breaks.

Productivity - This is the least productive of all the steppe types, except for ERIOG/PHOR communities. Sandberg's bluegrass accounts for only 40 lbs/acre herbage in late through early seral communities. Total browse ranges from 120 to 200 lbs/acre.

Comparison with Other Studies - This type has not been previously described.

Shrublands - Characterized by shrub dominance, without tree association or tree successional potential.

1a. Elevations usually above 3,500 feet 2

2a. Mountain big sagebrush (ARTRV) present 3

3a. Mountain snowberry (SYOR) associated 4

4a. Bitterbrush (PUTR) associated . . . . . ARTRV-PUTR/FEID (p. 163)

4b. Bitterbrush absent . . . . . ARTRV-SYOR/BRCA (p. 164)

3b. Mountain snowberry absent or present as scattered individuals (less than 5% cover) 5

5a. Elk sedge dominates with absence of Idaho fescue . . . . . ARTRV/CAGE (p. 162)

5b. Elk sedge absent; Idaho fescue, bluebunch wheatgrass, or Kentucky bluegrass dominate beneath the shrubs . . . . . ARTRV/FEID (p. 159)

2b. Mountain big sagebrush absent 6

6a. Bitterbrush present 7

7a. Idaho fescue present (coverage greater than 5%) . . . . . PUTR/FEID-AGSP (p. 167)

7b. Idaho fescue absent or coverage less than 5%) . . . . . PUTR/AGSP (p. 172)

6b. Bitterbrush absent 8

8a. Western juniper (JUOC) present . . . . . JUOC/FEID-AGSP (p. 183)

8b. Western juniper absent 9

9a. Ninebark (PHMA) present with absence of Douglas-fir (PSME) . . . . . PHMA shrublands (p. 177)

9b. Ninebark absent 10

10a. Mountain snowberry present 11

11a. Squawapple associated . . . . PERA3-SYOR (p. 176)

11b. Squawapple absent . . . . . SYOR (p. 165)

10b. Mountain snowberry absent 12

12a. Common snowberry (SYAL) present . . . . . SYAL/ROSA (p. 187)

12b. Common snowberry absent 13

13a. Mountain-mahogany (CELE) dominates . . . . . CELE communities (p. 192)

13b. Mountain-mahogany absent 1b

1b. Elevations generally below 3,500 feet 14

14a. Tall shrubs (greater than 3 ft. tall) dominate; bluebunch wheatgrass present at greater than 10% cover 15

15a. Smooth sumac (RHGL) present . . . . . RHGL/AGSP (p. 201)

15b. Smooth sumac absent 16

16a. Netleaf hackberry (CERE2) present CERE2/AGSP (p. 198)

16b. Hetleaf hackberry absent 17

17a. Bitterbrush present . . . . . PUTR/AGSP (p. 172)

17b. Bitterbrush absent 18

18a. Mountain-mahogany dominant over green-bush or green-bush absent . . . . . CELE (p. 192)

18b. Green-bush present in absence of mountain-mahogany . . . . GLNE/AGSP (p. 195)

14b. Low shrubs dominate (less than 3 feet tall); bluebunch wheatgrass absent or present at less than 10% cover 19

19a. Common snowberry present with rose usually associated . . . . . SYAL-ROSA (p. 187)

19b. Common snowberry absent; highly weathered basalts with buckwheats and drought-tolerant forbs (i.e., desert evening primrose, bladderpod). . ERIOG/PHOR (p. 205)

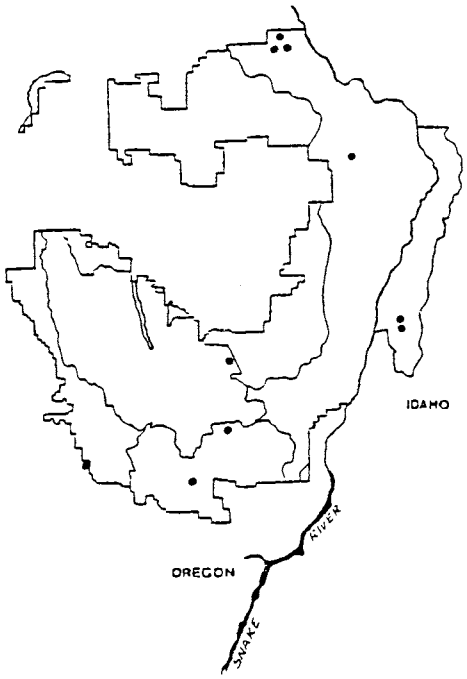
Summary of Plant Association and Community Type Characteristics 1/

Plant Community Type	Elevation (feet)	Slope Position	Aspect	Slope	Parent Material	(2) Soil Depth Total (in.) Rt. Conc.	Principal Indicators	Principal Increasers/ Invaders	(3) Forage (lbs./acre) dry
ARTRV/FEID	4500-7900 (6200)	tops to upper slope	all	1-55% (24%)	basalt, granodiorite	12-28 (21) 10-16 (13)	ARTRV,FEID CAHO,KOCR	BRCA,ERHE/ POPR,LUPIN	(425) 230-625
ARTRV-SYOR/ BRCA	5400-7000 (6425)	tops to upper slope	all	1-65% (35%)	Loess-ash various	----- -----	ARTRV,SYOR BRCA,POPR	BRCA,POPR/ OSOC,CYTEF	(800) 600-1000
PUTR/FEID-AGSP	4000-5800 (5200)	lower to upper slope	S	35-65% (54%)	Loess + basalt	6-12 (10) 7-13 (10)	PUTR,FEID AGSP,ERHE	POSA3,BASA/ CLPU,GAAP	(520) 350-690
PUTR/AGSP	1900-4500 (3050)	mid to upper slope	ESE-W	15-75% (55%)	basalt	5-10 (7) 10-15 (12)	PUTR,AGSP POBU,GAMU	POSA3,LOMAT/ EPPA,CLPU	(535) 300-900
PIMA-SYAL	3700-4500 (4100)	mid to upper slope	NW-NE	67-81% (73%)	Loess + basalt colluvium	-- (51) -- (24)	PIMA,SYAL ROSA,AGSP	AGUR,PEGA2/ GAAP,BRBR	---- ----
JUOC/FEID-AGSP	3600-4400 (4200)	mid to upper slope	SE-SW	50-75% (63%)	basalt	9-19 (13) 13-19 (16)	JUOC,FEID RICE,PEFRS	BASA,SEDUM/ ERLA,CAHI2	(270) 210-340
SYAL-ROSA	2200-4100 (2750)	lower to mid slope	NE-NW	15-94% (50%)	Loess + basalt colluvium	60-80 (70) 16-59 (32)	SYAL,ROSA FEID,FRAL2	CEAR,ACMIL/ HYPE,POPR	(55) 0-220
GLNE/AGSP	1800-2900 (2350)	lower to upper slope	SE-NE	56-85% (70%)	various	3-9 (6) 3-19 (8)	GLNE,AGSP PETR,ERPU	CEAR,ACMIL/ OPPO,FEME	(290) 160-440
CERE2/AGSP	1110-1600 (1375)	lower slope	SE-SW	15-43% (27%)	various	---- ----	CERE2,AGSP BRTE,ERPU	BRTE,GAAP/ RHRA,BRST	---- ----
RHGL/AGSP	1350-2800 (2100)	lower slope footslope	E-W	10-75% (50%)	colluvium various	40-58 (50) 12-39 (28)	RHGL,AGSP SCAN,PHHE	BRTE,GAAP/ HYPE,TOFL2	(360) 200-540
ARTRV/CAGE	7000-7400 (7200)	upper slope	SE	45-60% (53%)	andesite	---- ----	ARTRV,CAGE CAHO,STOC	ERHE,POGL/ SIHY,STOC	---- ----
ARTRV-PUTR/ FEID	3600-4400 (4000)	tops to upper slope	all	10-20% (14%)	basalt	---- ----	ARTRV,PUTR FEID,KOCR	AGSP,ERHE/ CLPU, BROMES	---- ----
SYOR	4200-6900	tops to upper slope	all	1-70% (21%)	Loess + basalt	---- ----	SYOR,BRCA AGUR,POGL	ERHE,CAHI2 MAGL,POPR	---- ----
PERA3-SYOR	4200-4500 (4400)	mid to upper slope	S-W	10-20% (15%)	Loess + basalt colluvium	---- ----	PERA3,SYOR KOCR,AGSP	ERHE,BASA/ AGUR,CHNA	---- ----
Talus Garlands	3600-4600 (4050)	mid to upper slope	SE-SW	28-82% (63%)	basalt talus	---- ----	PHLE2,HODI PRUNUS,ACGL	PHHE,SCAN/	---- ----
CELE	900-5900 (2700)	lower to upper slope	all	28-100 (65%)	sedimentary, basalt, metavolcanics	____ ____	CELE,AGSP	CEAR,BASA/	---- ----
ERIOG/PHOR	1400-2400 (2100)	lower slope	S	38-50% (42%)	basalt	3-5 (4) 4-7 (5)	ERMI,ERSTP PHOR,OECA2	PHHE,CRIN3/ OPPO,BRTE	9-98 (26)

1/ Range and mean (no.)
2/ Total soil depth and depth of root concentration (80% of roots)
3/ Forage production in mid and late seral communities

Mountain big sagebrush/Idaho fescue plant association
Artemisia tridentata vaseyana/Festuca idahoensis
(ARTRV/FEID) (SD29 11)

28. Deep Creek Basin, Seven Devils (Hells Canyon NRA) Plot 7068



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA, WVRD, PRD	Parent Material: basalt, granodiorite
Elevation: (6200 ft.) 4500-7900 ft.	Solum depth: (21 in.) 12-28 in.
Aspect: All	Loess depth: mixed
Slope (24%) 1-55%	Root conc: (13 in.) 10-16 in.
Position: ridgetop to upper 1/3 slopes	Depth to GT 35% rock frag./size: rock to surface/gravels
Other: Common on steep subalpine slopes of Seven Devils - Idaho + ridgetops in Oregon.	Surface soil/subsoil texture: silt loam/loam, silt loam

Table of Principal Species

ARTRV/FEID (n = 10)

Mean foliar Cover (%)/Constancy (%)

Species	Code	Steep High Elev. (n=4)	Gentle Mid Elev. (n=6)	Total Range
Shrubs				
*mountain big sagebrush	ARTRV	35/100	41/100	5-65
Grasses				
*Idaho fescue	FEID	15/100	2/33	0-20
bluebunch wheatgrass	AGSP	18/50	2/50	0-25
Wheeler's bluegrass	PONEW	1/50	--	0-1
western needlegrass	STOC	1/50	1/33	0-1
Kentucky bluegrass	POPR	-	36/67	0-65
*mountain brome	BRCA	8/50	2/100	0-15
Hood's sedge	CAHO	2/50	-	0-3
Forbs				
rosy pussytoes	ANRO	1/50	4/67	0-5
western hawkweed	HIAL2	3/50	-	0-5
lupines	LUCA,LUSE	6/75	8/100	0-15
groundsel	SEIN	4/75	2/50	0-10
tapertip hawksbeard	CRAC	2/50	-	0-3
*Wyeth's buckwheat	ERHE	25/75	8/83	0-70
yarrow	ACMIL	10/75	6/83	0-20
wayside gromwell	LIRU	-	2/50	0-3
Surface Features				
rock		10/75	4/50	0-20
gravel		13/100	9/33	0-45
bare ground		7/100	7/100	1-20
moss		2/50	3/33	0-3
litter		23/100	38/83	0-90

*Principal Indicator Species

The mountain big sagebrush/Idaho fescue plant association is separated topographically into a steep slope type found at higher elevations in the Wallowa and Seven Devils Mountains and a gentle ridgetop type at moderate elevations across the dissected plateau tops of Hells Canyon NRA.

ARTRV/FEID (steep, high) - In late seral stands Idaho fescue is the principal associate with mountain big sagebrush. With degradation, fescue declines while the following plants increase: mountain brome (BRCA), Hood's sedge (CAHO), Wyeth's buckwheat (ERHE), yarrow (ACMIL), and groundsel (SEIN). Heavy site deterioration results in dramatic increases by tailcup lupine (LUCA) and Wyeth's buckwheat (ERHE).

Fescue has been eliminated by past sheep abuse in many of these subalpine-montane sagebrush communities. In highly disturbed communities, Wyeth's buckwheat, mountain brome, yarrow, and golden buckwheat (ERFL) often replace the Idaho fescue. However, Hood's sedge tends to remain intact on moist concavities and deeper soil areas with Idaho fescue.

This high elevation type occurs on shallow gravelly soils from 7,700 to 7,900 feet in elevation, and on southwesterly aspects. Slopes average 40%. Total herbaceous production from two sampled sites ranged from 200 to 600 lbs./acre (dry wt.).

ARTRV/FEID (gentle, moderate) - These gentle ridgetop communities are generally in early and very early seral stages from past overgrazing. Idaho fescue, bluebunch wheatgrass, and prairie junegrass are relict while the dominant associate beneath the sagebrush is Kentucky bluegrass (POPR). Other frequent associates are mountain brome (BRCA), red besseya (BERU), lupines (LUSE, LUCA), yarrow (ACMIL), rosy pussytoes (ANRO) and Wyeth's buckwheat (ERHE). Over utilization on these sites has resulted in dense stands of Kentucky bluegrass (up to 60% cover) and severe increases in lupines (LUSES, LUCA) and showy fleabane (ERSP).

Environmental Features - The type occurs from 4,000 to 6,000 feet in elevation on gently-sloping ridgetops (usually less than 15% slope). The sagebrush occupies mounded topography as well as deep-soil non-mounded tops.

Management Considerations - Steep slope and gentle ridgetop ARTRV/FEID communities have been severely grazed by sheep and cattle. In addition, elk herds also make current use of these sites. Fire often kills basin big sagebrush, but mountain big sagebrush withstands burns better and sprouts following fire.

Comparison with Other Investigators - Schlaterer (1970) identified a floristically similar ARTRV/FEID type in south-central Idaho that had strong affinities to glaciated lands. The steep, high ARTRV/FEID communities of this study also occur on glaciated landscapes having coarse-textured soils.

Mountain big sagebrush/elk sedge plant community type
Artemisia tridentata vaseyana/Carex geyeri
(ARTRV/CAGE) (SD29 15) (n = 2)

This type is very limited in occurrence in Hells Canyon NRA. The type was encountered only in the Six Lakes Basin - Black Lake vicinity in the Seven Devils. Elk sedge dominated (mean cover: 50%) beneath sagebrush with only trace amounts of Hood's sedge (CAHO). Other frequently occurring plants were: western needlegrass (STOC), bottlebrush squirreltail (SIHY), cinquefoil (POGL), western hawkweed (HIAL2), Wyeth's buckwheat (ERHE), alpine fleeceflower (POPH), and silky lupine (LUSES). This community was found above 7,000 feet elevation on steep southeasterly slopes.

The Six Lakes Basin - Black Lake area has always been summer sheep range and thus it is possible that the elk sedge may have aggressively occupied overgrazed ARTRV/FEID sites. Elk sedge, however, was not encountered in any sampled stands of the ARTRV/FEID type in the Seven Devils, and it would appear that the types have unique environmental characteristics, although both sites are found on morainal material and share many compositional similarities.

Mountain big sagebrush - bitterbrush/Idaho fescue plant community type
Artemisia tridentata vaseyana - Purshia tridentata/Festuca idahoensis (ARTRV-PUTR/FEID) (SD29 16) (n = 5)

Bitterbrush can be found occurring with mountain big sagebrush as a transitional shrubland type between cold desert sagebrush-dominated vegetation and ponderosa pine-Douglas-fir forested vegetation on the south flank of the Wallowa Mountains. Late seral stands may be characterized by the sagebrush dominating bitterbrush with Idaho fescue and prairie junegrass abundant beneath (mean: 30%). Associated perennial forbs occur but at low coverage (i.e., yarrow, Wyeth's buckwheat, lupine). Mid seral stands are portrayed by mountain big sagebrush dominance over bitterbrush (2:1) with reduction in fescue and junegrass (mean: 10%). Bluebunch wheatgrass (always present) increases along with yarrow and Wyeth's buckwheat. Degraded stands in an early seral stage are exemplified by dominant sagebrush with mountain snowberry over a near grass-less vegetation where Wyeth's buckwheat has increased dramatically. Annuals may be more prominent (i.e., deerhorn (CLPU) and brome (BRCO)).

Distribution and Environmental Features - Communities in the ARTRV-PUTR/FEID type occur on the mid to low elevation plateau along the southern flank of the Wallowas. Sites are typically gentle sloping ridgetops or ridgebrows with convex microrelief. Elevations range from 3,600 to 4,400 feet (mean: 4,000).

Management Considerations - Two three-way exclosures located near Corral Gulch and above Goose Creek Canyon on the south flank of the Wallowas contained these communities. The game-proof exclosure at Goose Creek contained more abundant and vigorous grasses (FEID, AGSP, KOCR). The lack of fire and grazing pressure did not affect the density of the two shrubs inside and out, but both shrubs were more heavily deformed by extensive browsing outside the game exclosure. At Corral Gulch, the game-proof exclosures demonstrated increased sagebrush from protection over a 17-year period. The stock exclosure had received heavy use by game species resulting in hedged bitterbrush and dramatic occupation by Wyeth's buckwheat. Both shrub species are susceptible to fire; however, use of fire when the site is moist may consume non-shrub vegetation and benefit shrub regeneration. The diversity of these transitional communities should be promoted for their wildlife value. Deer, elk, ground squirrels, robins, meadowlarks, and grouse use these communities.

Comparison With Other Investigators - Hall (1973) includes big sagebrush in his bitterbrush-bunchgrass plant association as an increasing climax species on drier sites of the type. Volland (1976) also describes a similar plant community on the east slope of the Cascades at higher elevations (4,600 to 5,900 feet).

Mountain big sagebrush-mountain snowberry/mountain brome plant community type
Artemisia tridentata vaseyana - Symphoricarpos oreophilus/Bromus carinatus
(ARTRV-SYOR/BRCA) (SD29 17) (n = 7)

Mountain snowberry occurs with mountain big sagebrush on ridgetop mounds, ridge brows, and cornices as a transitional type between fir-dominated forest communities and grasslands. These shrub-dominated communities are usually heavily degraded from overgrazing due in part to their locations as "edge" for wildlife and shading for domestic stock. Idaho fescue probably occurred beneath the shrubs at one time, but has generally been replaced by Kentucky bluegrass (POPR) and mountain brome (BRCA).

ARTRV-SYOR/BRCA (mounds) - Ridgetop mounds are found with mountain big sagebrush and mountain snowberry dominating a forb-grass layer which reflects heavy past abuse. Mountain brome is always present at low coverage levels with weedy moist-site forbs (i.e., sticky geranium (GEVI), cinquefoils (POGR, POGL), leafy aster (ASFO), groundsel (SEIN), and penstemons). Idaho fescue has either been replaced by Kentucky bluegrass, the perennial forb group, or annual forbs (especially blue-eyed Mary (COPA) and cleavers (GAAP), over a barren soil surface.

