

# ANTELOPE-BRUSH/BUEBUNCH WHEATGRASS

*Purshia tridentata/Pseudoroegneria spicata*

Original prepared by W.R. Erickson

## Plant Community Information

### Description

This dry shrub-steppe grassland community is rare in late seral stages with a natural fire cycle (CDC n.d.). These remnant stands of antelope-brush (*Purshia tridentata*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) are often found on crests and upper slopes. Sites are also sometimes in open, savannah settings of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). Saskatoon (*Amelanchier alnifolia*), Idaho fescue (*Festuca idahoensis*), and arrow-leaved balsamorhiza (*Balsamorhiza sagittata*) are also key species. These sites have a diverse herbaceous flora (Braumandl and Curran [compilers and editors] 1992).

Rough fescue (*Festuca campestris*) or kinnickinnick (*Arctostaphylos uva-ursi*) are also dominant on some sites, and others may have shared abundance or patches of Columbia needlegrass (*Achnatherum nelsonii*), Sandberg's bluegrass (*Poa secunda*), pasture sage (*Artemisia frigida*), and shining arnica (*Arnica fulgens*). The presence of hairy golden-aster (*Heterotheca villosa*) and stiff needlegrass (*Achnatherum occidentale* ssp. *pubescens*) are considered diagnostic.

Other herbs typically present with a low cover include junegrass (*Koeleria macrantha*), slender hawksbeard (*Crepis atribarba*), timber milkvetch (*Astragalus miser*), yarrow (*Achillea millefolium*), death camas (*Zigadenus venenosus*), old man's whiskers (*Geum triflorum*), graceful cinquefoil (*Potentilla gracilis*), fern-leaved desert parsley (*Lomatium triternatum*), brown-eyed Susan (*Gaillardia aristata*), tufted phlox (*Phlox caespitose*), mariposa lily (*Calochortus macrocarpus*), dwarf

goldenrod (*Solidago spathulata*); and both blue-eyed Mary (*Collinsia parviflora*) and prairie crocus (*Anemone patens*) in spring.

Generally there is no moss and lichen layer. Occasionally, sites have a high cover of lichens (*Cladonia* spp.) or mosses (*Tortula ruralis*).

The presence of Kentucky bluegrass (*Poa pratensis*), particularly where it occurs with higher cover, is an indication of higher disturbance levels.

Climatically, this plant community occurs within relatively hot dry regions for plant growth. This community occurs on coarse-textured, glacio-fluvial terraces or colluvial materials over calcareous bedrock. Three common slope position occurrences are level, valley bottom sites; warm aspect, upper slopes (10–40%); to crests. These sites have been assigned to xeric moisture and medium to rich nutrient classes (Braumandl and Curran [compilers and editors] 1992). Soils vary from sandy and poor on the terraces to loamy and very rich on the slopes. They are classified variously, but melanization is a major soil process. Humus forms are usually Rhizomulls, but may be less well developed (Moders or Mors) on poor sites.

