USDA Natural Resources
Conservation Service

Ecological site R022BI212CA
Windy Peak

Accessed: 05/12/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 022B–Southern Cascade Mountains

Site Concept –
Slopes: 10 to 45 percent.
Landform: Moraines over lava flow (Loomis Peak).
Soils: Deep and very deep, well drained soils that formed in ash mixed with till from rhyodacite. There is greater than 35 percent rock fragments in most of this soil. The densic contact is at depths of 40 to greater than 60 inches.
Temp regime: Cryic.
MAAT: 40 degrees F (4.4 degrees C).
MAP: 81 to 99 inches (2,057 to 2,515 mm).
Soil texture: Stony ashy loamy sand
Surface fragments: 15 to 60 percent subangular fine and medium gravel and 18 to 60 percent 5 nonflat subangular cobbles, and subangular stones.
Vegetation: Mixed shrubs such as rubber rabbit brush (*Ericameria nauseosa* ssp. nauseosa var. speciosa), antelope bitterbrush (*Purshia tridentata*), greenleaf manzanita (*Arctostaphylos patula*), oceanspray (*Holodiscus discolor*), with scattered and windblown whitebark pine (*Pinus albicaulis*), Jeffrey pine (*Pinus jeffreyi*), and mountain hemlock (*Tsuga mertensiana*).

Associated sites

R022BI204CA	**Glaciated Mountain Slopes** This rangeland site is dominated by pinemat manzanita.
R022BI207CA	**Alpine Slopes** This rangeland site is sparsely vegetated by lupine and mountain hemlock.

Similar sites

R022BI208CA	**Cryic Pyroclastic Cones** This site has some similar species but is more diverse and is found on cinder cones on the eastern part of the park.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ericameria nauseosa ssp. nauseosa var. speciosa* (2) *Holodiscus discolor*
Herbaceous	(1) *Elymus elymoides* (2) *Linanthus pungens*

Physiographic features

This ecological site is found on moraines over lava flow on Loomis Peak. It occurs between 7,740 and 8,650 feet in elevation. Slopes range from 10 to 45 percent.

Table 2. Representative physiographic features

Landforms	(1) Moraine (2) Lava flow (3) Mountain
Flooding frequency	None
Ponding frequency	None
Elevation	2,359–2,637 m
Slope	10–45%
Aspect	N, E, S

Climatic features

This ecological site receives most of its annual precipitation in the winter months in the form of snow. The mean annual precipitation ranges from 81 to 99 inches (2,057 to 2,515 mm) and the mean annual temperature ranges is 40 degrees F (4.4 degrees C). The frost free (>32 degrees F) season is 50 to 85 days. The freeze free (>28 degrees F) season is 65 to 190 days.

There are no representative climate stations for this site. The nearest one is Manzanita Lake, which receives less precipitation than this area.

Table 3. Representative climatic features

Frost-free period (average)	85 days
Freeze-free period (average)	190 days
Precipitation total (average)	2,515 mm

Influencing water features

This ecological site is not influenced by wetland or riparian water features.

Soil features

This site is associated with the Xeric Vitricryands soil component, which consists of deep and very deep, well drained soils that formed in ash mixed with till from rhyodacite. The surface texture is stony ashy loamy sand with coarse textured subsurface horizons. There is greater than 35 percent rock fragments in most of this soil. There is a densic contact at a depth of 40 to greater than 60 inches. The mean AWC is low.

This ecological site has been correlated with the following map units and components within the CA789 Soil Survey Area:

Map Unit Component Percent
137 Xeric Vitricryands 75

Table 4. Representative soil features

Family particle size	(1) Sandy
Drainage class	Well drained
Permeability class	Very slow
Soil depth	102–203 cm
Surface fragment cover <=3"	15–60%
Surface fragment cover >3"	18–60%
Available water capacity (0-101.6cm)	2.03–20.32 cm
Soil reaction (1:1 water) (0-101.6cm)	6.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	5–61%
Subsurface fragment volume >3" (Depth not specified)	0–30%