ARTRV-SYOR/BRCA (slopes) - Steep montane sideslopes at high elevations can contain this community. All sampled locations had been heavily overgrazed as demonstrated by the lower seral stage vegetation associated with the sagebrush and snowberry shrubbery. Mountain brome and oniongrasses (MEBU, MESP) were always present but in low abundance. Weedy forbs dominated early seral stands beneath the shrubs (i.e., horsemint (AGUR), lupine (LUCA, LUSE, LULA2), asters (ASFO, ASIN), and Wyeth's buckwheat (ERHE). Very early seral stands are devoid of palatable grasses and may contain abundant stands of western sweet cicely (OSOC), penstemons, and cymopterus (CYTEF) on a rocky surface with high exposure of bare ground.

Distribution and Environmental Features - Mountain big sagebrush and mountain snowberry populate deep (greater than 36 inches) ash-influenced soils of mounded topography on the major ridgetops (i.e., Cold Springs, Beeler) of Hells Canyon NRA. The mounded sites are found on gently sloping ridgetops between 5,000 to 6,000 feet in elevation. Total herbage production on two sampled plots ranged from 600 to over 1,000 lbs./acre (dry wt.).

Montane slopes, brows, and cornice locations of ridges in Hells Canyon NRA and on the south flank of the Wallowa uplift contain ARTRV-SYOR/BRCA stands. Stands sampled were between 6,000 and 7,000 feet in elevation.

Comparison with Other Investigators - Hironaka (1983) described three ARTRV-SYOR habitat types containing bluebunch wheatgrass, Idaho fescue and elk sedge as subordinate members. His ARTRV-SYOR/FEID habitat type appears to be similar except that there needlegrass (STIPA) is an increaser with disturbance instead of Kentucky bluegrass, perhaps reflecting drier sites in that sampled area. Prairie junegrass and oniongrass are two grasses he found consistently with Idaho fescue.

Management Considerations - Both shrub species should resprout following fire. Though most sagebrush species are susceptible to fire mortality, mountain big sagebrush withstands burning better and generally resprouts following fire (Hironaka-1977). The community has an important wildlife value in providing diversity between two different habitats -- forest and grassland. Additionally, the variety of associated plants provides a rich mixture of food sources for both birds and mammals. Deer, elk, ground squirrels, grosbeaks, robins, and Franklin's grouse use these communities. The wildlife value represented by this type will probably exceed other resource values.

Mountain snowberry plant community type
Symphoricarpos albus (SYOR) (SM32) (n = 7)

Mountain snowberry (Symphoricarpos oreophilus) occurs as a dominant species in some transitional communities between forest and grassland. It also commonly occurs beneath ponderosa pine and Douglas-fir as an ecotonal type and encroaches onto grasslands at the forest fringe. Two physiographic sites occupied by the shrub community are described here -- mounded topography and steep canyon slopes.

Mountain snowberry mounds - (n = 4)

Mounded topographies adjacent to forested ridgetops are often populated by mountain big sagebrush and/or mountain snowberry. Many of these mounds have severely eroded from heavy animal use concentrated in areas near forested cover. As a result, Kentucky bluegrass (POPR) has replaced what was probably a fescue-dominated stand. Mountain brome is always present as is horsemint (AGUR), red avens (GETR), strawberries (FRVE, FRVI), yarrow (ACMIL), and cinquefoil (POGL). Other important increasing forbs are Wyeth's buckwheat (ERHE), harsh paintbrush (CAHI2), and showy fleabane (ERSPM). Tarweed (MAGL) invades these sites and is especially prolific on the aprons of the mounds where frost-heaved soils are easily eroded.

Ungulate use in mounded snowberry communities has enabled Kentucky bluegrass to invade and dominate with increases in weedy perennial forb species. Attraction to the mounds has been due to their desirable forage lasting longer into the summer drought period when vegetation on surrounding scablands has dessicated. Also, the deep soil mounds are softer and readily adjacent to shading areas while the scabland matrix surrounding the mounds is stoney. Gopher activity on the mounds is high and may account for dense patchiness by increasing forbs.

Canyon slope mountain snowberry - (n = 3)

These communities occur at high elevation (4,200-6,900 feet) slope positions on the upper third of montane and canyon ridges. Here snow cornices and seepages linger on easterly sites providing the opportunity for snowberry to occupy inter-rims and ridge brows on basaltic substrates. These communities are very productive and contain a rich forb component consisting of asters (ASFO, ASIN), little sunflower (HEUN), horsemint (AGUR), cinquefoil (POGL), and buckwheat (ERHE). Two tall grasses regularly occur in these communities -- mountain brome (BRCA) and blue wildrye (ELGL).

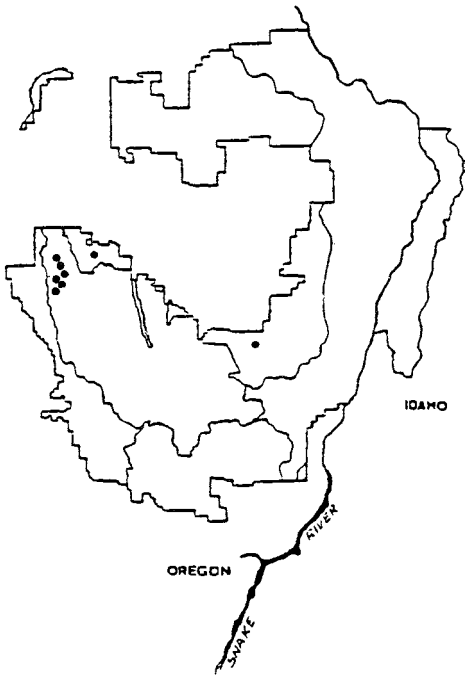
Soils sampled on two mounded sites showed total depths averaging around 35 inches. Snowberry roots were estimated to penetrate to approximately 47 inches in basaltic bedrock fissures.

Role of Fire - Probably limited due to the isolated nature of the vegetation on mounds. Canyon brows and upper slopes are often too rocky for continuous fire movement. Mountain snowberry should resprout following fire, but grass vigor should also be increased and may cause a retrogression to the shrubbery.

Management Considerations - The type is limited in extent. The highest value of these communities to resource managers is as diverse "edge". They produce important forage and seeds for wildlife. Deer, elk, grouse, ground squirrels, and a variety of songbirds use these sites. Reseeding practices may not be cost efficient due to the steep canyon slopes where sites are limited in extent and to limited area covered by mounded topography. Mounds may naturally reseed with existing grass vegetation.

Bitterbrush/Idaho fescue-bluebunch wheatgrass plant association
Purshia tridentata/Festuca idahoensis - Agropyron spicatum
(PUTR/FEID-AGSP) (SD31 11)

29. Little Sheep Ridge North of Fawn Creek (Eagle Cap Wilderness Area) *Plot 1136*



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: All Districts	Parent Material: basalt bedrock + loess
Elevation: (5200 ft.) 4000-5800 ft.	Solum depth: (10 in.) 6-12 in.
Aspect: (S) SSE-SSW	Loess depth: mixed
Slope (54%) 35-65%	Root conc: (10 in.) 7-13 in.
Position: (upper 1/3) interim at lower 1/3 slopes to ridge brows	Depth to GT 35% rock frag./size: rock to surface/stones, cobbles
Other: Centers on steep slopes of Minam river in northern Wallowa mountains.	Surface soil/subsoil texture: silt loam, silty clay loam/ silty clay

Table of Principal Species

PUTR/FEID-AGSP (n = 8)

Mean foliar Cover (%)/Constancy (%)

Species	Code	Late Seral (n=1)	Mid Seral (n=4)	Early Seral (n=3)	Late-Mid Seral Range
Shrubs					
*bitterbrush	PUTR	15/100	9/100	6/100	5-15
Grasses					
*bluebunch wheatgrass	AGSP	30/100	18/100	15/100	15-30
*Idaho fescue	FEID	10/100	10/100	4/100	10-10
Sandberg's bluegrass	POSA3	-	2/100	5/33	0-5
Perennial forbs					
*Wyeth's buckwheat	ERHE	3/100	3/100	2/67	1-5
grounsel	SEIN	-	2/75	1/33	0-5
arrowleaf balsamroot	BASA	-	20/50	15/100	0-25
hot rock penstemon	PEDE	-	4/100	10/67	0-5
*fern-leaved lomatium	LODIE	1/100	6/50	2/67	0-10
Oregon checker-mallow	SIOR	-	2/50	1/33	0-3
yarrow	ACMIL	1/100	2/100	1/100	1-3
varileaf phacelia	PHHE	-	2/75	-	0-3
Annual Forbs					
blue-eyed Mary	COPA	-	1/75	1/67	0-1
deerhorn	CLPU	1/100	2/75	1/33	0-5
tall annual willowweed	EPPA	-	1/50	10/33	0-1
cleavers	GAAP	-	2/75	1/33	0-5
Surface Features					
rock		10/100	18/100	8/100	5-50
gravel		5/100	16/100	23/100	5-25
bare ground		10/100	10/100	25/100	1-20
moss		25/100	2/75	6/67	0-25
litter		30/100	31/100	5/100	10-60
Herbage Production (lbs/acre dry wt.)					
Idaho fescue		190	100	-	40-190
bluebunch wheatgrass		200	210	-	190-230
other species		130	220	-	100-370
total		520	530	-	350-690

*Principal Indicator Species

Vegetative Composition - Bitterbrush occurs with Idaho fescue and bluebunch wheatgrass in the canyons on the north flank of the Wallowas. Late seral stands can be portrayed with bitterbrush shrubs scattered over an Idaho fescue and bluebunch wheatgrass-dominated grassland. The ground surface is characterized by low gravel and bare ground cover with high plant, litter, and moss coverage. As these communities are degraded, mid seral stands show declining coverage by bitterbrush, bluebunch wheatgrass, and moss. Sandberg's bluebrass (POSA3) increases along with an increase in exposed surface rock and gravel. Annual forbs populating these more degraded sites are deerhorn (CLPU), cleavers (GAAP), blue-eyed Mary (COPA), and tall annual willowweed (EPPA). Perennial forbs increasing with the disturbance are arrowleaf balsamroot (BASA), hot rock penstemon (PEDE), and fern leaved lomatium (LODIE). Early seral stands are characterized by decreased bitterbrush (often severely hedged), Idaho fescue and bluebunch wheatgrass. Increasing are Sandberg's bluegrass, balsamroot, hot rock penstemon, gravel, and bare ground.

Distribution and Environmental Features - Communities in the PUTR/FEID-AGSP plant association are restricted to steep canyon slopes of the north flank of the Wallowa Mountains. Individual sites are normally small. The most extensive stands occur in the lower Minam drainage. Elevations range from 4,000 to 5,800 feet (mean: 5,200 feet) and slopes from 35 to 65% (mean: 54%). Sites are typically inter-rims on the upper third of slopes, but may occur across all south-facing slope segments. Microrelief is convex to slightly undulating.

Soils - Soils are typically dark reddish brown in color in surface layers, less than 12 inches in depth, and formed in basalt bedrock with minor amounts of loess. Weathered bedrock below the soil material provides a deeper rooting zone for the bitterbrush. Surface soil layers have silty clay loam to silt loam textures with greater than 35% rock fragments by volume. Subsoils extend into the parent material, have silty clay textures, and contain greater than 35% to occasionally greater than 60% rock fragments by volume. Stone and cobble-sized rock fragments are predominant throughout the soil layers. Surface rock usually exceeds 35% cover.

These soils are fairly uniform although total depths may vary depending upon slope position. Some communities at lower slope locations may occur in colluvium where soil depth exceeds 30 inches. These sites appear transitional to more mesic fescue-dominated bunchgrass communities. The more exposed slopes, especially in the lower Minam, show evidence of past surface erosion which has removed enough soil material in the upper layers to expose the more clayey subsoils. These sites commonly have basalt bedrock directly below the remaining surface layer.

Synecological Relationships - The canyonlands of the northern Wallowas, with conditions favoring moisture retention longer into the summer drought season, more readily produce Idaho fescue with bluebunch wheatgrass. Windblown loess deposition enhances water-holding capacity and is more prevalent in these canyonlands bordering the Palouse Prairies of southeastern Washington. The southern flank of the Wallowa uplift also contains fescue with bluebunch wheatgrass. But here, bitterbrush is restricted to lower elevations where fescue is unable to persist. The occurrences of bitterbrush with fescue and bluebunch wheatgrass is restricted to isolated areas of the canyonlands. The type was probably more extensive prior to heavy browsing damage by high deer populations in the 1942-1950 period. Most bitterbrush plants exhibit a degraded habit and young, thrifty plants are difficult to find.

Comparison With Other Bitterbrush Types - Principal differentiations between this type and the PUTR/AGSP plant association are as follows:

1. Location - Primarily on canyon side slopes in the northern Wallowa Mountains at higher elevations (5,200 feet mean), whereas PUTR/AGSP is commonly found at lower elevations (3,000 feet mean) on canyon sideslopes of the southern flank of the Wallowas.

2. Presence of Idaho fescue and Wyeth's buckwheat in PUTR/FEID-AGSP and absence of these species in PUTR/AGSP.

Role of Fire - Bitterbrush readily succumbs to range fire. Wyeth's buckwheat will be promoted as a result of fire in these communities. Bitterbrush stands can be regenerated using fire, as the achenes are redistributed by mouse populations (Daubenmire - 1970), but it will respond only if the soil is wet at the time of the burn or shortly thereafter (Blaisdell and Mueggler - 1956). When fires are not followed by rain, bitterbrush seldom sprouts and grasslands are promoted.

Management Considerations - The occurrence of bitterbrush with highly palatable bunchgrass vegetation and a variety of palatable forb species makes this type highly desirable to wildlife. The southerly canyon aspects are more free of deep winter snows and are among the first areas of the canyons to green-up in early spring at these elevations. They are, therefore, very important stands for winter-spring range. The achenes provide important foods to chipmunks, mice, and mantled ground squirrels. Song birds also use the fruits (blackbirds) while upland gamebirds make use of fruit and young buds (Martin, Zim, Nelson - 1951). The principal users of bitterbrush are mule deer and to a lesser degree, elk, sheep, and cattle. Severe hedging and deformation results from repeated heavy browsing. Young seedlings are nipped off which tends to create single-aged stands of decadent older plants in heavily used ranges. Deer need some browse during cold, severe winters. Bitterbrush, mountain mahogany, and ceanothus have contributed up to 10% of winter mule deer diets in eastern Oregon and Washington (Mitchell - 1951). Browse in this area (especially bitterbrush) has succeeded from combinations of severe drought in the 1920-1940 period, heavy use in the late 40's, and periodic epidemics creating severe stand damage by meadow mice and grasshoppers. Vegetative maps from the 20's show many more acres of bitterbrush than are present in the Province today. Variation in precipitation and rodent populations have combined to reduce browse to a third or even a fifth of annual production (Garrison - 1953) in eastern Oregon and Washington. Bitterbrush is also an important summer forage, becoming increasingly utilized by mule deer as

summer drought desiccates other herbaceous forages (Austin and Urness - 1983). Cattle and sheep all make use of bitterbrush with principal use in late summer and early fall.

Productivity - Total forage production is among the highest of all shrubland types sampled. In addition, bitterbrush produces a highly palatable browse in an otherwise bunchgrass-dominated landscape. Bunchgrass production may decline in mid and early seral communities while other forage species may increase. Total forage production probably remains roughly the same in all seral stages.

Comparison With Other Studies - Daubenmire (1970) defined a shrub savanna or shrub steppe in the Cascadian foothills of Washington as the bitterbrush/ Idaho fescue habitat type which he defined as cooler and moister than the ARTR/AGSP zone. Hall (1973) classified a bitterbrush-bunchgrass plant association centered in the southern Blue and Ochoco Mountains. Both bluebunch wheatgrass and Idaho fescue are components in this type which must contain bitterbrush plant density within 30 feet spacing or denser. Bitterbrush occurs there on gentle slopes (5-30%), whereas in the Wallowas, the type is at the limits of its ecologic range and compensates by occupying steep southerly exposures (35-65%). Mueggler and Stewart (1980) found this type to be very scarce in Montana and characterized it by just one plot.

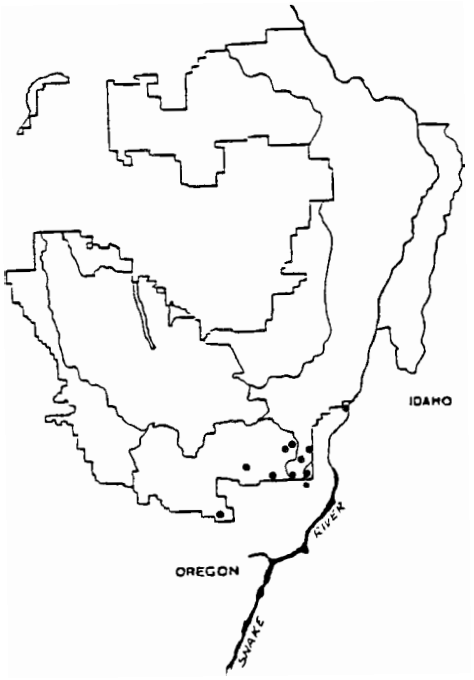
"Study nature, not instruments."