### Distribution

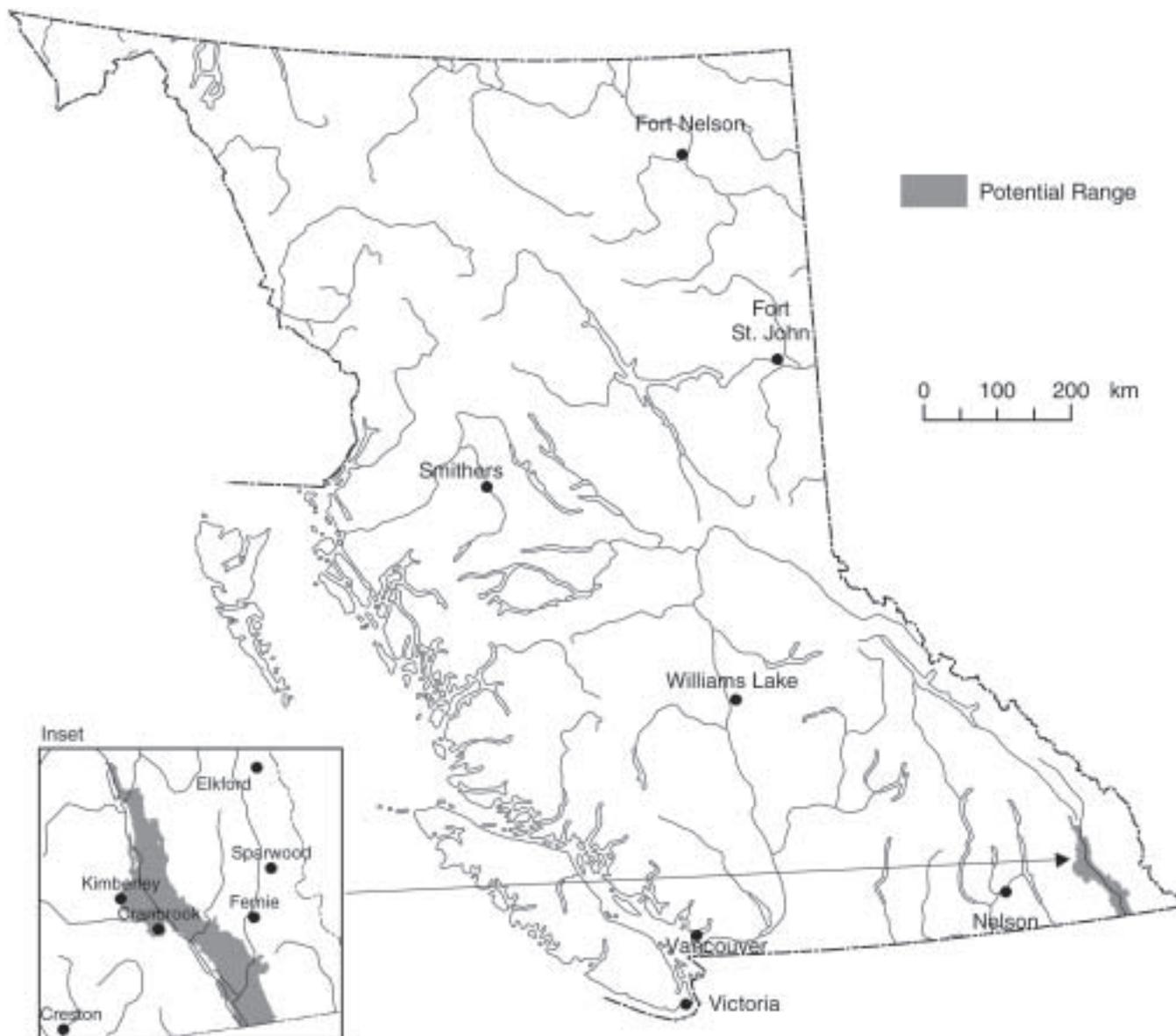
#### Global

The community is one of a complex of similar types that reaches its northern extent in British Columbia. Occurring east of the Cascade Mountains in British Columbia, similar plant communities extend south to Washington and Oregon, Idaho and Montana, and Oregon (NatureServe Explorer 2002).

#### British Columbia

This plant community is restricted to valley bottoms and lower slopes in the southern Rocky Mountain

## Antelope-brush / Bluebunch Wheatgrass (*Purshia tridentata* / *Pseudoroegneria spicata*)



Note: This map represents the potential area where this plant community may be found. The map is based on the Ecoregion and Biogeoclimatic ecosystem classifications as well as current knowledge of the distribution of the plant community. This plant community occurs as localized areas within the range represented.

Trench. It occurs south of Canal Flats, is bounded on the west by St Mary River and on the east by Baynes Lake, and extends to the border at Tobacco Plains.

### ***Forest region and districts***

Southern Interior: Rocky Mountain

### ***Ecoprovince and ecosection***

SIM: EKT

### ***Biogeoclimatic units***

IDF: dm2/02

PP: dh2/00

### ***Broad ecosystem units***

DP, PP

### ***Elevation***

700–1200 m

## **Plant Community Characteristics**

### **Structural stage**

3: shrub-herb

3a: low shrub

Sometimes set in open savannahs not covered by the structural stage classification.

### **Natural disturbance regime**

Frequent stand-maintaining fires (NDT4) (MOF and MELP 1995). Periodic fire, grazing and browsing, and insect outbreaks are among the historic natural disturbances for this community (Youtie et al. 1988; MOF and MELP 1995; Rondeau 2001; University of Wyoming, n.d.; D. Johnson, pers. comm.). Collectively, these disturbances would keep stands open and provide renewal or replacement opportunities where growth or vigour was stagnated due to plant density, bunchgrass litter, pine needle accumulations, or competition. Renewal would be provided by a frequent fire regime, such as the 5- to 25-year frequency required to maintain the ponderosa pine/antelope-brush habitat type, bluebunch wheatgrass phase in a treeless state (Arno 1979; Fischer and Clayton 1983).

This community is part of broader fire-maintained ecosystems, which have been subject to fire

suppression and consequent forest encroachment and ingrowth (Gayton 1996; Hardy and Arno [editors] 1996). In addition, the key species of the community still have susceptibilities to higher burn intensities in different seasons (Thomson 1988; Zlatnik 1999a, 1999b).