Ecological dynamics

This ecological site is characterized by extensive stands of shrubs and sub-shrubs, with a scattering of whitebark pine (*Pinus albicaulis*), Jeffrey pine (*Pinus jeffreyi*), and mountain hemlock (*Tsuga mertensiana*). The trees provide about 5-10 percent total canopy cover. Many of these trees have shrub-like stature or reduced heights due to wind exposure. Shrubs present on this site include rubber rabbitbrush (*Ericameria nauseosa* ssp. nauseosa var. speciosa), antelope bitterbrush (*Purshia tridentata*), greenleaf manzanita (*Arctostaphylos patula*), oceanspray (*Holodiscus discolor*), and the low-growing granite prickly phlox (*Linanthus pungens*). Forbs are commonly found in this plant community as well, species include marumleaf buckwheat (*Eriogonum marifolium*), sulphur-flower buckwheat (*Eriogonum umbellatum*), Pacific lupine (*Lupinus lepidus*), drawf alpinegold (*Hulsea nana*) and beardtongue (Penstemon spp.).

Rubber rabbitbrush, granite prickly phlox, antelope bitterbrush, oceanspray and greenleaf manzanita are well adapted to the course textured, well-drained soils found on this ecological site. The shrub species expressed on this site are commonly found early on in the successional stages and rely on some level of disturbance for regeneration. Without low frequency fire or other disturbances shrubby vegetation will become decadent and begin to die back.

Tolerance of dry, cold conditions allows these species to thrive on this ecological site. Adaptations, such as a long tap root, allow antelope bitterbrush to survive on course-textured soils with a high percentage of rock fragments (Zlatnik 1999). Similar to the other shrubs growing on this ecological site, greenleaf manzanita is well-adapted to well-drained soils, tolerant of cold temperatures (Wilken and Burgher 2009), and is a recurrent member of high elevation brush lands.

This ecological site provides important high elevation wildlife habitat. Antelope bitterbrush provides vital browse

resource. Rodents, like deer mice, also rely on antelope bitterbrush for a large portion of their diet (Zlatnik 1999). This shrub also provides important cover for a wide variety of animals, including ungulates, birds, and rodents. During the winter rubber rabbitbrush is also considered to be an important resource for wildlife and some rodents (Tirmenstein 1999). The flowers, leaves, and young stems are commonly browsed by a variety of large animals and jack rabbits (Tirmenstein 1999). Oceanspray is generally not considered a good browse species, but can be moderately important for mule deer. More importantly, it provides nesting habitat, cover and food for non-game birds and small animals (Archer 2002).

At this elevation whitebark pine (*Pinus albicaulis*) commonly shares dominance with mountain hemlock (*Tsuga mertensiana*). Jeffrey pine (*Pinus jeffreyi*) also occurs on this high elevation site however not as commonly. These trees are adapted to the rocky, well-drained soils that are found on this site. Trees on this ecological site will remain small and appear stunted, due to the short growing season and harsh conditions. The patchy growth form of whitebark pine helps reduce mortality particularly on exposed sites.