Vogl

Bitterbrush/Bluebunch wheatgrass plant association
Purshia tridentata/Agropyron spicatum (PUTR/AGSP) (SD31 12)

30. Pine Creek Canyon Below McLain Gulch (Hells Canyon NRA)

Plot 1266



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA, PRD	Parent Material: basalt bedrock + colluvium
Elevation: (3050 ft.) 1900-4500 ft.	Solum depth: (7 in.) 5-10 in.
Aspect: (W) ESE-W	Loess depth:
Slope (55%) 15-75%	Root conc: (12 in.) 10-15 in.
Position: mid 1/3 to upper 1/3 slopes	Depth to GT 35% rock frag./size: rock to surf./cobbles, stones
Other: Centers on canyon slopes of N.Pine cr. in Southern Wallowa mountains.	Surface soil/subsoil texture: sandy clay loam, sandy clay/ silt loam, silty clay loam

Table of Principal Species

PUTR/AGSP (n = 11)

Mean Foliar Cover (%)/Constancy (%)

Species	Code	Late Seral (n=2)	Mid Seral (n=5)	Early Seral (n=2)	Very Early Seral (n=6)	Total Range
Shrubs						
*bitterbrush	PUTR	20/100	8/100	15/100	20/100	1-20
Grasses						
*bluebunch wheatgrass	AGSP	25/100	16/100	10/100	3/100	3-25
Sandberg's bluegrass	POSA3	1/100	5/33	1/50	-	0-5
*bulbous bluegrass	POBU	3/100	1/17	2/100	-	0-5
annual bromes	BROMU	6/100	3/33	4/100	4/100	0-3
Perennial Forbs						
arrowleaf balsamroot	BASA	7/100	19/100	18/100	20/100	3-35
*shrubby bedstraw	GAMU	3/50	3/67	-	-	0-5
hot rock penstemon	PEDE	1/50	1/33	1/50	1/100	0-1
swale desert-parsley	LOAM	3/50	4/50	-	1/100	0-10
nine-leaf lomatium	LOTR	1/50	11/33	35/50	-	0-35
*fern-leaved lomatium	LODIE	1/100	6/50	1/50	-	0-15
yarrow	ACMIL	3/50	2/50	-	-	0-3
Annual forbs						
tall annual willowweed	EPPA	1/50	2/67	3/100	25/100	0-3
Douglas' knotweed	PODO	-	1/50	5/50	15/100	0-15
deerhorn	CLPU	1/17	1/50	3/100	15/100	0-15
prickly lettuce	LASE	-	1/17	2/100	1/100	0-3
Surface Features						
rock		2/100	7/100	6/100	3/100	1-15
gravel		3/100	18/100	15/100	15/100	5-30
bare ground		16/100	22/100	40/100	20/100	20-55
moss		3/100	6/50	1/50	-	0-15
litter		38/100	23/67	18/100	15/100	0-50
Herbage Production (lbs/acre dry wt.)						
bluebunch wheatgrass		325	200	-	-	120-400
other species		265	280	-	-	30-500
total		600	480	-	-	300-900

*Principal Indicator Species

Vegetative Composition - Bitterbrush occurs with bluebunch wheatgrass on canyon sites that are too low in elevation to support Idaho fescue in the extreme southeastern flank of the Wallowas. Late seral stands are dominated by a bluebunch wheatgrass-bitterbrush savannah where bitterbrush covers 20% of the area. Associated are Sandberg's bluegrass, arrowleaf balsamroot, and fern-leaved lomatium (LODIE). Endemics to this type are shrubby bedstraw (GAMU) and bulbous bluegrass (POBU). With degradation, bluebunch wheatgrass declines, as bare ground and rock/gravel coverage increases. Increasing perennials are Sandberg's bluegrass, arrowleaf balsamroot and lomatiums (LOTR, LODIE).

Distribution and Environmental Features - Communities in the PUTR/AGSP association are generally found in deep basalt drainages along the southern flank of the Wallowa Mountains. Its distribution pattern may be due to less influence from Palouse loess on the southern flank of the Wallowas which favors bluebunch wheatgrass instead of Idaho fescue. Elevations range from 1,800 to 4,500 feet (mean: 3,050 feet), almost 2,000 feet lower than the mean elevation for communities in the PUTR/FEID-AGSP association. Sites are usually rocky inter-rims at the mid to upper third of slopes, but occasionally are on ridge brows or lower slopes. Slopes are moderately steep to steep (range: 15-75%, mean: 55%) and microrelief is convex.

Soils - Soils are typically dark reddish brown in color in surface layers, less than 10 inches in depth, and formed in basalt bedrock and colluvium with very minor loess influence. Weathered bedrock and colluvium below the soil material is often deep providing a greater rooting zone for bitterbrush. Surface soil layers have sandy clay loam or sandy clay textures and usually contain greater than 35% rock fragments by volume. Subsoil layers are absent, although weathered bedrock may be as deep as 15 inches. Cobble and stone-sized material predominates in surface layers. Surface rock fragments generally exceed 20% cover.

Variation in soil depth and rock/fragment content is common. Soils may form on deep colluvium in toeslope positions or may have upper layers directly underlain by fractured bedrock. Clay concentrations are common in the more stable sites.

Productivity - Total forage production is among the highest of all shrubland types. Moderately high production of bluebunch wheatgrass and the highly palatable browse of bitterbrush make this community important to wild ungulates. Early seral communities may produce significantly less bluebunch wheatgrass, but other forage species tend to remain the same.

Synecological Relationships - Southern Wallowa canyonlands in the Pine Creek watershed contain abundant stands of PUTR/AGSP. The hot, dry canyon ecosystem adjacent to a Great Basin-influenced climate does not permit fescue to occupy these sites. Bitterbrush does not usually occupy those northerly slopes where FEID-AGSP occurs at low elevations. These southern Wallowa stands are still a bitterbrush savanna, but the shrub layer is usually slightly denser (12% vs. 10% in PUTR/FEID-AGSP).

Reinvestigation of Parker 3-Step C&T locations has provided trends over the past 25 years. Mid seral stands exhibit increasing arrowleaf balsamroot and fern-leaved lomatium (LODIE) resulting from displacement of the surface mantle and movement of colluvium on steep (70%) slopes. These two plants with stout candexes can persist and outcompete shallower-rooted species. At one cluster location in Fish Creek Canyon of Pine Ranger District, bitterbrush is invading a

bluebunch wheatgrass-dominated grassland. This could be a result of more favorable environmental conditions, lack of fire to the ecosystem, and/or reduced game numbers permitting the shrub to establish.

Role of Fire - See PUTR/FEID-AGSP discussion.

Management Considerations - See PUTR/FEID-AGSP discussion.

Comparison With Other Bitterbrush Types - Principal differentiations between this type and the PUTR/FEID-AGSP plant association are as follows:

1. Location - Primarily on canyon sideslopes on the southeast flank of the Wallowa Mountains centering around the Pine Creek watershed at lower elevations (mean: 3,000 feet) while PUTR/FEID-AGSP is commonly found at higher elevations (mean: 5,200 feet) in the northern Wallowas.

2. Presence of bulbous bluegrass, oniongrass, and shrubby bedstraw in PUTR/AGSP and absence of these species in PUTR/FEID-AGSP.

Comparison With Other Studies - A PUTR/AGSP habitat type was defined by Daubenmire (1970) as a xerophytic inclusion in the PUTR/FEID habitat type along the eastern base of the Cascades in Washington. Hall (1973) classified a bitterbrush-bunchgrass plant association centered in the southern Blue and Ochoco Mountains with both Idaho fescue and bluebunch wheatgrass as components of the type. Absence of fescue was permitted in his type. Bitterbrush occurs more commonly on gentle slopes (5-30%) with varied exposures in the Great Basin-influenced mountains of the southern Blue Mountains while the PUTR/AGSP type in the Wallowas is confined to more southerly exposures on steep slopes (35-65%). Bitterbrush is at the upper limits of its ecologic range in the Wallowas and thus compensates by occupying the warmer sites.

Mueggler and Stewart (1980) describe a similar vegetative type on steep, granitic slopes of the Bitterroot Valley in Montana where it covers extensive foothill slopes. Soils were dry, shallow, and rocky with a high exposure of rock and surface soil similar to PUTR/AGSP sites in the Wallowas.

Squawapple - Mountain snowberry plant community type
Peraphyllum ramosissimum - Symphoricarpos oreophilus
(PERA3-SYOR) (SD30) (n = 3)

Vegetative Composition - Squawapple shrublands are very restricted in occurrence to a narrow transitional belt below the forested fringe on the gentle southern slopes of the Wallowa uplift. Mountain snowberry is generally associated. Bitterbrush and mountain big sagebrush may also occur as members of this plant community type. These communities are used by animals for shading and are generally overgrazed. The best stands encountered contained prairie junegrass, bluebunch wheatgrass, and mountain brome with Wyeth's buckwheat (ERHE), arrowleaf balsamroot (BASA), and little sunflower (HEUN). Very degraded stands were devoid of all perennial grasses except for trace amounts of mountain brome. Prominant forbs in these poorer condition stands were horsemint (AGUR), yarrow (ACMIL), varileaf phacelia (PHHE), gray rabbitbrush (CHNA), and rayless daisy (ERIN).

Distribution and Environmental Features - Squawapple is restricted in occurrence in eastern Oregon to the sagebrush desert and ponderosa pine forest fringe at the desert-mountain interface. The species was only found from Eagle Creek westerly to Frazier Mountain near Medical Springs on the southern extremities of the Wallowa-Snake Province. Communities occur in areas of accumulation of colluvium intermediate in depth between forest and non-forest zones. Elevations range between 4,200 and 4,500 feet (mean: 4,400 ft) perhaps indicating the restriction of the type to the same or closely related basalt flows. Slopes are moderate and range from 10 to 20% (mean: 15%). Microrelief is convex to undulating.

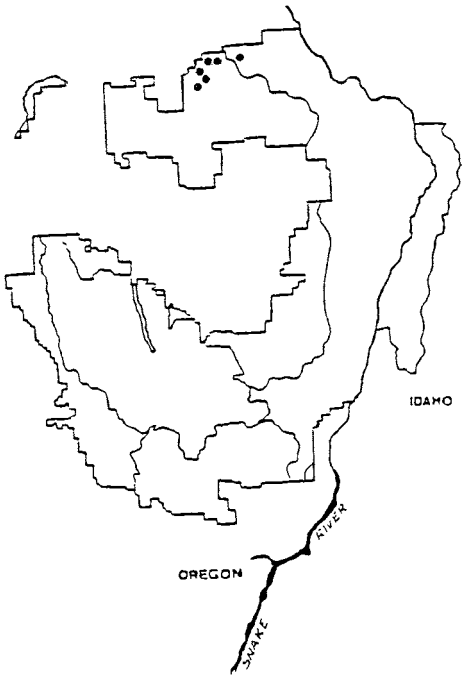
Synecological Relationships - The environmental factors permitting establishment of squawapple or its absence from similar habitats is unknown at present. The species apparently has a very limited tolerance for either levels of salinity or competition with Great Basin species.

Management Considerations - This transitional community is most important for the diversity of shrubs-forbs-grasses included in the stand which provide browse and seeds to wildlife species. Management should be to promote this diversity and maintain the vigor of principal shrub species. Deer winter range is important where squawapple occurs. Squawapple appears capable of sustaining heavy browse pressure and may be a prime species to promote for increasing deer winter range habitat.

Comparison With Other Studies - This plant community type has not been described previously.

Ninebark-common snowberry plant community type
Physocarpus malvaceus-Symphoricarpos albus
(PHMA/SYAL) (SM19)

32. Bull Canyon (Wallowa Valley Ranger District) *Plot 97*



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA, WVRD	Parent Material: basalt colluvium + loess
Elevation: (4100 ft.) 3700-4500 ft.	Solum depth: (51 in.)
Aspect: (NW-NE)	Loess depth: (24 in.)
Slope (73%) 67-81%	Root conc: (24 in.)
Position: (upper 1/3) mid 1/3 to upper 1/3 slopes	Depth to GT 35% rock frag./size: 51 in./cobbles
Other: Shrubland transition to PSME/PHMA forested stringers	Surface soil/subsoil texture: silt loam/loam

Table of Principal Species

PHMA-SYAL (n = 6)

Species	Code	Mean Foliar Cov (%)	Mean Foliar Cons (%)	Total Range (%)
Shrubs				
*ninebark	PHMA	82	100	65-95
*common snowberry	SYAL	26	100	5-40
*roses	ROSA	7	67	0-20
serviceberry	AMAL	6	50	0-10
chokecherry	PRVIM	10	17	0-10
Forbs				
red avens	GETR	8	50	0-15
horsemint	AGUR	6	50	0-15
*cleavers	GAAP	18	100	3-40
yampa	PEGA2	1	67	0-1
yarrow	ACMIL	1	50	0-1
Grasses				
bluebunch wheatgrass	AGSP	8	83	0-15
Idaho fescue	FEID	4	50	0-5
rattlesnake brome	BRBR	14	67	0-40
Surface Features				
rock-gravel-pavement		0	0	-
bare ground		5	67	0-15
moss		13	100	1-60
litter		73	100	30-95

* Principal Indicator Species

Vegetative Composition - Ninebark (PHMA) totally dominated these communities (mean: 82% cover) with common snowberry (SYAL) always present (mean: 26% cover). Roses occurred with the snowberry in 67% of the stands sampled. Serviceberry (AMAL), cherry (PRVIM), and syringa (PHLE2) were common shrubs commonly occurring with ninebark.

The tall shrub canopy was often so dense that few herbaceous species were able to persist in the shade beneath. However, animals utilize these cool sanctuaries for shading and habitation. As a result, opportunistic annuals are transported by animals to colonize on disturbed areas within these stands. Cleavers (GAAP) is very common in the disturbed areas as a result. Occurring from the adjacent bunchgrass communities were bluebunch wheatgrass (AGSP), Idaho fescue (FEID), and rattlesnake brome (BRBR). Horsemint (AGUR) and yampah (PEGA2) also occurred frequently.

This plant community is separated from the Douglas-fir/ninebark plant association by a distinctive lack of tree reproduction in sampled stands. These shrublands are abundant on northerly aspects of bunchgrass-dominated slopes in the canyonlands. They clearly lack a visible trace of having supported trees. Soil depth is often sufficient on many sites for tree establishment, but moisture retention may be limiting to tree growth in the canyonlands where precipitation is less. Therefore, some sites dominated by this community should be treated as noncommercial timber producing areas unless the proximity to timbered ninebark suggests a future tree component is probable or if they are part of a patterned landscape where fire has temporarily removed tree composition.

Environmental Features - Sampled stands ranged from 3,700 feet to 4,500 feet with mean elevation at 4,100 feet. Aspect is a key to survival of ninebark on canyon slopes. These communities occur in the upper third of steep slopes with northwest and northeast aspects where deeper soils, longer moisture retention, and favorable shading from dessicating summer drought provide the necessary conditions for shrub growth and maintenance in the bunchgrass zone. Slopes ranged from 67 to 81% (mean 73%). Soils are much like those observed in lower elevation Douglas-fir/ninebark communities. They are very dark in color in surface layers, often greater than 50 inches in depth, and formed in basalt colluvium with loess. Surface layers have silt loam textures and contain less than 15% rock fragments by volume, most of which are gravel-sized. Subsoils are loams and normally increase greatly in rock fragment content.

The steep topography where ninebark occurs alternates between smooth and dissected concave areas at the upper to midslope levels of the canyon. Generally, at the midslope and lower third levels, enough moisture had collected from slope seepage on more favorable northerly aspects to provide tree cover and potential climax by communities in the Douglas-fir/ninebark (PSME/PHMA) plant association.

Role of Fire - Ninebark is moderately resistant to fire and profusely regenerates from basal sprouts following fire. These shrublands are occupying sites that probably have been modified by periodic wildfire. As fire is removed from these communities, trees may establish on the sites given several decades of stability, a seed source, and adequate soil moisture.

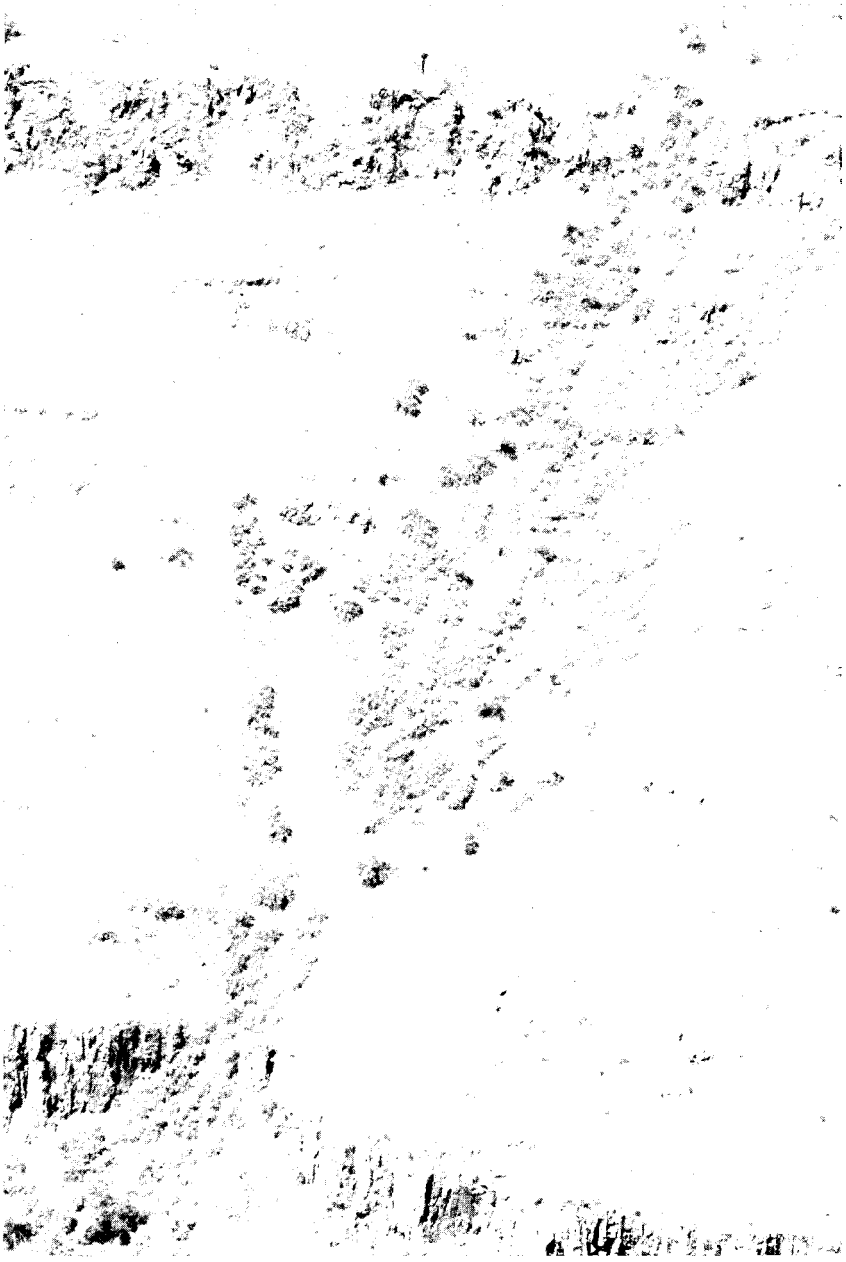
Management Considerations - Principal use is for big game cover and livestock shading. In general, these communities provide wildlife habitat by increasing diversity on canyon landscapes. Tree initiation and establishment in this type

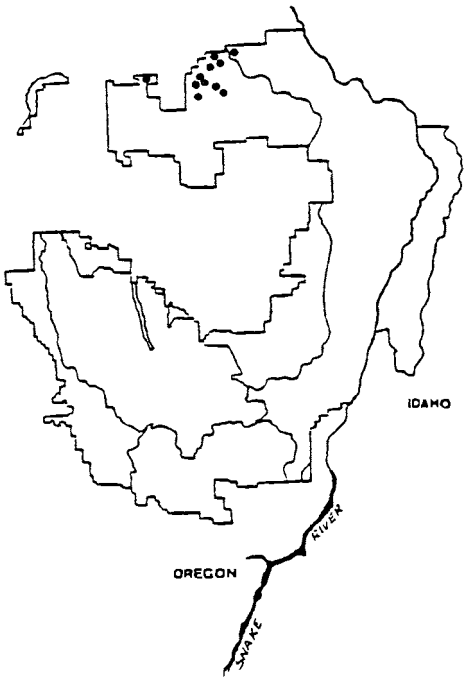
may not be economically feasible based on the necessity to reduce shrub competition and the difficulty in operating machinery on very steep slopes.