The species of this community are generally adapted to and resilient to disturbance. An exception is the susceptibility of bluebunch wheatgrass and Idaho fescue to spring defoliation by herbivores (McLean and Marchand 1968). Conditioning of the vegetation by native ungulates is part of the natural ecosystem processes of this community. The subzone variant area supports large populations of ungulates and is important as winter range. Current typical composition reflects the influence of grazing and browsing pressure, with more dominance by antelope-brush and balsamroot, and less by Idaho fescue and bluebunch wheatgrass (Youtie et al. 1988; University of Saskatchewan, n.d.; pers. obs.). In addition, these latter two bunchgrasses most likely have exchanged dominance on late seral sites. This community has been replaced by grazing pressure on early seral sites, with conversion to pussytoe species, needlegrasses and weedy forbs, and invading species such as cheatgrass (McLean and Marchand 1968; pers. obs.). Sometimes, however, the tough, arching stems of bitterbrush provide mini-refugia, which protect the late-seral species (D. Gayton, pers. comm.).

For the most part, the form of antelope-brush differs when compared with shrubs in the south Okanagan valley (W. Erickson, pers. obs.). The smaller and less-upright form and presumably younger top-growth may suggest historic disturbances, more severe winter temperatures, effects or possibly a genetic difference in the Trench populations (pers. obs.; D. Gayton, pers. comm.). A negative feedback mechanism should be noted, in which the old growth antelope-brush plants are killed in the event of a fire, due to the level of fuel accumulation in their structure and in the protective zone they provide (D. Gayton, pers. comm.).

Many sites currently have considerable exposure of bare mineral soil. The extent to which this represents

the natural condition (i.e., due to natural erosion or hoof action by native ungulates) is unknown.

### **Fragility**

Moderately fragile due to the dry climate and the effects of coarse soils on plant growth, ameliorated by the presence of underlying calcareous bedrock and the site stability influences of the coarse soils. Classic studies by McLean and Marchand (1968) in related habitats indicate the long period of recovery required from an early seral stage. Many sites may be stalled in a state with Kentucky bluegrass, needlegrass (*Achnatherum* spp.), or cheatgrass (*Bromus tectorum*) dominance, and may require management treatments for recovery (Westoby et al. 1989).

## **Conservation and Management**

### **Status**

The antelope-brush/bluebunch wheatgrass plant community is on the provincial *Red List* in British Columbia. It is ranked S2 in British Columbia. Its global status is unknown; however, related plant communities are ranked G3.

### **Trends**

Identified as declining, with remaining occurrences estimated at between 21 and 100 (Meidinger et al. 2002). The plant community has been replaced with weedy, seral species on many sites, and some sites have been lost to development. There is not a complete inventory of occurrences of this plant community, but at least 17 plots have been described (Meidinger 2002; W. Erickson, unpubl.). Terrestrial ecosystem mapping summaries indicate 710 ha mapped as this community in the Premier-Diorite project area. Based on plot data from the project, there is considerable disturbance and invasion of introduced species in the area.

### **Threats**

Threats include livestock and wildlife grazing and browsing, urban development, invasive species, impoundments, golf course development, intensive agriculture and probably climate change. In addition, fire suppression, soil exposure, reductions in plant cover, and the lack of prescribed burning lead to forest encroachment. Outdoor recreation (e.g., trail bikes), livestock and wildlife grazing and browsing can cause soil exposure, impact plant vigour and composition, and reduce ecosystem stability. Invasive species can invade the community, displacing native plant species.

### **Legal Protection and Habitat Conservation**

There is no legal protection for plant communities except for those within protected areas and parks.

This community occurs in several small protected areas, including Kikomun Creek Park, Premier Ridge and Sheep Mountain Wildlife management areas. It may also occur within Premier Lake Provincial Park and recently acquired conservation properties.

Several range reference areas include this community, including Skookumchuck, Old Premier Ridge, Gold Creek, Bagley's Pasture, and Bull River. Others, such as Premier Ridge, Pickering Hills, and Standard Hill, are currently in earlier seral stages, but have the site potential to develop this community over time. These long-term monitoring exclosures are considered too small in size (2–3 ha) for plant community conservation, with the exception of Skookumchuck, which has 104 ha under protection (D. Gayton, pers. comm.).

The *Forest and Range Practices Act* enables the use of range use plans in managing livestock operations. Range use planning may address this community through implementation of similar recommendations as outlined below in the "General wildlife measures" below.