State and transition model

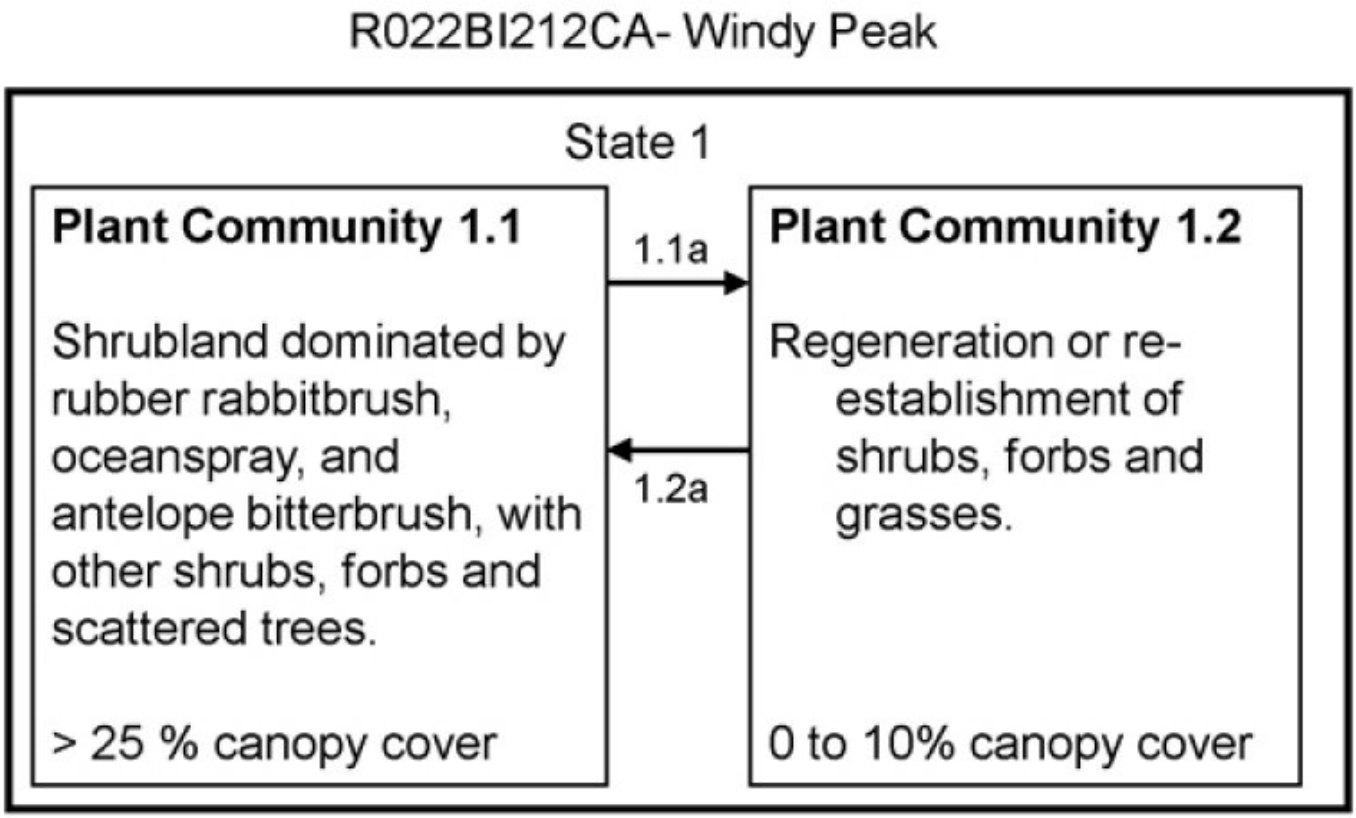

Figure 3. Windy Peak Model

State 1
Natural State

This is the natural state for this ecological site.

Community 1.1
Scrubland >25 percent cover

Figure 4. Windy peak shrubland

Shrubs are the dominant vegetation on this ecological site, with scattered forbs. While trees are present they exhibit a reduced growth form and equal only about 5 to 10 percent total cover. Common trees are whitebark pine (*Pinus albicaulis*), Jeffrey pine (*Pinus jeffreyi*), and mountain hemlock (*Tsuga mertensiana*). Shrubs provide about 20 to 30 percent of the ground cover. Shrub species include antelope bitterbrush (*Purshia tridentata*), oceanspray (Holodiscus microphyllus) and rubber rabbitbrush (*Ericameria nauseosa* ssp. nauseosa var. speciosa). Common forb species include marumleaf buckwheat (*Eriogonum marifolium*), sulphur-flower buckwheat (*Eriogonum umbellatum*), Pacific lupine (*Lupinus lepidus*), granite prickly phlox (*Linanthus pungens*), drawf alpinegold (*Hulsea nana*), thickstem aster (*Eurybia integrifolia*), beardtongue (Penstemon sp.) and Indian paintbrush (Castilleja sp.). Shrubs growing here are tolerant of dry, cold conditions and course-textured soils. Rubber rabbitbrush is considered an early- to mid-seral species. Seeds from rubber rabbitbrush are designed to easily disperse long distances by the wind. Making it the first to sprout from seed post-fire and perfect for colonizing disturbed sites (Tirmenstein 1999). Oceanspray is moderately shade-tolerant allowing it to persist throughout the successional process and is known to sprout readily post fire (Archer 2002). Antelope bitterbrush commonly colonizes after disturbance and can also persist throughout the successional process. Without disturbance occurring on a regular interval stands will become senescent and decadent (Zlantnik 1999). Occassional fire aides seed germination for greenleaf manzanita (Wilken and Burgher 2009). Granite prickly phlox (*Linanthus pungens*), a sub-shrub, exhibits the same adaptive characteristics as the full stature shrubs growing here. Tree species represented here grow well on sites with cold winters, short growing season, well-drained soil, and a substantial snow pack. Jeffrey pine is relatively shade-intolerant and can be considered an early- to mid-seral species, except on harsh sites where they are considered the climax. This species has adapted to fire by developing a thick bark to increase the chances of survival (Gucker 2007). Whitebark pine has moderately thick bark therefore it is able to survive low-to-moderate intensity fires (Howard 2002). A small fire from a lightning strike or other source could decrease shrub competition, creating gaps for seedling regeneration. This process is important for establishing seedlings of shade intolerant species like Jeffrey pine. Due to harsh conditions this ecological site will not develop into a forest. Disturbance will decrease shrub and tree cover temporarily while encouraging seedling regeneration. Shrubs will reestablish from seed and vegetative reproduction, after the old decadent stands have been removed by fire or other disturbance. Vegetation on this site will benefit from small fires or other disturbance which removes the old, dying, and decadent plants.