Productivity - These communities produce very little forage in late seral stands since the ninebark tends to shade out all but the most shade tolerant species. Early seral stands, however, are quite productive. Both Idaho fescue and bluebunch wheatgrass may codominate these communities before ninebark re-invasion.

Comparison With Other Studies - Hall (1973) recognized PHMA/SYAL in the Blue Mountains. He noted the type might be a fire-induced shrubland suitable for conversion to trees and that some fir were reproducing in this type. However, he cautioned that although the sites seemed suitable for tree growth, shrub competition was severe enough that revegetation and tree establishment would be extremely difficult.

Talus Garland Plant Community Type (NTS1 11) (n = 11)





33. Table Mountain Near Haystack Rock (Wallowa Valley Ranger District) *Plot 113*

ENVIRONMENT
(all plots)

Location:
all districts

Elevation: (4050 ft.)
3600-4600 ft.

Aspect: (SE-SW)
all but north

Slope: (63%)
28-82%

Position: mid to
upper 1/3 slopes

Other: indicates
areas of subsurface
water below talus

Steep canyon side slopes dominated by bunchgrass communities often contain stone stripes ringed by various shrub communities. Shrubs persist only on the edges of these mobile rocky "streams" where talus movement is less. These margin shrubs establish and persist because of good moisture storage afforded deep beneath the talus where water evaporation is minimal and abundant from ready percolation through the rocky stripe. Syringa (PHLE2), oceanspray (HODI), cherry (PRIVI, PREM), and Rocky Mountain maple (ACGL) are all major talus margin shrubs.

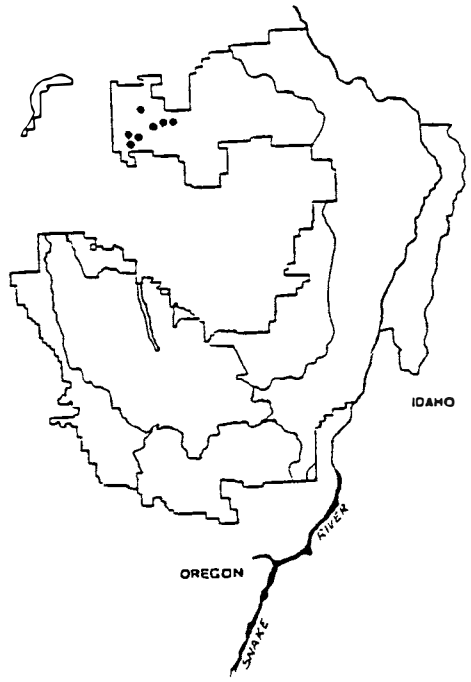
Syringa or mock orange occurs in the AGSP/POSA3 zone from 3,500 - 4,200 feet on very steep slopes (mean: 68%) between exposed rim palisades, predominantly at midslope positions. Other shrubs associated with syringa are elderberry (SACE), gooseberry (RIIN), serviceberry (AMAL), snowberry (SYAL), and rose (RONU). Forb composition is minimal, but fern-leaved lomatium (LODIE), phacelia (PHHE), skullcap (SCAN), and cleavers (GAAP) are regularly represented. Sweetroot (OSOC) and fern-leaved lomatium (LODIE) are especially good colonizers of these steep, rocky sites.

Oceanspray dominates other talus margins in similar environmental settings, but contains higher coverage amounts of common snowberry than the syringa-dominated talus margins.

Douglas hawthorn (CRDO) and chokecherry (PRVI) often occupy seepage patches at the head of stone stripes indicative of good spring development opportunities on otherwise droughty canyon slopes. These communities are often positioned higher up the canyon slope near the canyon crest or in the upper third where seepage levels occur between upper flow basalts.

Western juniper/Idaho fescue - bluebunch wheatgrass plant association
Juniperus occidentalis/Festuca idahoensis - Agropyron spicatum
(JUOC/FEID-AGSP) (CJG1 11)

34. Mud Creek Canyon (Wallowa Valley Ranger District) Plot 635



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: WVRD	Parent Material: basalt bedrock minor colluvium
Elevation: (4200 ft.) 3600-4400 ft.	Solum depth: (13 in.) 9-19 in.
Aspect: (SW) SE-SW	Loess depth: none
Slope (63%) 50-75%	Root conc: (16 in.) 13-19 in.
Position: rock outcrops at mid to upper 1/3 slopes	Depth to GT 35% rock frag./size: rock to surface/gravels, cobbles
Other: restricted to canyons west of Joseph Cr.	Surface soil/subsoil texture: loam/clay loam, clay

Table of Principal Species

JUOC/FEID-AGSP (n = 6)

Mean Foliar Cover (%)/Constancy (%)

Species	Code	Late Seral	Mid Seral	Early Seral	Total Range
Shrubs					
*western juniper	JUOC	15/100	16/100	15/100	5-25
*squaw currant	RICE	1/100	2/75	-	0-3
*common snowberry	SYAL	5/100	3/75	5/100	0-5
Grasses					
*Idaho fescue	FEID	20/100	2/75	5/100	0-20
*bluebunch wheatgrass	AGSP	25/100	20/100	20/100	15-30
Sandberg's bluegrass	POSA3	-	5/100	15/100	0-15
rattlesnake brome	BRBR	1/100	4/75	1/100	0-5
cheatgrass	BRTE	1/100	2/75	-	0-5
Forbs					
yarrow	ACMIL	5/100	1/100	1/100	1-5
harsh paintbrush	CAHI2	-	1/75	1/100	0-1
*Gray's lomatium	LOGR	1/100	2/75	1/100	0-3
woodsia	WOOR	1/100	1/50	-	0-1
hot rock penstemon	PEDE	5/100	3/50	1/100	0-5
*shrubby penstemon	PEFRS	1/100	12/75	1/100	0-30
*Blue Mountain penstemon	PEVE	1/100	1/100	1/100	1-1
common eriophyllum	ERLA	-	1/75	1/100	0-1
*sticky cinquefoil	POGLN	10/100	2/75	-	0-10
balsamroot	BASA	3/100	3/75	25/100	0-25
skullcap	SCAN	3/100	6/50	-	0-10
stonecrop	SELA2	1/100	2/100	3/100	1-3
Surface Features					
rock/pavement		75/100	68/100	45/100	45-75
bare ground		10/100	18/100	30/100	1-40
moss		15/100	11/75	1/100	0-30
litter		5/100	3/100	60/100	1-60
Herbage Production (lbs/acre dry wt.)					
Idaho fescue		60	20	-	0-60
bluebunch wheatgrass		140	160	-	120-210
other forage species		40	105	-	45-110
total		240	285	-	210-340

*Principal Indicator Species

Vegetative Management - Northward-trending canyons west of Joseph Creek that empty into the Grande Ronde River (Wildcat, Mud, Buck, Bobcat) contain the principal juniper communities of the Wallowa-Snake Province. Very little other juniper occurs elsewhere in the Province except for stands of Rocky Mountain juniper in the Eagle Cap Wilderness Area and along the Wallowa River Canyon of the Wallowa Valley.

This type is characterized by western juniper (JUOC) occupying basalt rims with squaw currant (RICE) often associated. The type occurs in a complex with bunchgrass communities. Typically annual bromes (BRBR, BRTE) occur beneath the trees with separate communities occurring on southerly and northerly sides of the tree. On the north, where afternoon shade falls, Idaho fescue (FEID) and common snowberry (SYAL) often occur. Here balsamroot (BASA) and lupine (LUPIN) can be found as indicators of disturbance. On the south side, bluebunch wheatgrass (AGSP) generally dominates with Sandberg's bluegrass (POSA3). Here weedy annuals increase with disturbance (tall willowweed (EPPA) and deerhorn (CLPU)). The rim crest is especially conducive to Penstemon species. Four penstemons--hot rock (PEDE), Blue Mountain (PEVE), shrubby (PEFRS), and glandular (PEGL)-- occur frequently and often together. Other species of note are Gray's bisquitroot (LOGR), sticky cinquefoil (POGLN), and common eriophylum (ERLA). Juniper foliar coverage averages 15% over a bunchgrass community of Idaho fescue and bluebunch wheatgrass which averages approximately 40% cover in late seral stands and about 25% in mid and early seral stands. With disturbance, fescue declines as arrowleaf balsamroot, stonecrop, and Sandberg's bluegrass increase.

A moist site juniper community was sampled to reflect the easterly aspect where the juniper occupied a concavity instead of a rim convexity or ridge point. Juniper coverage increased to 35% with high sub-shrub association by common snowberry (SYAL), cherries (PREM, PRVI), and ocean spray (HODI). Elk sedge (CAGE) and pinegrass (CARU) replaced the bunchgrasses as gramineous components. Two principal forbs occurring here were western sweetroot (OSOC) and horsemint (AGUR). These communities were infrequent and occurred on northerly aspects where moisture and aspect in combination were perhaps too severe to support the more common forested type (i.e., PSME/PHMA).

Distribution and Environmental Features - The JUOC/FEID-AGSP communities occur at upper canyon slope positions between 3,600 feet and 4,400 feet in elevation. The majority of sites are on southwest-facing slopes of northward trending ridges. Substrates are highly fractured Columbia River basalts.

Soils - Soils are dark brown in color in surface layers, less than 19 inches in depth, and formed in or adjacent to basalt rimrock outcrops. Surface layers have loam textures and greater than 35% coarse fragments by volume. Subsoils are thin and have clay loam and clay textures. These clayey subsoils often extend well into bedrock fractures. Rock fragments tend to be gravel-sized in surface layers and cobble-sized in subsoil layers. Surface rock exceeds 50% cover and may cover as much as 75% of the total above-ground area.

JUOC/FEID-AGSP sites are usually adjacent to areas of deep colluvial soils especially below rimrock outcrops. The zone between these sites may be occupied by juniper and other shrubs and consists of a more well-developed soil over deeper, very rocky colluvium. Typically, however, the juniper communities are confined to rimrock outcrop areas.

Management Considerations - Cattle and big game readily utilize these communities since they provide shading near forage-rich grassland communities. The juniper-dominated rims are separated by expansive FEID-AGSP and FEID-KOCR grasslands which are relatively accessible from the major ridge- tops. Chukars are frequently encountered. The annual bromes common in these communities and adjacent grasslands provide a key food source to them.

Fire has probably not been frequent in these rim-protected communities. The lack of observed juniper invasion off-site may be a result of fire occurrence and/or intense bunchgrass competition in the inter-rim areas.

Productivity - Total herbage production in these communities is low (less than 300 lbs/acre, dry wt.) with bluebunch wheatgrass the predominant available forage.

Comparison with Other Investigators - Hall (1973) also defined this type in the Blue Mountains. On Wallowa Valley Ranger District, western juniper occurs at the eastern edge of its range on steep canyon slopes (mean: 63%). Hall describes this type on undulating topography of less than 25% slope. In the southern Blue Mountains, western juniper is closer to the Great Basin where it is a major species adapted to those drier environmental conditions. Burkhardt and Tisdale (1979) studied successional relationships in western juniper stands of Owyhee County in southwestern Idaho. These stands were nearer the Great Basin and more like those described by Hall.

Bluebunch wheatgrass/sticky cinquefoil plant community type (n = 3)
Agropyron spicatum/Potentilla glandulosa nevadensis
(AGSP/POGLN)

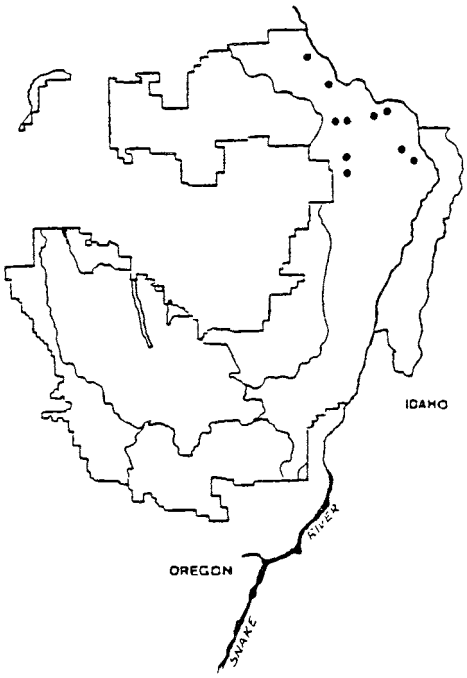
This plant community type is found on Columbia River basalt rims with absence of western juniper in the same general location as the JUOC/FEID-AGSP type. The type was observed as isolated communities on McAllister Ridge, Horse Pasture Ridge, and Table Mountain on the Wallowa Valley Ranger District.

Bluebunch wheatgrass clearly dominates these communities with some Idaho fescue occurring on moist microsites. Sandberg's bluegrass (POSA3) and rattlesnake brome (BRBR) always occur in minor amounts. Sticky cinquefoil (POGLN) is the most common forb on these sites and occurs with hot rock penstemon (PEDE) on rim crests, but also aggressively colonizes colluvial inter-rim sites with skullcap (SCAN), silky lupine (LUSE), balsamroot (BASA), and harsh paintbrush (CAHI2).

The type was sampled on rims between the 4,000 and 4,400 feet in elevation. The aspects were always southwesterly and slopes were steep (66%). This community type extends beyond the limits of the JUOC/FEID-AGSP community into those sites incapable of supporting western juniper.

Common snowberry-rose plant association
Symphoricarpos albus - Rosa sp. (SYAL-ROSA) (SM31 11)

35. Knight Creek Canyon (Hells Canyon NRA) *Plot 553*



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA	Parent Material: basalt colluvium + loess
Elevation: (2750 ft.) 2200-4100 ft.	Solum depth: (70 in.) 60-80 in.+
Aspect: (NE-NW)	Loess depth: (30 in.) 16-43 in.
Slope (50%) 15-94%	Root conc: (32 in.) 16-59 in.
Position: (footslopes) lower 1/3 to mid 1/3 slopes	Depth to GT 35% rock frag./size: (64 in.) 51-80 in.+/gravels
Other: sites similar to FEKO low-but deeper soil	Surface soil/subsoil texture: silt, silt loam/silty clay loam, silty clay

Table of Principal Species

SYAL-ROSA (n = 10)

Mean Foliar Cover (%)/Constancy (%)

Species	Code	Late Seral (n=3)	Mid Seral (n=4)	Early Seral (n=3)	Total Range
Shrubs					
*common snowberry	SYAL	80/100	88/100	82/100	65-95
**rose species	ROSA	35/100	18/75	5/67	0-75
Grasses					
Idaho fescue	FEID	1/33	1/25	3/67	0-5
bluebunch wheatgrass	AGSP	1/33	2/75	3/67	0-5
Japanese brome	BRJA	-	10/25	-	0-10
rattlesnake brome	BRBR	-	5/50	30/33	0-30
Perennial Forbs					
*white stemmed frasera	FRAL2	1/100	1/25	1/33	0-1
red besseya	BERU	1/67	1/25	6/67	0-10
red avens	GETR	5/33	1/25	3/67	0-5
*western hawkweed	HIAL2	1/67	2/50	3/33	0-3
yarrow	ACMIL	1/67	5/25	8/67	0-15
silky lupine	LUSE	1/67	20/25	8/67	0-20
common goatweed	HYPE	10/33	1/50	15/67	0-25
field chickweed	CEAR	1/33	1/25	4/100	0-5
gromwell	LIRU	1/67	1/25	1/33	0-1
Missouri goldenrod	SOMI	5/33	1/50	3/33	0-5
Annual Forbs					
*cleavers	GAAP	5/67	22/75	38/100	0-60
blue forget-me-not	MYMI	-	6/50	2/100	0-10
common speedwell	VEAR	-	-	5/33	0-5
tonella	TOFL2	-	1/25	39/67	0-75
miner's lettuce	MOPE	1/67	-	40/100	0-60
Surface Features					
rock		-	11/50	-	0-20
gravel		-	-	-	0-0
bare ground		1/33	2/75	5/33	0-5
moss		70/100	46/100	65/100	10-90
litter		37/100	75/100	75/100	15-95
Herbage Production (lbs/acre dry wt.)					
total		-	55	220	

* Principal Indicator Species

** Active hybridization occurs between Rosa nutkana and R. woodsii

Vegetative Composition - Canyon shrublands dominated by common snowberry (SYAL) are frequently encountered on north facing slopes where favorable moisture regimes permit shrub growth in the bunchgrass zone. Rose (Rosa nutkana, Rosa woodsii or a hybridization of both) is most commonly associated with the snowberry. Many of these communities are often so dense that few other plants can persist in the deep shade beneath the shrubs. Members of the FEID-KOCR communities; i.e., Idaho fescue (FEID), prairie junegrass (KOCR), bluebunch wheatgrass (AGSP), red besseya (BERU), white stemmed frasera (FRAL2), red avens (GETR), and silky lupine (LUSE) are often found where breaks occur in the shrub canopy.

With disturbance of the shrubland by ungulates, bare areas may become populated by annual bromes, yarrow (ACMIL), field chickweed (CEAR), and cleavers (GAAP). Small leaved montia (MOPE), field chickweed (CEAR), and goatweed (HYPE) are prominent invaders in heavily disturbed SYAL-ROSA communities. Below 3,000 feet elevation tonella (TOFL2) and chervil (ANSC2) may become very abundant in these shrublands.

Distribution and Environmental Features - The SYAL-ROSA shrubland generally occurs below 3,000 feet in elevation (mean: 2,700 feet), but has been found as high as 4,100 feet. The type occurs with greatest frequency in the lower Imnaha Canyon system and the Snake River Canyon north of Pittsburg. Notable stands also occur in Big Canyon on the Idaho side of the Snake River.

These communities can be found on moderate to steep footslopes (ranges: 15-94%) on northerly aspects. Slope positions range from the lower to mid third of canyons in areas where soil slumping is often common. Some concave microsites, which retain snow and moisture later into the summer months, contain SYAL-ROSA thickets in FEID-KOCR grasslands.

Soils - Soils are very similar to those supporting FEID-KOCR (low elevation) communities. Surface layers are black in color, total solum depths are greater than 60 inches, and soil is formed in deep loess accumulations over basalt colluvium and bedrock. Residual soils formed in basalt/colluvium are often buried by over two feet of nearly rock-free loess. Surface layers have silt or silt loam textures with less than 5% rock fragments by volume. Buried subsoils are usually more dense, have silty clay loam to silty clay textures, and contain less than 15% rock fragments. Rock fragments are gravel-sized in surface layers and tend to be gravel to cobble-sized in subsoil layers. Surface rock seldom exceeds 2% cover.