## Identified Wildlife Provisions

### Sustainable resource management and planning recommendations

This small patch community was originally distributed over ~385 000 ha, although sparsely. It occurred as small to large patches, often within a mosaic of open or savannah type forest, and grasslands. It is recommended to:

- ❖ maintain and restore shrub-steppe grassland and open savannah;
- ❖ control forest ingrowth and encroachment;
- ❖ maintain or restore at least 20 occurrences of this community in good condition across the range of the plant community; and
- ❖ maintain or restore occurrences to as close to natural condition as possible and practical.

### Wildlife habitat area

#### Goal

Maintain or recover known occurrences.

#### Feature

Establish WHAs at occurrences that have been confirmed by a registered professional in consultation with the B.C. Conservation Data Centre or Ministry of Forests regional ecologists. Priority for WHAs should be any climax occurrences of this community. As a lower priority, WHAs may be established within earlier seral stages where the key species of the community are present in small patches, to recover community to climax condition.

#### Size

The size of the WHA should be based on the extent of the plant community occurrence. WHAs will generally be between 5 and 20 ha when the community occurs in relatively pure composition. However, WHAs may be larger, when the community has a patchy distribution or when recovery is the main objective.

### Design

The WHA should encompass the entire extent of the occurrence plus a 100 m surrounding the perimeter of the community. When occurrences are narrow, such as along ridge tops, include 200 m surrounding perimeter. Where possible, minimize inclusion of invasive species.

### General wildlife measures

#### Goals

1. Maintain and restore antelope-brush, bluebunch wheatgrass, Idaho fescue, rough fescue, and balsamroot cover; cycles of litter and light intensity natural fire renewal. Increase cover and diversity of other native species (e.g., forbs, rough fescue) and maintain open savannah structure (e.g., <15% cover) of older (e.g., >150 year old) ponderosa pine and Douglas-fir trees where they are present.
2. The recommended Desired Plant Community is as follows: shrub-steppe between 15 and 30% canopy cover of antelope-brush; herb layer dominated by >5%, preferably >15% cover each, of at least two of the following: bluebunch wheatgrass, Idaho fescue, rough fescue, or arrow-leaved balsamroot. A composition with <10% each of co-dominating saskatoon, pinegrass, or other herb layer species is acceptable.
3. Manage to maintain and increase the species named above as the Desired Plant Community.
4. Maintain a diversity of disturbance regimes.
5. Allow for the processes of litter accumulation and renewal.
6. Maintain a diversity of understorey species composition (e.g., *Festuca* spp.).
7. Maintain shrub-steppe/grassland structure and plant community processes.
8. Minimize soil disturbance.
9. Control forest encroachment and ingrowth.
10. Minimize the introduction and spread of invasive species.

## Measures

### Access

- Do not develop roads or trails.

### Pesticides

- Do not use pesticides.

### Range

- Plan livestock grazing (i.e., timing, distribution, and level of use) to meet general wildlife measure goals described above. Fencing could be required by the statutory decision maker to meet goals, to recover community, or for restoration treatments.
- Do not place livestock attractants within WHA.

### Recreation

- Do not develop recreational sites, trails, or facilities.

## Additional Management Considerations

Minimize impacts to vegetation, soils, and hydrology when operating adjacent to a WHA, particularly during road development and maintenance.

Actively manage to restore and maintain this community, emulating effects of natural fire regime, with restoration silvicultural treatments and light intensity, prescribed burns in fall (Thomson 1988; Zlatnik 1999a, 1999b). Burns should be able to be carried out under a regular burn plan, plus species-level monitoring, without the need for a specific site management plan. Light to moderate grazing/ browsing and periodic renewal are necessary as part of the disturbance regime for this community, but higher levels can cause the loss of the community through competition-mediated shifts in composition and species invasions (McLean and Marchand 1968; Ross 1997).

Avoid linear or extensive soil disturbances. Concerns around access are based on the concentrating effect of livestock or wildlife use, which can increase the spread of invasive species (e.g., cheatgrass).

Restrict recreational use (i.e., dirt bikes, mountain bikes, and other off-road vehicles).

Private land stewardship will be an important component of the conservation of this community as many sites occur on private land.

## Information Needs

1. Further inventory and confirmation of classification to clarify the extent of this community.
2. Monitor recovery trends in relation to site factors and restorations treatments, and for the relationship between specific community types currently encompassed within this community.