These soils are the deepest found of all steppe plant associations. They are relatively uniform in color, texture, and rock-fragment content. Total depths and depth to the buried soil layer may vary, however, since the origin of soil material is accumulated colluvium. Its source and magnitude will vary according to slope position. The deepest accumulations occur at footslope locations where solum depths exceeding seven feet are not uncommon. The major difference between these soils and those found supporting FEID-KOCR (low) communities is this exceptional depth. In addition, soils supporting SYAL-ROSA communities are more often clayey in subsoil layers.

Successional Relationships - Based on photographic comparisons over the past 25-30 years, SYAL-ROSA stands have increased throughout the canyonlands. This increase may be the result of fire removal from the ecosystem or as a response to overgrazing of deep-soil mesic grassland communities (i.e., FEID-KOCR). It is

also possible that the shrubs are responding to more favorable moisture, indicating either a wetter period of a climatic cycle, a change in distribution, timing of precipitation, or a combination of all three factors.

Other evidence of shrub increases during this time period are available. A game-proof exclosure was installed in 1969 at Pleasant Valley. The majority of the enclosed site contained a very mesic community with some scattered shrubs from an adjacent thicket. By 1976, rose and snowberry showed significant increases in cover and frequency. By 1982, the exclosure was virtually dominated by SYAL-ROSA with almost total exclusion of the grassland species.

Percent composition calculated from 3/4" loop readings in 1971 and 1983 dramatically reflect the change resulting from exclusion of grazing animals inside the game exclosure.

	1971	1983
bluebunch wheatgrass	16	2
Kentucky bluegrass	7	22
yarrow	35	5
rose	7	19
snowberry	1	47
prickly lettuce	12	0

Dramatic increases by snowberry and rose result from browse protection. The increase by Kentucky bluegrass without ungulate grazing pressure may reflect the tolerance of bluegrass to shading and the insulation from heat and drought provided by the protective partial shrub canopies of snowberry and rose. Outside the exclosure, heavy grazing continued by cattle and elk following years of historic sheep use. The community there became dominated by Kentucky bluegrass with minor occurrences by snowberry and rose. This appears to indicate that moderate to heavy grazing of the low shrubs can limit their importance in these communities and may even promote replacement by Kentucky bluegrass. Monitoring of ecological plots over time should provide more site specific information concerning the fluctuations of SYAL-ROSA plant communities.

At the upper elevational limits of SYAL-ROSA, (4,500-5,500 feet elevation) the shrubs decrease in stature and coverage (SYAL = 20% cover) with a much greater grass coverage (FEID, AGSP = 25 - 35% cover) in fair-good condition. This community has been described by Daubenmire (1970) as a FEID-SYAL habitat type. The FEID-KOCR (high) and FEID-AGSP/LUSE plant associations in the Wallowa-Snake contain a shrubby phase which essentially equates to this FEID-SYAL habitat type.

SYAL-ROSA sites at mid to low elevations usually contain FEID-KOCR communities in close proximity. Many FEID-KOCR sites appear to be undergoing some invasion by snowberry and rose. Ninebark shrublands generally occur at higher elevations (mean: 4,278 feet) than SYAL-ROSA shrublands (mean: 2,760 feet). SYAL-ROSA shrublands are not considered to be future PIPO-PSME/SYAL forest communities.

Role of Fire - Common snowberry is resistant to fire and sprouts vigorously after burning. Roses are is moderately resistant to fire and develop basal sprouts following fire. Reduction of SYAL-ROSA may best be achieved by a combination of high intensity burning and heavy over-grazing. The resultant vegetation, however, may be less desirable than the shrublands.

Management Considerations - The low-statured, rhizomatous snowberry is palatable to cattle and big game. It can withstand normal grazing well, but heavy grazing will eradicate it. Periodic heavy grazing of some stands may promote more favorable forage producing grasses. The SYAL-ROSA stands of the canyonlands provide a diversity for wildlife habitat (i.e., browse, hiding cover). This plant association is separated from the Douglas-fir/snowberry and ponderosa pine/snowberry plant associations by a distinctive lack of tree reproduction in sampled stands. These shrublands are abundant on northerly aspects of bunchgrass-dominated slopes in the canyonlands. They clearly lack a visible trace of trees. Soil depth is often sufficient on some sites for tree establishment, but moisture retention may be limiting to tree growth in the canyonlands where precipitation is less. Therefore, most sites dominated by this community should be treated as noncommercial timber-producing areas unless the proximity to timbered snowberry suggests a future tree component is probable or if they are part of a patterned landscape where fire has temporarily removed tree composition. Indicators of the forested snowberry sites when trees are not present are: Utah honeysuckle (LOUT2), common serviceberry (AMAL), and spiraea (SPBE).

Productivity - The amount of forage produced in these communities is inversely related to canopy cover of the dominant shrubs. Sample plots in dense SYAL-ROSA shrub communities produced very little herbaceous forage. However, very early seral communities with low shrub cover may produce substantial amounts of forbs and grasses. Browse production by snowberry can also be significant in all seral stages.

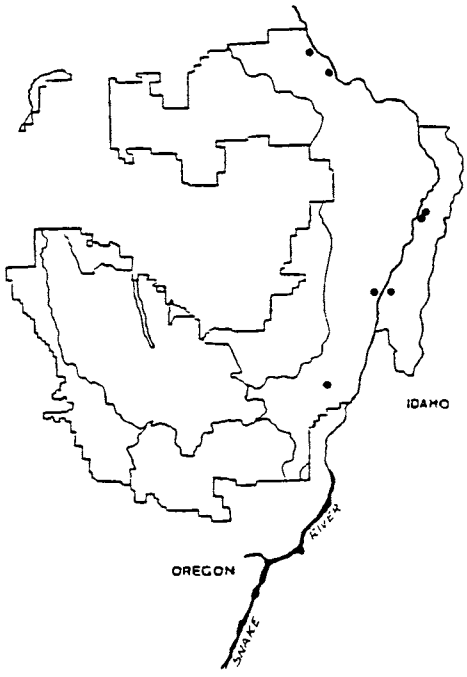
Comparison with Other Studies - Daubenmire (1970) identified a snowberry phase of his FEID-SYAL habitat type which is similar to the Wallowa-Snake SYAL-ROSA plant association. His FEID-SYAL consisting of Idaho fescue with high forb composition and dwarf, sterile snowberry not characterized in the Wallowa-Snake. It does exist, but infrequently as small stands. Hall (1973) identified a "snowberry shrubland" plant association ranging from 1,700 to 5,800 feet in the Blue Mountains. At the upper elevational limits of the snowberry type where he found elk sedge (CAGE), he considered the type transitional to PIPO-CARU. This SYAL-ROSA plant association is more mesic as evidenced by higher coverage of snowberry, less grass composition, and no elk sedge. Otherwise the lower elevations and north slope sites of this study are probably quite similar to SYAL-ROSA in the canyonlands of Hall's study. Tisdale (1986) identified a FEID-SYAL community type in his Snake River Canyon work in Idaho that equates to this plant association.

"Diversity = Stability"

Vogl

Curlleaf mountain-mahogany plant community type
Cercocarpus ledifolius (CELE) (SD49)

36. Granite Creek Canyon (Hells Canyon NRA) ***Plot 920***



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA	Slope: (65%) 28-100%
Elevation: (2700 ft.) 900-5900 ft.	Position: (upper 1/3) lower 1/3 to upper 1/3
Aspect: (SW) All	Other: represents three plant associations separated elevationally.

Table of Principal Species

CELE (n = 6)

Species	Code	Mean Foliar Cov(%)/Cons(%) High Elev.	Mid Elev.	Low Elev.
Shrubs				
*mountain mahogany	CELE	35/100	43/100	65/100
green-bush	GLNE	-	20/50	-
netleaf hackberry	CERE2	-	-	23/100
mountain snowberry	SYOR	38/100	-	-
serviceberry	AMAL	1/50	-	8/100
Grasses				
Idaho fescue	FEID	3/100	10/50	-
*bluebunch wheatgrass	AGSP	8/100	28/100	10/100
elk sedge	CAGE	4/100	-	-
cheatgrass	BRTE	-	1/50	25/50
Forbs				
Wyeth's buckwheat	ERHE	30/100	1/50	-
fern-leaved lomatium	LODIE	3/100	-	-
arrowleaf balsamroot	BASA	3/100	-	-
yarrow	ACMIL	8/100	3/100	2/100
Snake River phlox	PHCO2	-	3/100	-
field chickweed	CEAR	-	5/100	1/100
Surface Features				
bedrock		10/100	8/100	-
rock		4/100	2/100	30/50
gravel		8/100	10/50	-
bare ground		2/100	5/50	1/50
moss		5/50	42/100	50/100
litter		52/100	8/100	42/100

*Principal Indicator Species

Bluebunch wheatgrass is the most commonly occurring plant beneath Snake River Canyon mountain-mahogany stands. Other common associates in late seral and mid seral stages include: yarrow (ACMIL) and annual bromes (BRBR, BRTE). With degradation, bluebunch wheatgrass declines as annual bromes increase.

Three elevational levels were sampled where mountain-mahogany occurs. At the lower elevations (900-1,000 feet), the species was encountered only on toe slopes and river bar sites north of Mountain Sheep Creek in association with netleaf hackberry and serviceberry. Snake River phlox and field chickweed occurred regularly with bluebunch wheatgrass beneath the shrubs. At the 2,000-4,000-foot mid-elevation level, the stands of mountain-mahogany generally occurred on rim outcrops with an affinity for limestone. Here, spiny green-bush (GLNE) and Snake River phlox (PHCO2) were often associated. At the highest elevations (5,000-6,000 feet), mountain snowberry (SYOR), syringa (PHLE2), and oceanspray (HODI) often occurred with mountain-mahogany. On these more moist sites, Idaho fescue (FEID) and bluebunch wheatgrass (AGSP) were associated along with other fescue series members -- Wyeth's buckwheat, arrowleaf balsamroot, and fern-leaved biscuitroot. Wyeth's buckwheat and elk sedge form mats on colluvial exposures at these higher elevations.

Distribution and Environmental Features - Slopes were generally steep (mean: 78%) on the rim-dominated sites. The river-level sites near the Salmon River junction with the Snake were generally on more gentle slopes (mean: 29%). The type was found on all major aspects, though the southwest aspect was most typical. Mountain-mahogany is a prolific species on the sedimentary - outcroppings of the Pittsburg Formation (Vallier-1973) in the Snake River Canyon. It is common on limestone, but may occur on basalts and metabasalts as well.

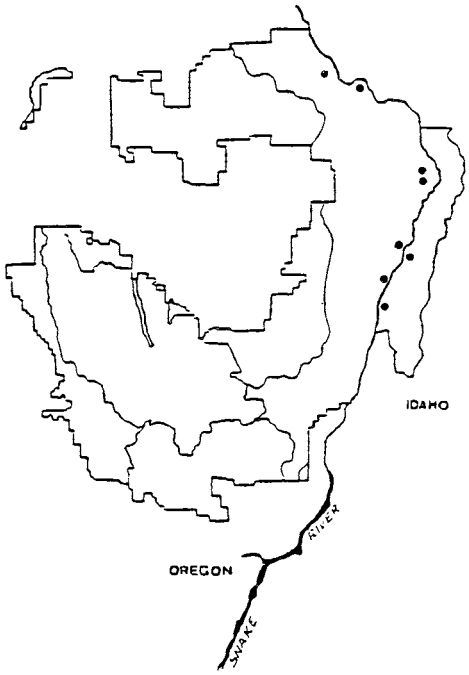
Management Considerations - The mountain-mahogany foliage is highly preferred by big game (deer and elk). Besides having a notable winter browse line, seedlings are often scarce as they are also grazed by ungulates. Scheldt and Tisdale (1970) attributed the lack of seedlings in Idaho to foraging by rabbits. Most of the stands sampled in Hells Canyon NRA showed either a lack of regenerating mountain-mahogany or severely hedged juvenile plants. Cattle tend not to use these sites due to steepness of slope. Mountain-mahogany stands provide excellent winter cover and browse for big game.

Mountain-mahogany stands occupy sites that often cannot carry fire. However, when stands are burned, fire is usually damaging to the shrub. Fire mortality was observed in several stands of mountain-mahogany where only a snag population remained. Few mountain-mahogany shrubs resprout following fire; these few often die within a few seasons (Wright, et al, 1979). Several insects were reported by Scheldt and Tisdale (1970) as being especially injurious to mountain-mahogany stands in Idaho.

Comparison with other Investigators - Schlatterer (1972) identified a mountain-mahogany type Central Idaho with a shrubby open canopy phase consisting of mountain snowberry (SYOR), mountain big sage (ARTRV), and bluebunch wheatgrass (AGSP) as well as a dense canopy phase where Idaho fescue (FEID) and bluebunch wheatgrass (AGSP) were more dominant. Mueggler and Stewart (1980) and Hironaka (1983) also identified a CELE/AGSP type in Montana and Idaho respectively. All investigators noted the affinity of their types to sedimentary deposits. Hall (1973) found mountain-mahogany occurring on basaltic materials in the Blue Mountains with Idaho fescue, pinegrass, and elk sedge often associated.

Spiny green-bush/bluebunch wheatgrass plant association
Glossopetalon nevadense/Agropyron spicatum
(GLNE/AGSP) (SD65)

37. Pleasant Valley (Hells Canyon NRA) *Plot 744*



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA	Parent Material: bedrock from various geologies
Elevation: (2350 ft.) 1800-2900 ft.	Solum depth: (6 in.) 3-9 in.
Aspect: (SW) NE, NW, SE-SW	Loess depth: none
Slope (70%) 56-85%	Root conc: (8 in.) 3-19 in.
Position: (upper 1/3) lower 1/3 to upper 1/3 slopes	Depth to GT 35% rock frag./size: rock to surface/gravels
Other: restricted to rocky rimss in Snake River and Imnaha river canyons.	Surface soil/subsoil texture: loam, loamy sand/loam

Table of Principal Species

GLNE/AGSP (n = 8)

Species	Code	Mean Foliar Cov (%)/Cons (%) Late Seral (n=6)	Mid Seral (n=2)	Total Range
Shrubs				
*spiny green-bush	GLNE	23/100	15/100	10-45
Grasses				
*bluebunch wheatgrass	AGSP	17/100	8/100	5-20
foxtail fescue	FEME	1/50	1/50	0-1
cheatgrass	BRTE	3/100	1/100	1-5
rattlesnake brome	BRBR	2/50	1/50	0-5
Japanese brome	BRJA	1/17	1/100	0-1
Forbs				
yarrow	ACMIL	2/100	1/100	1-5
*whorled penstemon	PETR	2/67	3/50	0-3
shaggy fleabane	ERPU	3/67	-	0-3
prickly pear	OPPO	1/33	1/100	0-1
field chickweed	CEAR	5/50	1/50	0-10
varileaf phacelia	PHHE	2/50	1/50	0-5
Surface Features				
bedrock		24/67	28/100	0-40
rock		15/100	3/100	1-40
gravel		25/50	13/100	0-50
pavement		5/17	15/100	0-20
bare ground		7/83	1/50	0-10
moss		22/100	8/100	3-50
litter		17/100	7/100	3-30
Herbage Production (lbs/acre dry wt.)				
bluebunch wheatgrass		200	215	140-290
other forage species		105	65	5-200
total		305	280	160-450

* Principal Indicator Species

The GLNE/AGSP type is found exclusively on rock outcrops and canyon rims and occurs as small isolated shrub groupings in a vegetation complex with bunchgrass communities. Spiny green-bush (GLNE) occupies the fractures of the rimrock with bluebunch wheatgrass (AGSP) occurring more commonly on deeper soil areas between rims. Bluebunch wheatgrass, varileaf phacelia, and shaggy fleabane are generally present in late seral stages. Annual bromes (BRBR, BRTE), field chickweed, and yarrow, commonly occur. Prickly pear is opportunistic on shallow soil sites of the rim crest while the whorled penstemon (PETR) occupies crevices of the rim face. Mosses are high in cover (mean: 19%) as is bedrock, rock, and gravel (mean: 50%).

Environmental Features - This type has not previously been defined. It occurs between 1,800 feet and 2,900 feet in elevation on rocky slopes in the Snake River Canyon. Slopes are steep (56-85%, mean: 70%) and predominantly southwest-facing, although all aspects may support the type.

Soils - Soils are typically very dark greyish brown to dark brown in color in surface layers, less than 9 inches in depth, and formed in a variety of parent materials. Sedimentary, metavolcanic, and intrusive substrates may support these communities, but they were never observed on basalts. Surface soil layers have sandy loam or loam textures with greater than 35% rock fragments by volume. Subsoils are thin and rocky, have loam textures and often contain greater than 60% rock fragments by volume. Weathered bedrock and rock fractures below the soil provide deeper rooting for all plants and appear necessary for the maintenance of spiny green-bush. Rock fragments are gravel-sized throughout the soil layers and may exceed 40% cover on the ground surface.

These soils are fairly uniform considering the different substrates they are derived from. Soil color, structure, and rock fragment content vary the most. These characteristics seem inconsequential in comparison to the severely limiting soil depths. Nature of rock fractures is hard to determine, but is evidently an important determinant for distribution of the type. Many of the sample sites showed bedrock dipping at steep angles, the resulting fracture planes presumably enhancing the rooting zone and determining the distribution of green-bush.

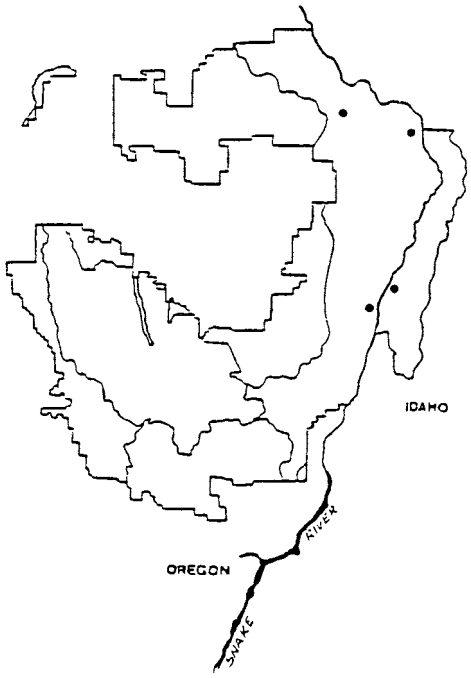
Management Considerations - These inaccessible communities are visited infrequently by domestic livestock as evidenced by the lack of utilization of bunchgrasses. Deer account for the hedged characteristic of the greenbush plants and probably are the principal ungulates using these sites. The green-bush communities occur in primary winter range for deer and bighorn sheep in Hells Canyon NRA. Observations of deer utilizing the green-bush were made in the canyons on repeated occasions.

Fire has modified these communities very little because of their relatively isolated nature on rims and rock outcrops.

Productivity - Production of bluebunch wheatgrass, the only species that supplies a reasonable amount of forage, is about 300 lbs/acre (dry wt.).

Netleaf hackberry/bluebunch wheatgrass plant association
Celtis reticulata/Agropyron spicatum (CERE2/AGSP) (SD56 11)

38. Snake River North of Steep Creek (Hells Canyon NRA) Plot 942



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA	Slope: (27%) 15-43%
Elevation: (1375 ft.)	Position: canyon btms.
Aspect: (SE-SW)	Other: receives very high use by recreationists, livestock and big game for shading

Table of Principal Species

CERE2/AGSP (n = 5)

Species	Code	Mean Foliar Cov (%)	Cons (%)	Total Range
Shrubs				
*netleaf hackberry	CERE2	36	100	20-75
Grasses				
*bluebunch wheatgrass	AGSP	13	100	5-25
*cheatgrass	BRTE	26	100	3-60
barren brome	BRST	13	60	0-25
Forbs				
hairy golden aster	CHVI2	3	40	0-5
narrow-leaved skullcap	SCAN	4	40	0-5
prickly pear	OPPO	1	40	0-1
moth mullein	VEBL	3	40	0-5
*shaggy fleabane	ERPU	2	80	0-5
yarrow	ACMIL	2	100	1-5
common yellow sweet-clover	MEOF	4	60	0-10
cleavers	GAAP	3	60	0-5
Surface Features				
rock		36	100	20-50
bare ground		3	100	1-5
moss/lichen		20	100	1-50
litter		35	100	10-60

* Principal Indicator Species

Vegetative Composition - The hackberry communities of the Wallowa-Snake Province are generally found at lower slope positions in deep canyons, occupying seepage lines on river terraces, and along riparian margins. Bluebunch wheatgrass is commonly associated as are annual bromes. Cheatgrass (BRTE), cleavers (GAAP), and barren brome (BRST) are usually present beneath the tree canopies where shading animals have disturbed the ground. Common associates tend to be some of the most drought-tolerant plants of the canyonlands (i.e., hairy golden aster (CHVI2), shaggy fleabane (ERPU), prickly pear (OPPO), and moth mullein (VEBL). Poison ivy (RHRA) occurs frequently with this community where it can tap deep moisture reserves. In more disturbed communities, skullcap (SCAN), yarrow (ACMIL), cheatgrass (BRTE), and common yellow sweet clover (MEOF) may form weedy patches.

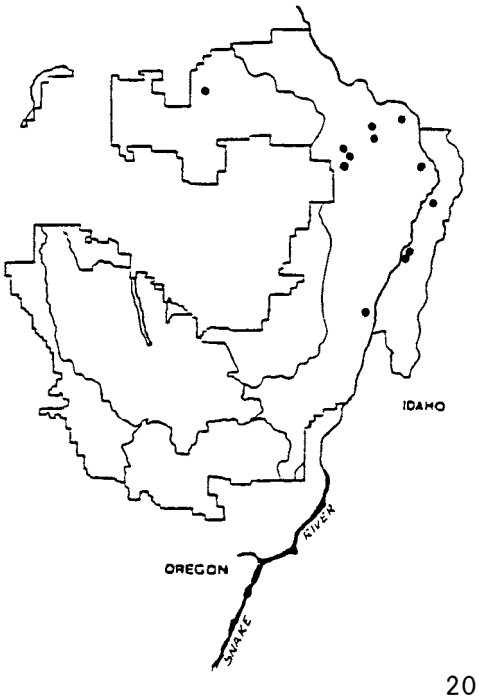
Distribution and Environmental Features - Elevations of sampled plots ranged from 1,100-1,600 feet on colluvial aprons, river bars, and along stream courses at the bunchgrass-riparian vegetation margin. Soils are well-drained colluvium or alluvial sands. Non-riparian habitats are exposed, hot, and among the driest sites in the canyon. Persistence of hackberry on these dry sites is due to subterranean moisture availability. Hackberry tends to define seepage areas by its extension across lower colluvial slopes otherwise devoid of shrubbery.

Management Considerations - Hackberry is sometimes the only available shade-producing plant over large expanses in the canyon bottoms. Because of this, the shrub is often browsed to a highline with the area beneath the hackberry heavily trampled. As a result of this disturbance, annual bromes are generally always found beneath the shrubs. Hackberry usually survives ground fire and may resprout following fire damage.

Comparison with Other Investigators - Daubenmire (1970) identified a hackberry/cheatgrass habitat type in the Snake River Canyon of southeastern Washington. He also noted its confinement to colluvial aprons near canyon bottoms. The cheatgrass associated was probably of zootic causes based on animal shading disturbance. Miller (1976), in classifying white alder communities, defined elevation limits of a hackberry community type for the Snake River drainage at 900 feet and 1,650 feet. He noted that the hackberry marked areas of good to excellent stream channel stability. Tisdale (1986) described a CERE2/AGSP habitat type consisting of very similar vegetation in the Snake River Canyon in Idaho. He postulated a second type in highly disturbed sites as a CERE2/SPCR habitat type.

Smooth sumac/bluebunch wheatgrass plant association
Rhus glabra/Agropyron spicatum (RHGL/AGSP) (SD61 21)

39. Roland Creek Canyon (Hells Canyon NRA) *Plot 576*



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA, WVRD	Parent Material: basalt, meta-volcanic, granite colluvium and loess
Elevation: (2100 ft.) 1350-2800 ft.	Solum depth: (50 in.) 40-58 in.
Aspect: (SE + SW) E-W	Loess depth: mixed
Slope (50%) 10-75%	Root conc: (28 in.) 12-39 in.
Position: footslopes, talus slopes toe-slopes	Depth to GT 35% rock frag./size: rock to surface/gravels to boulders.
Other: Common on talus cones of canyon lands. Rhus may invade adjacent bunchgrass communities.	Surface soil/subsoil texture: sandy loam/loam

Table of Principal Species

RHGL/AGSP (n = 12)

Species	Code	Mean Foliar Cov (%)/Cons (%) Late Seral (n=3)	Mid Seral (n=2)	Early Seral (n=7)	Total Range
Shrubs					
*smooth sumac	RHGL	35/100	28/100	51/100	15-85
Grasses					
*bluebunch wheatgrass	AGSP	28/100	12/100	14/100	3-35
Sandberg's bluegrass	POSA3	1/33	1/50	1/14	0-1
*cheatgrass	BRTE	4/100	7/100	19/86	0-40
rattlesnake brome	BRBR	3/67	-	10/43	0-25
Japanese brome	BRJA	-	10/50	6/43	0-10
Forbs					
skullcap	SCAN	-	15/50	6/57	0-15
yarrow	ACMIL	2/100	1/50	2/86	0-5
prickly pear	OPPO	1/33	1/50	2/29	0-3
horseweed	COCA2	-	1/50	4/43	0-10
varileaf phacelia	PHHE	1/67	-	1/14	0-1
Snake River phlox	PHCO2	1/33	5/50	1/43	0-5
goatweed	HYPE	1/33	-	3/57	0-5
tonella	TOFL2	-	1/50	20/57	0-60
Surface Features					
rock		68/67	40/100	52/100	0-80
gravel/pavement		10/67	40/50	10/14	0-50
bare ground		4/100	5/50	10/14	0-10
moss		5/67	-	7/86	0-40
litter		23/100	25/100	47/100	1-80
Herbage Production (lbs/acre dry wt.)					
bluebunch wheatgrass		215	150	250	125-250
other forage species		215	100	290	70-290
total		430	250	540	200-540

* Principal Indicator Species

Vegetative Composition - Smooth sumac normally occurs on colluvial or sandy alluvial soils at toe slope positions in the deep canyons of Hells Canyon NRA. In late seral stage, the RHGL/AGSP communities appear as patchy shrublands (mean RHGL cover: 35%) with bluebunch wheatgrass (AGSP) associated most heavily in openings. The shrubs generally are three to five feet tall. In some very protected stands of the canyons, sumac occurs with six to ten foot stature. Perennial forbs occur infrequently and with low cover. Narrow leaved skullcap (SCAN), varileaf phacelia (PHHE), yarrow (ACMIL), and horseweed (COCA2) are the most common. Certain plants, though not restricted to RHGL/AGSP, are indicative of the xeric, hot environment in which these deep canyon communities occur (i.e., prickly pear (OPPO), thyme leaf sandwort (ARSE), and prickly lettuce (LASE).

Increasing with disturbance are annual bromes (especially cheatgrass), goatweed (HYPE), cleavers (GAAP), and tonella (TOFL2). Tonella is especially prolific in more highly disturbed colluvium beneath sumac stands.

Distribution and Environmental Features - Communities in the RHGL/AGSP commonly occur as isolated small stands in tributary canyons of the Snake, Imnaha, and Grande Ronde Rivers at elevations below 3,000 feet. Sampled stands occurred from 1,350 to 2,800 feet (mean: 2,100 feet) on slopes with predominantly south to southwest aspects. Sumac stands generally occur on steep foot slopes (mean slope: 50%) where gravel to boulder-sized colluvium is accumulated. Vegetative cover is low with rock, gravel, and bare ground comprising as much as half of the total surface area of these sites.

Soils - Soils are typically very dark brown in color in surface layers, greater than 40 inches in depth, and formed in basalt, metabasalt, or granitic colluvium, or alluvium. Loess is often mixed with these materials. Surface layers have sandy loam textures with greater than 35% rock fragments. Subsoils commonly have loam textures with greater than 60% rock fragments by volume. Rock fragment distribution is normally layered throughout the soil and varies from gravel to boulder-sized. Surface rock fragments often exceed 50% cover.

These soils are highly variable. Their character will depend upon formative parent material and kind of deposition. Although gravel-sized material from colluvial or alluvial sources is the most common substrate, these communities will occur in bouldery rubble at some toeslope locations. Loess influence on forage production is greater on the more stable sites. In general, the stability of these sites depends upon the size of colluvial materials with the larger sizes providing greater stability to the site.

Synecological Relationship - Smooth sumac stands are often bordered by riparian zone vegetation downslope and xeric grassland vegetation (FEID-AGSP, AGSP/OPPO, AGSP/POSA3) upslope. Hackberry (CERE2) was often closely associated, but occupied more stable, moderately sloping sites and was more restricted to seepage lines and canyon bottoms. Sumac can apparently persist in more droughty colluvial talus cones. Green-bush (GLNE) occurs on rims at these lower elevations and was not observed in close proximity to smooth brome.

Role of Fire - RHGL/AGSP stands on rocky toe slopes are probably not susceptible to frequent fire damage. Smooth sumac will invade adjacent bunchgrass, dominated slopes in the absence of periodic fire. Following fire on these bunchgrass sites, the shrubs will have difficulty in competing against vigorous grassland vegetation. Animals tend to rub lateral branches and browse the sumac thus creating a high-line that would reduce the risk of a fire "crowning out".

Rockiness of the sites would also afford a level of fire protection. Fire has probably been instrumental toward containing the sumac by limiting its invasion into adjacent grassland slopes.

Management Considerations - Sumac stands are generally in close proximity to water and/or gentle canyon bottomlands. Animals, therefore, utilize RHGL/AGSP stands quite heavily for shading, grazing, or hiding cover. Due to steepness of slopes, rocky nature of the surface, and relatively small extension of stands in the canyon steppe, seeding of these communities may not be at all practical. Management of the surrounding sites and improving distribution of domestic grazing animals may limit degradation in these communities and help maintain the diversity they provide to the canyon ecosystem. Rabbits and deer browse on foliage and twigs; songbirds, chukars and quail feed on sumac and grass seeds in winter.

Sumac is invading some more mesic grassland sites throughout the canyon. This could be a result of lack of fire in the grassland ecosystems, response to overgrazing, and/or a favorable sequence of moist growing seasons.

Productivity - Forage production in this type is low in comparison to that measured in both bunchgrass and more mesic shrub communities. RHGL/AGSP, however, may have the highest total herbaceous production (mean: 360 lbs./acre dry wt.) of all xeric shrublands identified.

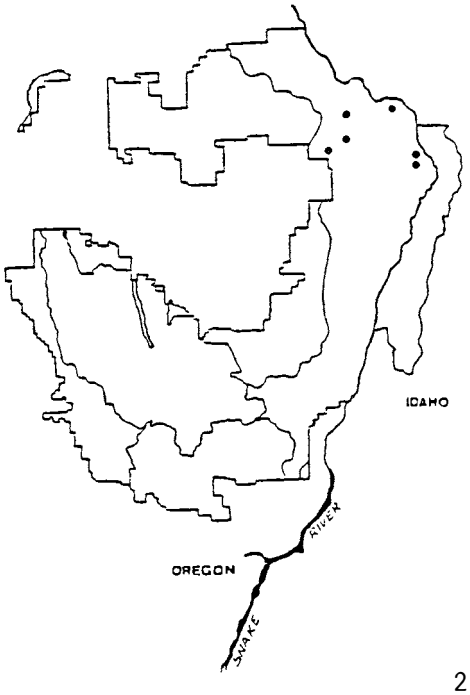
Comparison with Other Studies - Daubenmire (1970) described a RHGL/AGSP habitat type and indicated that a RHGL/BRTE zootic climax occurred in southeast Washington. Better condition sites in adjacent Oregon provided him more information and he concluded that cheatgrass had probably colonized degenerated bluebunch wheatgrass areas underneath the sumac. Tisdale (1986) described smooth sumac stands in the Snake River Canyon with bluebunch wheatgrass subordinate to red three awn. He suggests an RHGL/AGSP habitat type based on the strong component of bluebunch wheatgrass in these stands.

"Natural diversity should be preserved and
restored, and not destroyed and replaced with
monocultures that invite unnatural catastrophes."

Vogl

Buckwheat/Oregon bladderpod plant association
Eriogonum spp./*Physaria oregana* (ERIOG/PHOR) (SD93 22)

40. Lightning Creek Canyon (Hells Canyon NRA) Plot 336



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA	Parent Material: highly weathered basalt
Elevation: (2100 ft.) 1400-2400 ft.	Solum depth: (4 in.) 3-5 in.
Aspect: (S)	Loess depth: none
Slope (42%) 38-50%	Root conc: (5 in.) 4-7 in.
Position: lower 1/3 slopes	Depth to GT 35% rock frag./size: surface to 7 in./pea gravels
Other: Unique community occuring on very hot, dry altered basalt outcrops	Surface soil/subsoil texture: gravelly sands, gravelly sandy loams

Table of Principal Species

ERIOG/PHOR (n = 6)

Species	Code	Mean Foliar Cov (%)	Cons (%)	Range
bluebunch wheatgrass	AGSP	6	83	0-10
cheatgrass	BRTE	5	83	0-20
rattlesnake brome	BRBR	1	50	0-1
hairy milkvetch	ASIN2	2	50	0-5
*varileaf phacelia	PHHE	1	67	0-1
hairy golden-aster	CHVI2	1	50	0-1
*western prairie-clover	PEOR4	1	50	0-1
*pallid milkweed	ASCR	1	33	0-1
bristly cryptantha	CRIN3	2	50	0-1
*strict buckwheat	ERSTP	7	67	0-3
*slenderbush buckwheat	ERMI	5	50	0-10
prickly pear	OPPO	1	50	0-1
yarrow	ACMIL	1	67	0-1
*fuzzy tongue penstemon	PEER	1	33	0-1
*Oregon bladderpod	PHOR	4	67	0-5
*desert evening primrose	OECA2	1	100	1-3
hoary chaenactis	CHDO	2	67	0-3
Surface Features				
rock		6	83	0-15
pavement		82	100	60-95
bare ground		5	33	0-5
moss/lichen		3	33	0-5
litter		1	100	1-1

* Principal Indicator Species

Vegetative Composition - The ERIOG/PHOR plant association is found as isolated small communities on limited and unique substrates. Two species of buckwheat (Eriogonum strictum var. proliferum and Eriogonum microthecum) populate hydrothermally altered basaltic outcroppings found sporadically in the lower Imnaha and Snake River Canyons where this type is restricted. These outcroppings are easily weathered and generally contain a talus cone. Spatial patterns develop between the associated plants. Plants demonstrating a specific affinity to these sites are: desert evening primrose (OECA2), Oregon bladderpod (PHOR), western prairie-clover (PEOR4), fuzzy tongue penstemon (PEER), pallid milkweed (ASCR), and hoary chaenactis (CHDO). Other species commonly found are: prickly pear (OPPO), bristly cryptantha (CRIN3), hairy golden-aster (CHVI2), varied-leaf phacelia (PHHE), hairy milkvetch (ASIN2), yarrow (ACMIL), bluebunch wheatgrass (AGSP), and cheatgrass (BRTE).

Environmental Features - This type occurs sporadically from 1,400 feet to 2,400 feet in the Snake and Imnaha Canyons on southerly aspects and moderately steep slopes (mean: 42%). Surface temperatures are probably the hottest in the canyon owing to the southerly aspect, sparseness of vegetation, dark color of the rock, and extremely shallow soil (less than 6 inches in depth). There is little forage value to the grazing animal. Forage production, where measured, never exceeded 10 lbs/acre (dry wt.). Fire will not carry through these communities because of this sparseness of vegetation. The soil surface consists of pea gravels and sands (mean: 78% cover) which readily erode when displaced. Soil textures are gravelly sands to gravelly sandy loams.

Comparison with Other Investigators - Daubenmire (1970) defined an Eriogonum microthecum - Physaria oregana habitat type on similar sites along the Snake River in southeastern Washington. These consist of hydrothermally altered basaltic outcroppings at tops of flow structures in the lower Imnaha River system and on mudstones of the Coon Hollow Formation (Vallier 1974). Some of the sites visited in this study contained E. microthecum (50% on sampled plots) while all plots contained the evening primrose. Physaria oregana and Eriogonum strictum var. proliferum were both present 67% of the time on sampled plots. The sites are essentially equivalent such that no differentiation should be made based on the species of Eriogonum present.