## Cross References

Badger, Douglas-fir/snowberry/balsamroot, Lewis's Woodpecker, Long-Billed Curlew

## References Cited

- Arno, S.F., J.H. Scott, and M.G. Hartwell, 1995. Age-class structure of old growth ponderosa pine/ Douglas-fir stands and its relationship to fire history. U.S. Dep. Agric. For. Serv., Intermtn. Res. Stn., Ogden, Utah. Res. Pap. INT-RP-481.
- Braumandl, T.F. and M.P. Curran (compilers and editors). 1992. A field guide for site identification and interpretation for the Nelson Forest Region. B.C. Min. For., Res. Br., Victoria, B.C. Land Manage. Handb. No. 20.
- B.C. Conservation Data Centre (CDC). n.d. Rare plant associations of B.C. B.C. Min. Environ., Lands and Parks, Victoria, B.C. Unpubl.
- B.C. Ministry of Forests and B.C. Ministry of Environment, Lands and Parks (MOF and MELP). 1995a. Bark beetle management guidebook. Victoria, B.C. Forest Practices Code of B.C. guidebook. Available from: <http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/beetle/betletoc.htm>
- \_\_\_\_\_. 1995b. Biodiversity guidebook. Victoria, B.C. Forest Practices Code of B.C. guidebook.
- Fischer, W.C. and J.L. Holifield. 1987. *Balsamorhiza sagittata*. In U.S. Dep. Agric. For. Serv., Rocky Mtn. Res. Stn., Fire Sci. Laboratory. Fire Effects Information System. Available from: <http://www.fs.fed.us/database/feis/>. Accessed July 5, 2002.
- Gayton, D. 1996. Fire-maintained ecosystems and the effects of forest ingrowth. B.C. Min. For., Nelson For. Reg., Nelson, B.C.

- Hardy, C.C. and S.F. Arno (editors). 1996. The use of fire in forest restoration. U.S. Dep. Agric. For. Serv., Intermtn. Res. Stn., Ogden, Utah. Gen. Tech. Rep. INT-GTR-341.
- McLean, A. and L. Marchand. 1968. Grassland ranges in the southern interior of British Columbia. Can. Dep. Agric. Info. Div., Ottawa, Ont. Publ. 1319.
- Meidinger, D.M. 2002. Unpublished summaries. B.C. Min. For., Res. Br., Victoria, B.C. On file.
- NatureServe Explorer. 2002. An online encyclopedia of life [Web application]. Version 1.6. Arlington, Va. Available from: <http://www.natureserve.org/explorer>.
- Rondeau, R. 2001. Ecological system viability specifications for southern Rocky Mountain Ecoregion. Colorado Natural Heritage Program. Available from: <http://www.google.com/search?q=SRM%2BRangeland%2BCover%2BType%2BDouglas-fir&hl=en&lr=&ie=UTF-8&start=10&sa=N>.
- Ross, T.R. 1997. Vegetation monitoring program: final report. East Kootenay Trench Agriculture/Wildlife Committee, Cranbrook, B.C.
- Thomson, S. 1988. The effects on vegetation of prescribed burning for wildlife habitat and range improvement in southeastern British Columbia. *In* Proc. Wildlife and Range Prescribed Burning Workshop. M.C. Feller and S.M. Thomson (editors). Univ. B.C., Faculty of Forestry, Vancouver, B.C., pp. 120–133.
- University of Saskatchewan. n.d. Rangeland ecosystems and plants database. Available from: <http://www.usask.ca/agriculture/plantsci/classes/range/>.
- University of Wyoming. n.d. Field guide to common western grasshoppers: Mormon cricket. Available from: <http://www.sdvc.uwyo.edu/grasshopper/ansi.htm>.
- Westoby, M.B., B. Walker, and I. Noy-Meir. 1989. Opportunistic management for rangelands not at equilibrium. *J. Range Manage.* 42(4):266–274.
- Youtie, B.A., B. Griffith, and J.M. Peek 1988. Successional patterns in bitterbrush habitat types in north-central Washington. *J. Range Manage.* 41:122–126.
- Zlatnik, E. 1999a. *Purshia tridentata*. *In* U.S. Dep. Agric. For. Serv., Rocky Mountain Res. Stn., Fire Sciences Laboratory. Fire Effects Information System [online]. Available from: <http://www.fs.fed.us/database/feis/>. Accessed April 18, 2002.
- \_\_\_\_\_. 1999b. *Pseudoroegneria spicata*. *In* U.S. Dep. Agric. For. Serv., Rocky Mountain Res. Stn., Fire Sci. Laboratory. Fire Effects Information System [online]. Available from: <http://www.fs.fed.us/database/feis/>. Accessed April 18, 2002.

## Personal Communications

- Gayton, D. 2002. Forest Research Extension Partnership, Nelson, B.C.
- Johnson, D. 2002. Agriculture Canada, Lethbridge, Alta.