Incidental Communities

1a. Aspen clones dominate over grasses and sedges and forbs . . . . . POTR (p. 226)

1b. Aspen absent 2

2a. Grasses and sedges dominate 3

3a. Tufted hairgrass (DECA) present 4

4a. Moist sedge group (i.e., CAPA, CAHO, CALU) . . . . . DECA-MOIST SEDGE MDWS (p. 224)

4b. Wet sedge groups (i.e., CARO2, CAAQ, CALE5) . . . . . DECA-WET SEDGE MDWS (p. 225)

3b. Tufted hairgrass absent 5

5a. Wet site sedges occur in absence of grasses . . . . . WET SEDGE MDWS (p. 225)

5b. Wet sedges absent 6

6a. Forb-grass meadows present; often dominated by California oatgrass (DACA), Kentucky bluegrass (POPR). or timothy (PHPR) . .Ridgetop MDWS (p. 223)

6b. Forb-grass meadows absent 7

7a. Giant wild rye present . ELCI (p. 210)

7b. Giant wild rye absent or present at less than 5% coverage. SPCR (p. 216)

2b. Forbs dominate. 8

8a. Seepage meadow vegetation 9

9a. Cusick's camas (CACU) present . . . . . CACU (p. 211)

9b. Cusick's camas absent; mules ears (WYAM), sticky cinquefoil (POGR), groundsel (SEIN), or bistort occur . . . . . Ridgetop MDWS (p. 223)

8b. Ridgetop outcrop vegetation 10

10a. Wallowa lewisia (LECOW) present . . . LECOW (p. 214)

10b. Wallowa lewisia absent; sulfurflower present . . . . . ERUMS (p. 215)

INCIDENTAL COMMUNITIES

Summary of Plant Association and Community Type Characteristics 1/

Plant Community Type	Elevation (feet)	Slope Position	Aspect	Slope	Parent Material	(2) Soil Depth Total (in.) Rt. Conc.	Principal Indicators	Principal Increasers/ Invaders	(3) Forage (lbs./acre) dry
SPCR	1200-1500 (1350)	lower slope river bars, terraces	W+E	5-22% (14%)	Ash-Loess + colluvium, alluvium	34-64 (45) 20-40 (30)	SPCR,ERPU VEAR,ERCI	BRTE,BRJA/ OPPO,HYPE	(690) 310-970
ELCI	1900-2550 (2250)	lower slope	all	10-23% (17%)	various	---- ----	ELCI,MOPE	BROMES/ GAAP,CARDARIA	---- ----
CACU	3400-6000 (5050)	lower to upper slope	SE-SW	15-60% (40%)	basalt	16-27 (22) 12-16 (14)	CACU,AGSP ALAC,PEBO	ACMIL,PODO/ ERUMS,PEVE	(1020) 560-1500
LECOW	5600-6300 (5730)	ridge tops, ridge brows	all	1-45% (15%)	various	---- ----	LECOW,PEFRS DAUN,SELA2	BAIN,LOCO2/ MAGL,GRNA	---- ----
ERUMS	4200-5600 (4740)	tops to upper slopes	S-W	5-55% (30%)	basalt	---- ----	ERUMS,AGSP POSA3,COCA4	PODO/	---- ----
Ridgetop Meadows	5300-5800 (5560)	ridge tops	all	1-8% (4%)	various	(24) 12-24 (18)	POGR,CALI3 DACA,PHPR	POGR,ARSO/ WYAM,POPR	(2600)
DECA-moist sedge Meadows	5400-7200 (6140)	ridges, basins	all	1-10% (3%)	basalt	19-30 (25) (17)	DECA,CAPA CAHO,CALU	ASFO,PEGL4/ VECA,RUOC	(780)
DECA-wet sedge Meadows	4800-7800 (6440)	ridges, basins	all	1-5% (2%)	basalt	21-40 (31) 17-18 (17)	DECA,CARO2 CAAQ,CASC5	ASFO,SECY2/	(550)
Wet sedge Meadows	5700-7400 (6500)	ridges, basins	all	1-15% (7%)	basalt	---- ----	CARO2,CAAQ CASC5,CACA		---- ----
POTR	4000-5300 (6500)	upper slopes	SE-SW	10-40% (30%)	various	---- ----	POTR,CARU BRCA,ASFO	ASFO,HAJE/	---- ----

1/ Range and mean (no.)
2/ Total soil depth and depth of root concentration (80% of roots)
3/ Forage production in mid and late seral communities

Giant wildrye plant community type
Elymus cinereus (ELCI) (GB71 11) (n = 2)

Giant wildrye occurs at lower elevations along riparian stream courses on colluvial or alluvial terraces. These stands are usually very dense with wildrye often dominating to the exclusion of other plants. Miner's lettuce (MOPE) is always associated. Disturbance of stands show weediness by cleavers (GAAP), white top (Cardaria sp.), and annual bromes.

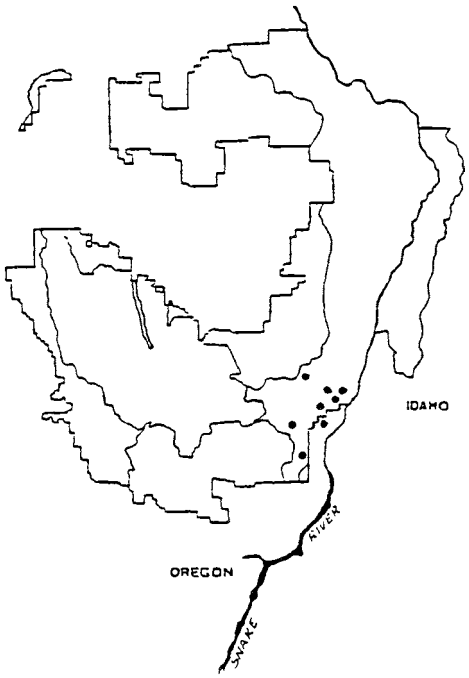
Wildrye sites are usually gently sloping and below 3,000 foot elevation in canyon bottoms. They occur as riparian stringers or patches at toe of slope positions on deep, fine-textured soils.

Many giant wildrye sites in the Snake River Canyon and its tributary canyons have been overgrazed resulting in the presence of only relict clumps of the species. These giant wildrye bottoms were once much more extensive in the canyonland bottoms (Wade Hall-personal communication). Heavy sheep overgrazing as well as intensive haying of the native stands has reduced them to relict status in many places. Daubenmire (1970) relates that giant wildrye was extensively cut for hay in the early settlement days. Giant wildrye is very susceptible to grazing and mowing below 8 inches. The species often has been preferred by winter grazing cattle following softening of its harsh herbage from fall and winter storms. In many canyon bottoms, the most preferred grass species (i.e., bluebunch wheatgrass and Idaho fescue) were lost to overgrazing resulting in greater dependence on the once abundant giant wildrye stands. In these situations, the succulent new spring growth of giant wildrye may have been more highly sought after by livestock with injurious results for the plant.

Before white settlement, Indians gathered seed of the wildrye for food. Today, their habitation sites often are defined by the occurrence of the grass. It is speculated that pre-historic peoples carried the seeds to their habitation sites and milled the seed for food consumption. The locations of these sites at south-facing toeslope positions would provide a good seedbed for the initiation of giant wildrye growth and establishment.

Cusick's camas plant community type
Camassia cusickii (CACU) (FW39 11)

41. Lonesome Creek Summit (Hells Canyon NRA) *Plot 1025*



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA, PRD	Parent Material: basalt bedrock
Elevation: (5050 ft.) 3400-6000 ft.	Solum depth: (40 in.)
Aspect: (SE-SW) SE to W	Loess depth: mixed
Slope (40%) 15-60%	Root conc: (15 in.) 13-17 in.
Position: (upper 1/3) canyon btm. to upper 1/3 slopes	Depth to GT 35% rock frag./size: surface to 7 in./gravels
Other: Centers on seepage sites of N.Pine -Dry cr. as unique community	Surface soil/subsoil texture: loam, clay/clay, silty clay

Table of Principal Species

CACU (n = 8)

Species	Code	Mean Foliage Cov(%)/Cons(%) Late Seral (n=2)	Mid Seral (n=4)	Early Seral (n=2)	Total Range
Grasses					
*bluebunch wheatgrass	AGSP	-	12/100	10/100	0-25
Sandberg's bluegrass	POSA3	5/100	1/25	1/50	0-5
Forbs					
*Cusick's camas	CACU	55/100	38/100	50/100	20-60
fern-leaved lomatium	LODIE	-	4/50	25/50	0-25
swale desert parsley	LOAM	10/50	3/25	-	0-10
Oregon checker-mallow	SIOR	1/50	2/50	1/50	0-3
Blue Mountain penstemon	PEVE	-	9/50	1/50	0-15
*Bolander's yampa	PEBO	1/50	5/50	-	0-5
*tapertip onion	ALAC	10/50	9/75	-	0-15
stonecrop	SELA2	4/100	10/25	3/50	0-10
woodrush pussytoes	ANLU	5/50	5/75	17/100	0-30
sulfurflower	ERUMS	-	3/75	1/50	0-5
yarrow	ACMIL	1/100	2/100	18/100	1-20
sticky cinquefoil	POGL	10/50	-	1/100	0-10
Douglas' knotweed	PODO	1/50	8/100	18/100	0-25
Surface Features					
rock		23/100	44/100	35/100	10-70
gravel		5/100	12/100	10/100	3-20
pavement		-	8/50	-	0-10
bare ground		4/100	7/100	15/100	1-20
moss		10/100	7/100	-	0-15
litter		35/100	16/100	2/100	1-65

* Principal Indicator Species

Vegetative Composition - The Cusick's camas seepage patch community contains 40 to 60% foliar cover of camas almost to the exclusion of other plants. Rock and gravel often make up the remainder of site coverage. Frequently associated plants are Bolander's yampa (PEBO), yarrow (ACMIL), Blue Mountain penstemon (PEVE), tapertip onion (ALAC), stonecrop (SELA2), pussytoes (ANLU), and Douglas' knotweed (PODO). When Cusick's camas occurs in an AGSP/POSA3 community, it decreases in coverage (20%). The seepage site plants found in the camas patches are replaced by AGSP/POSA3 members (i.e., bluebunch wheatgrass, woodsia, skullcap).

Cusick's camas communities are located in an area where past sheep overgrazing has resulted in adjacent bunchgrass communities that frequently have degraded to early and very early seral stages. Grazing by ungulates has resulted in the invasion by sulfurflower (ERUMS) and Blue Mountain penstemon (PEVE) from adjacent rocky rim habitats. With degradation, bare ground increases between perennials, moss declines, and rock/gravel coverage increases. Degraded camas sites contain a greater abundance of yarrow, Douglas' knotweed, pussytoes, and fern-leaved lomatium.

The characteristic site for the species is beneath basalt rims on colluvial inter-rim locations where seepage water persists well into early summer to permit the large bulbiferous plants to grow and flower in dense patches. As the seepage duration is reduced, the species is found more non-continuously as part of a bluebunch wheatgrass community. As succeeding rim levels are descended from the ridgetop, the camas community usually changes from continuous patches to separated individuals within a bunchgrass type.

Distribution and Environmental Features - This unique type occurs as small isolated communities within a well defined zone on the Wallowa-Whitman National Forest. An area bounded by Gumboot Creek on the west side of the Imnaha River, North Pine Creek south of Lonesome Summit, and by the Snake River Canyon from P.O. Saddle southward to Kirby Point is the center of a Cusick's camas population. Its only other known occurrence is in a limited area of Hells Canyon opposite this area in Idaho.

Cusick's camas has been observed from 3,400 feet in North Pine Creek Canyon to 6,000 feet at Nesbit Butte. Sampled stands located in the center of the Cusick's camas range were between 4,900 to 5,600 feet in elevation. Aspects were southerly with slopes averaging 40%. The highly oxidized reddish soils of camas communities were shallow and had clay to clay loam surface horizons. Total forage production on two sample plots ranged from 600 to over 1,000 lbs./acre, (dry wt.) with camas making up most of this amount.

Management Considerations - Elk appear to relish the leaf tips and an occasional camas inflorescence. Several camas patches were observed where the camas leaves had been uniformly grazed while adjacent bluebunch wheatgrass plants went unused. Most of the grazing witnessed apparently occurred after the flowering period. Ungulates can readily damage these communities by disturbance of the soil when it is still saturated with moisture; thus, sheep use before mid-July could be detrimental. Once the plants have flowered and the seepage dries, the grazing animal will have a minimal impact on the site.

Wallowa lewisia plant community type
Lewisia columbiana var. wallowensis (LECOW) (FX41 11) (n = 4)

The Wallowa bitterroot or lewisia sporadically occupies the upper canyon rims and ridge brows of the Snake River Canyon and adjacent canyons in Oregon. It is prolific on stable, rocky walls and peaks of the Seven Devils. Lewisia co-exists with shrubby penstemon (PEFRS) on the rim tops. Sandberg's bluegrass (POSA3), onespike oatgrass (DAUN), stonecrop (SELA2), and scabland fleabane (ERBL) are typical scabland associates while bluebunch wheatgrass and Idaho fescue occur as opportunists from adjacent FEID-KOCR grasslands. Other prominent plants associated are yarrow (ACMIL), hoary balsamroot (BAIN), Cous bisquitroot (LOCO2), and Blue Mountain penstemon (PEVE). As adjacent deeper-soil bunchgrass sites are overgrazed, lewisia may invade from its rocky habitat.

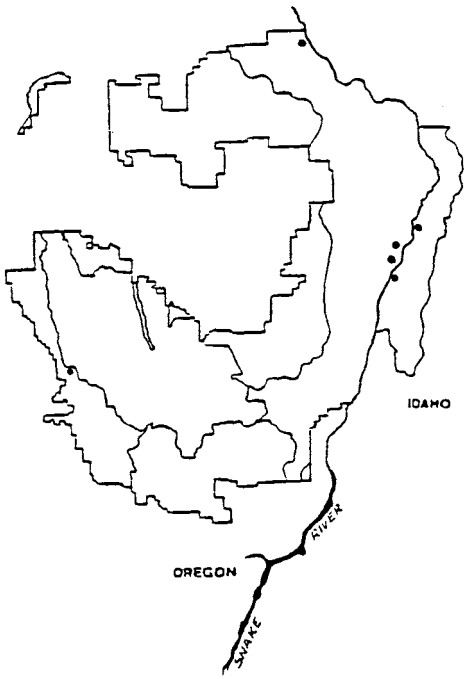
The stands sampled all occurred at ridgetop or ridgebrow locations in Oregon (Grizzly, Morgan, Jackey, and Deadhorse Ridges). Elevations ranged from 5,000 to 6,500 feet on these sites. The species also clings to rim palisade walls. Other observed communities of lewisia in the Seven Devils ranged from 6,000 to 9,000 feet where the species appeared to be more common as either a reflection of substrate affinities, cooler-moister conditions, or by virtue of its geographical setting closer to the center of its range.

Sulfurflower plant community type
Eriogonum umbellatum stellatum **(ERUMS) (FM91 13) (n = 6)**

These plant communities occur on ridge crests, saddles, and inter-rim sloping narrow ridges where probable past overgrazing coupled with wind erosion have resulted in a very harsh site. On the oxidized red-brown soils of the Lonesome-McGraw-Kirby Ridge vicinity, sulfurflower occurs as the dominant plant. Erosion pavement, rock, and gravel coverage is very high (mean: 50%). Associated plants are few and spatially separated. The more common plants with their mean foliar coverage percentage are as follows: Douglas' knotweed (PODO) (3%); bluebunch wheatgrass (AGSP) (8%); Sandberg's bluegrass (POSA3) (5%); and clustered birdbeak (COCA4) (2%). Sulfurflower may be part of other buckwheat scabland communities (i.e., strict buckwheat), but is especially prolific on the Lonesome-McGraw area of Hells Canyon NRA.

Sand dropseed plant association
Sporobolus cryptandrus (GB12 11)

22. Bill's Creek Terrace (Hells Canyon NRA) *Plot 930*



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: HCNRA	Parent Material: colluvium/ alluvium, + ash,loess
Elevation: (1350 ft.) 1200-1500 ft.	Solum depth: (45 in.) 34-64 in.
Aspect: (W + E) all	Loess/ash depth: (27 in.) 0-53 in.
Slope (14%) 5-22%	Root conc: (30 in.) 20-40 in.
Position: (river bars) river bars and river terraces	Depth to GT 35% rock frag./size: (52 in.) 50-53 in./gravels
Other: portrays SPCR communities on climax site: CERE2 communities often adjacent	Surface soil/subsoil texture: sandy loam, silt loam/ sandy loam,loamy sand

Table of Principal Species

SPCR (n = 5)

Species	Code	Mean Foliar Coverage (%) Constancy (%) Mid Seral (n=2)	Early Seral (n=3)	Total Range
Grasses				
*sand dropseed	SPCR	38/100	15/100	10-50
red three awn	ARLO3	-	14/100	0-30
annual fescues	FEME,FEMI	5/50	5/67	0-5
annual bromes	BRTE,BRJA	20/100	36/100	1-50
Perennial Forbs				
goatweed	HYPE	1/50	5/100	0-10
purple milkvetches	ASIN2,ASPUG	-	1/33	0-1
*shaggy fleabane	ERPU	1/50	5/33	0-5
prickly pear	OPPO	-	2/67	0-3
Annual Forbs				
thyme leaf sandwort	ARSE	5/100	2/67	0-5
Indian wheat	PLPA	-	3/33	0-3
*common speedwell	VEAR	3/50	5/33	1-5
*filaree	ERCI	2/100	1/100	1-3
blue forget-me-not	MYMI	-	1/67	0-1
rock		1/100	13/67	0-20
gravel		-	1/33	0-1
bare ground		1/100	1/100	1-1
moss		30/100	22/100	1-60
litter		25/100	50/100	15-90
Herbage Production (lbs/acre dry wt.)				
sand dropseed		400	250	210-400
other species		160	475	160-715
total		560	725	310-970

* Principal Indicator Species

Vegetative Composition - This type is characterized by communities on the sandy river terraces and alluvial bars where sand dropseed (SPCR) is considered climax. In these communities, sand dropseed dominates as the only perennial bunchgrass in mid seral stands. Cheatgrass (BRTE) and Japanese brome (BRJA) are usually always associated. Very few forbs occur in these grasslands. Shaggy fleabane (ERPU), thyme leaf sandwort (ARSE), and filaree (ERCI) are the most frequently encountered. Other plants that are restricted to warm, low elevation habitats often occurring with sand dropseed are: moth mullein (VEBL), blazing star (MELA2), ground-cherry (PHLO2), and white stemmed globemallow (SPMU).

Early seral sand dropseed communities are usually invaded by red three awn (ARLO3), goatweed (HYPE), and prickly pear (OPPO) with reduced dropseed coverage. Annual brome coverage is nearly double that of mid seral communities. Annual forbs that are most commonly associated include thyme leaf sandwort (ARSE), blue forget-me-not (MYMI), filaree (ERCI), and small flowered crane's bill (GEPU). Bare ground, rock, and gravel exposure increase with disturbance. Moss coverage declines with the site degradation.

Distribution and Environmental Features - River terraces and alluvial bars along the Snake River are the only sites capable of supporting climax sand dropseed communities in the Province. Elevations range from 1,200 to 1,500 feet (mean: 1,350 feet), one of the lowest elevation communities found on the Wallowa-Whitman National Forest. Slopes are flat to gentle (range 5-22%, mean: 14%) with variable aspects.

Soils - Soils are typically very dark greyish brown in color in surface layers, greater than 34 inches in depth, and formed in river-deposited sands or colluvial volcanic ash covering post-pleistocene terraces of the Snake River. Rock fragments may be absent in "recently" deposited surface layers but increase greatly in the river terrace material. Surface and subsoil layers have silt loam or sandy loam textures. Clay concentrations are uncommon and occur only in the older river terraces. Rock fragments are gravel-sized in colluvial surface and subsurface layers, and gravel to boulder-size in deep terrace layers. Surface rock seldom exceeds 5% cover.

These soils are extremely variable because of differences in parent and manner of deposit. Some are formed in river deposited material without a layer of colluvium in the surface. These soils are sandy and quite uniform. Other soils are formed in deep ash accumulated at toeslopes on old river terraces or river bars. These soils are coarse-ashy in the surface and sandy in the subsurface layers. Rocky colluvium may mix with the ash in surface and subsurface layers forming variable mixes of fine and coarse material. What all these soils have in common is their inability to hold moisture. Despite their position at lower slopes, they are excessively well-drained and are capable of supporting only the most drought tolerant species. Rooting depths are among the deepest observed in all grassland types indicating the need and ability of sand dropseed to tap deep moisture sources.

Summary of Soil and Site Characteristics (all samples) - SPCR

Solum Depth*	Rooting Depth**	Ash Depth	Surface Soil depth	Site Stability	*** Summer Temp.	Depth to 35% rock fragments	%Surface rock frag.
34 in. to 60 in.	20 in. to 40 in.	0 to 53 in.	15 in. to 34 in.	very stable	57°F to 71°F	0 to 54 in.	0% to 20%

* Depth to bedrock, paralithic contact, or unconsolidated rock material.
** Depth that includes 80% of all roots. *** Temperature at 20 in. depth.

Successional Relationships - Probable pre-historic sites of sand dropseed are the warm, sandy substrates provided by the alluvial deposition of the Snake River. Sand dropseed aggressively invades severely degenerated AGSP-POSA3 communities and is able to persist with heavy use by ungulates because of its protected root crown, late maturity, and lower preference in communities containing bluebunch wheatgrass. The sandy river bars and terraces are uniformly vegetated with sand dropseed and cheatgrass. Bluegunch wheatgrass and Sandberg's bluegrass are not present.

Sand dropseed communities are usually adjacent to the low elevation AGSP-POSA3 types (especially AGSP-POSA3/OPPO, AGSP-POSA3/ASCU4, AGSP-POSA3/ERPU), and xeric shrublands (i.e., netleaf hackberry, smooth sumac).

Role of Fire - Sand dropseed is not readily damaged by fire. In late seral communities, the lack of fuels and open, spatial nature of the dropseed stands may slow the spread of fire. Earlier seral communities may present a special problem. Unused sand dropseed foliage accumulates and forms dense bunches of flammable dry material. The rate of spread through such communities must be rapid enough to lower the intensity of the burn in order to insure the survival of sand dropseed.

Management Considerations - Cattle and wild ungulates generally avoid these sites in preference to adjacent bluebunch wheatgrass-dominated grasslands. Hackberry (CERE2) shrubs often are interspersed within the sand dropseed-dominated grassland and provide thermal cover to animals. Disturbance from animal congregation in these situations is the major impact to these communities. Sheep undoubtedly have made early use of annual bromes associated with sand dropseed communities. Livestock are known to utilize sand dropseed when it is succulent in early summer, but normally cattle have left the river level before green-up of the species. Cattle utilize the species principally in the fall following rain-softening of cured shoots. This use pattern normally promotes sand dropseed.

Productivity - Overall herbage productivity is moderately low in sand dropseed communities and made up predominantly by species of low palatability. No other type produces as much sand dropseed. This species tends to decline in productivity on the more severely degraded sites while other species, notably annuals, increase.

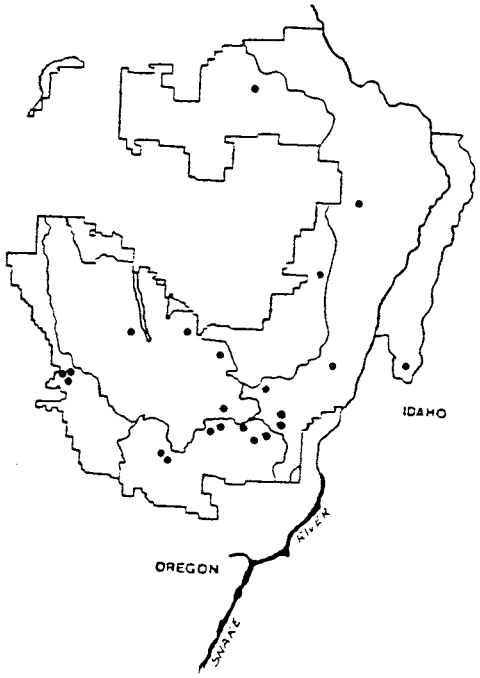
Comparison With Other Studies - Daubenmire (1970) described a SPCR-POSA3 habitat type in limited sampling of the Snake River Canyon in southeast Washington. His sampled plots contained a high Sandberg's bluegrass coverage and frequency (mean: 16% and 78% respectively). Sandberg's bluegrass is absent on the sites portraying the sand dropseed river terrace communities in Idaho and Oregon. Either the early availability of Sandberg's bluegrass on these gentle river-level sites has resulted in the total elimination of Sandberg's bluegrass or the Daubenmire sites are located on other substrates where Sandberg's bluegrass has been better able to persist with grazing pressure. However, the hot, dry sandy substrates of the Hells Canyon NRA sites may not have ever supported Sandberg's bluegrass. Tisdale (1980) also describes a SPCR-POSA3 habitat type for the Snake River Canyon with Sandberg's bluegrass averaging 2% coverage and occurring with a frequency of 36%. The sites with Sandberg's bluegrass probably would fit into the AGSP-SPCR-ARLO3 plant community type of this Wallowa-Snake Province.

"Men argue, nature acts."

Voltaire, 1764

Meadows

42. Deep Creek Basin, Seven Devils (Hells Canyon NRA) Plot 7069



ENVIRONMENT (all plots)	SOILS (typical soils)
Location: all districts	Parent Material: loess-ash over various geologies
Elevation: (6300 ft.) 4700-7800	Solum depth: (25 in.) 17-40 in.
Aspect: all	Loess-Ash depth: (20 in.) mixed to 40 in.
Slope (3%) 0-15%	Root conc: (18 in.) 17-22 in.
Position: plateau-ridge tops, basins benches, brows	Depth to GT 35% rock frag./size: (23 in.) 17-40 in./gravels, stones
Other: represents areas where soil is saturated during most of the year	Surface soil/subsoil texture: silt loam,silt/silty clay, silty clay loam,sandy clay loam

Table of Principal Species

Meadows (n = 22)

Species	Code	Ridgetop Meadows (n=3)	DECA-Moist Sedge (n=6)	DECA-Wet sedge (n=5)	DECA-Wet Sedge (n=5)	Wet Sedge (n=3)
		Mean Foliar Cover (%)/Constancy (%)				
Grasses						
tufted hairgrass	DECA	-	20/100	21/100	12/100	-
timber oatgrass	DAIN	-	5/50	-	-	-
timothy	PHPR	6/67	-	-	-	-
California oatgrass	DACA	40/33	-	-	-	-
Kentucky bluegrass	POPR	20/33	10/25	-	-	-
Sedges and Rushes						
Holm's Rocky Mtn sedge	CASC5	-	-	32/100	-	44/67
beaked sedge	CARO2	-	-	-	6/75	62/67
water sedge	CAAQ	-	-	-	6/50	13/67
lenticular sedge	CALE5	-	-	-	8/75	-
Jones' sedge	CAJO	-	-	-	27/50	15/33
thick-headed sedge	CAPA	-	15/75	-	-	-
Hood's sedge	CAHO	-	20/25	-	-	-
few flowered spikerush	ELPA2	-	-	-	21/50	3/33
Forbs						
common horsetail	EQAR	-	2/25	-	2/75	38/33
mountain buttercup	RAPO	-	-	42/25	9/50	-
bistort	POBI	8/67	3/50	9/50	1/50	1/33
leafybract aster	ASFO	-	9/75	10/50	-	-
cleftleaf groundsel	SECY2	-	-	7/50	-	-
sticky cinquefoil	POGR	25/67	4/25	-	-	-
twin arnica	ARSO	15/67	-	-	-	-
mules ears	WYAM	43/67	-	-	-	-
woolyhead clover	TRER	17/67	-	-	-	-
groundsel	SEIN	20/33	6/50	-	-	-
California false hellebore	VECA	-	8/25	-	-	-
Herbage Production (lbs/acre dry wt)						
tufted hairgrass	DECA	-	300	110	-	-
other grasses	PHPR,POPR,DACA	1600	20	-	-	-
sedges		100	210	180	-	-
forbs		900	250	260	-	-
Total		2600	780	550	-	-

Meadows in the Wallowa-Snake Province have been severely degraded by grazing, making portrayal at later seral stages very difficult. Presumably the moist meadows between 5,000-7,000 feet elevation were once characterized by a dominant cover of tufted hairgrass (DECA) and sedges (Carex Spp.). Although vestiges of tufted hairgrass remain in some meadows, Kentucky bluegrass (POPR), timothy (PHPR), showy aster (ASFO), cinquefoils (POGR, POGL), and sedges are often the most prevalent species. Extremely degraded meadows are often dominated by mules ears (WYAM), woolyhead clover (TRER), slender rush (JUTE varieties), groundsel (SEIN), and twin arnica (ARSO). Hydric areas of moist meadows often contain bistort (POBI) and California oatgrass (DACA). The sedge component may contain pond sedge (CALI3), meadow sedge (CAPR), woodrush sedge (CALU), Liddon's sedge (CAPE), and Holm's Rocky Mountain sedge (CASC5) depending on elevation, moisture content, and degree of disturbance. Common dandelion (TAOF) was very frequent in most meadows sampled.

Hall (1973) described moist meadows dominated by tufted hairgrass and/or Kentucky bluegrass in the Blue Mountains. Franklin and Dyrness (1973) described DECA-POPR communities in the grand fir zone of eastern Oregon with recognition of the four major steps in degeneration depicted by Reid and Pickford in 1946. These stages are 1) perennial grass domination; 2) mixed grass and forb domination; 3) perennial forb domination; and 4) annual forb domination. Mountain meadows in forb dominated stages are the most frequently encountered in the Wallowa-Snake Province. Some of these are characterized in the FEID-CAHO plant association degenerative sequence.

Meadows have been segregated into four types based on the following attributes:

1. Ridgetop meadows - These moist inclusions in the FEID-KOCR dominated ridgetops normally dry late in summer and are located on the flat dissected plateau top.

2. Tufted hairgrass - Moist sedge meadows. Usually adjacent to water courses with a vernal moisture supply to the roots below the surfaces.

3. Tufted hairgrass - Wet sedge meadows. Usually adjacent to water courses with surface moisture present most of the summer season.

4. Wet sedge meadows - Water is standing year-round. Only hydric-adapted plants can tolerate this environment.

Ridgetop Meadows (n = 3) (FW)

The dissected plateau of the Imnaha-Snake divide contains meadows as inclusions in the FEID-KOCR ridgetop type. They differ from the FEID-DAIN-CAREX type by their assemblage of wetter plant species and occurrence on nearly level ridgetop sites. These sedge-grass meadows are very forb-rich owing to the intensity and duration of grazing by domestic and wild ungulates. Meadows could not generally be found in better than early seral stages.

Mid seral ridgetop meadows are portrayed as being dominated by forbs including sticky cinquefoil (POGR), groundsel (SEIN), yarrow (ACMIL), red avens (GETR), dandelion (TAOF), woolyhead clover (TRER), and twin arnica (ARSO). Included in these forb-rich sites are sedges (i.e., pond sedge (CALI3)) and grasses (i.e., California oatgrass (DACA), prairie junegrass (KOCR), timothy (PHPR), and Kentucky bluegrass (POPR)). Bistort defines the wetter portions of these meadows.

Early seral ridgetop meadows are portrayed by a diminished species list with lower abundance by grasses and sedges and invasion by alien forbs. Dominating these meadows are mules ears (WYAM), sticky cinquefoil (POGR), twin arnica (ARSO), woolyhead clover (TRER), and yarrow (ACMIL). Bistort (POBI) and slender rush (JUTET) define the wetter segments.

Very early seral ridgetop meadows have lost their moisture-holding capacity to maintain mesic and hydric plants resulting from desiccation of the upper soil horizons. The loss of perennial vegetative cover permits this surface drying due to increased exposure and heat. As a result, bare ground surface gravels and rocks tend to dominate with a plant population listing of annuals in low abundance (i.e., Torrey's cryptantha (CRTO), Douglas' knotweed (PODO), cluster tarweed (MAGL), and Harkness' linanthus (LIHA)). Only the deep tap root of mules ears is able to encounter moisture that was once available at surface levels of these deep soil sites. Vernal pools that have dried are populated by Kellogg's knotweed (POKE) and needle-leaf navarretia (NAINP).

Tufted hairgrass - moist sedge meadows (n = 6) (MM19 21)

Tufted hairgrass (DECA) meadows are found from 5,400 to 7,200 feet in the Wallowa-Snake Province with a moist sedge group of species requiring subirrigated moisture throughout most of the vernal season. The sedges which are most commonly found and define this group are: thick-headed sedge (CAPA), Hood's sedge (CAHO), and woodrush sedge (CALU). Timber oatgrass (DAIN), Canada reedgrass (CACA), and Kentucky bluegrass (POPR) may also be associated in this grass-sedge dominated community. Forbs which occur in these communities, often as weedy patches, are California false hellebore (VECA), leafybract aster (ASFO), globe penstemon (PEGL4), and sweetmarsh groundsel (SEFO).

Tufted hairgrass meadows have received intense overgrazing due to their location near water sources for animals and because of their abundance of preferred forage species. As a result, many meadows assignable to the type are difficult to distinguish because they have lost their native sedge-grass composition. Eroded water courses lower the water table and alter the hydrollogic regime which contributes to changes in species composition. Replacement is usually by rank, succulent forbs often of high stature (i.e., Fendler's waterleaf (HYFE), arrow-leaf groundsel (SETR), California false hellebore (VECA), western coneflower (RUOC), and asters (especially leafybract aster and thickstem aster)).

Tufted hairgrass - wet sedge meadows (n = 10) (MM19 22)

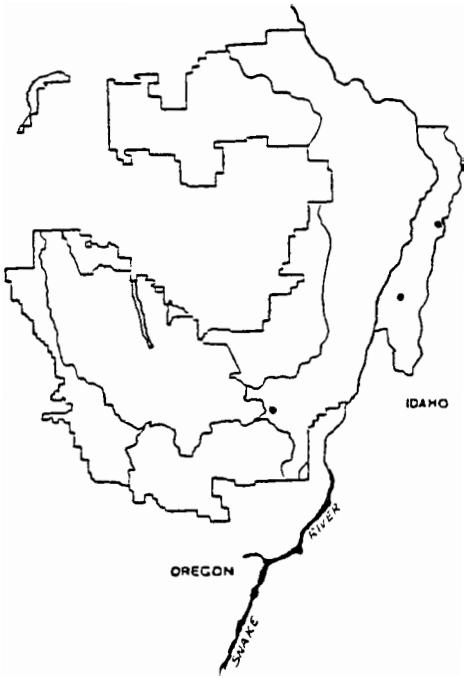
Tufted hairgrass - wet sedge meadows are found from 4,800 to 7,800 feet in the Wallowa-Snake Province. Sedges that belong to this wet group include species requiring standing water throughout most of the summer season. At lower elevations (below 6,500 feet), the following sedges are often associated: beaked sedge (CARO2), water sedge (CAAQ), blister sedge (CAVE), lenticular sedge (CALE5), Jones' sedge (CAJO), and thick-headed sedge (CAPA). Of these, beaked sedge and lenticular sedge are the most frequent. Forbs which may be associated are mountain buttercup (RAPO), bistort (POBI), common horsetail (EQAR), and common camas (CAQU). Above 6,000 feet, Holm's Rocky Mountain sedge (CASC5) is the dominant associate with tufted hairgrass. Few-flowered spike-rush (ELPA2) is often a member of these higher elevation wet communities. Forbs which may be associated are bistort (POBI), leafybract aster (ASFO), cleftleaf groundsel (SECY2), mountain buttercup (RAPO), and Pacific onion (ALVA).

Wet sedge meadows (n = 3) (MW19)

Sedges requiring season-long standing water characterize the wet sedge meadows of the 5,000 to 7,000 foot elevational range in the Wallowa-Snake Province. The most commonly occurring sedges are beaked sedge (CARO2) and water sedge (CAAQ) below 6,500 feet and Holm's Rocky Mountain sedge (CASC5) above 6,000 feet. The only grass able to withstand these wet habitats is Canada reedgrass (CACA). The sedge community is almost pure except for a few associated forbs. The most frequently found forbs are bistort (POBI), arrowleaf groundsel (SETR), and Gray's lovage (LIGR).

Quaking aspen plant community type
Populus tremuloides (POTR) (HQG1) (n = 3)

69. Little Granite Creek near Hibbs Cow Camp (Hells Canyon NRA) *Plot 7024*



ENVIRONMENT
(all plots)

Location:
HCNRA, ECRD

Elevation: (6500 ft.)
4000-5300 ft.

Aspect:
SE-SE

Slope: (30%)
10-40%

Position: upper 1/3 slopes

Other: occurs sporadically across Province

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Quaking aspen stands are infrequent in the Wallowa-Snake Province. Clones are generally limited to fringes around meadows or as islands in a ridgetop grassland where subsurface moisture is available throughout most of the growing season. These stands are usually highly modified by cattle and big game use or water developments. Describing the native plant community of these stands is therefore difficult. Grasses and sedges usually occurring in better condition stands are pinegrass, elk sedge, Hood's sedge, Kentucky bluegrass, and mountain brome. Generally, forbs are weedily present and form dense, rank stands beneath the trees. Major species encountered are leafy aster (ASFO), showy fleabane (ERSP), sticky cinquefoil (POGL), paintbrushes (CAMI2, CAHI2), lupines (LUPIN), penstemons (PENST), blue stickseed (HAJE), and meadowrue (THOC).

Aspen is found in limited abundance in the Blue Mountains (Hall - 1973) as well as the Wallowa and Seven Devils Mountains. In the Blue Mountains, meadows fringed by aspen are more commonly found. Aspen is much more important in plant communities in the central Rockies. Aspen communities have been described by Schlatterer (1972) in south central Idaho; Youngblood (1979) in Wyoming and Utah; Steele (1983) in extreme southeast Idaho and western Wyoming; and Mueggler (1985) in an overview of aspen community classification throughout the Rocky Mountains, Great Plains, and Black Hills.