Forest overstory. Canopy cover ranges from 1 to 6 percent with large spaces between clumps of trees. Canopy cover is evenly distributed between white bark pine (Pinus albicaulis), Jeffrey pine (Pinus jeffreyi), and mountain hemlock (Tsuga mertensiana) all making up 1 to 2 percent of the total.

Forest understory. The understory is dominated by shrubs, with forbs and grasses accounting for only a small amount of the total vegetative cover. Rubber rabbit brush averages about 20 percent, but can be as high as 40 percent. Oceanspray (Holodiscus discolor) and granite prickly phlox (Linanthus pungens) account for another 20 percent of the shrub cover. Antelope bitterbrush (Purshia tridentata) and Greenleaf manzanita (Arctostaphylos patula) make up about 5 percent of the understory cover. Most widespread forbs include sulphur-flowered buckwheat (Eriogonum umbellatum), marumeaf buckwheat (Eriogonum marifolium), and pacific lupine (Lupinus lepidus). Grass species include squirreltail (Elymus elymoides) and western needlegrass (Achnatherum occidentale).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	84	280	437
Forb	22	91	193
Grass/Grasslike	11	67	84
Tree	–	4	13
Total	**117**	**442**	**727**

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	1-5%
Grass/grasslike basal cover	0-2%
Forb basal cover	0-2%
Non-vascular plants	0%
Biological crusts	0%
Litter	26-68%
Surface fragments >0.25" and <=3"	15-60%
Surface fragments >3"	18-60%
Bedrock	15-25%
Water	0%
Bare ground	10-20%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	0-25%
>0.15 <= 0.3	–	–	0-10%	0-14%
>0.3 <= 0.6	0-1%	30-65%	0-5%	1-8%
>0.6 <= 1.4	0-1%	0-2%	–	–
>1.4 <= 4	0-3%	–	–	–
>4 <= 12	2-6%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Community 1.2
Barren patches with few shrubs, forbs and grasses

This post-fire regeneration community was not encountered, but would most likely be dominated by fire-adapted species such as Greenleaf manzanita which can resprout after fire and its seeds are scarified by heat. Antelope bitterbrush does not resprout after fire but will germinate from wind blown seed. There will be open cover in burned areas with scattered grasses and forbs. Trees may establish in the open areas during this time.

Pathway 1.2a
Community 1.1 to 1.2

This pathway is created fire and initiates regeneration (Community 1.2).

Pathway 1.2a
Community 1.2 to 1.1

With time and growth a mixed scrubland develops with scattered trees (Community 1.1).

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Tree					
1	**Trees**			0–13	
	whitebark pine	PIAL	*Pinus albicaulis*	0–6	0–2
	mountain hemlock	TSME	*Tsuga mertensiana*	0–6	0–2
	Jeffrey pine	PIJE	*Pinus jeffreyi*	0–3	0–1
Shrub/Vine					
1	**shrubs**			84–437	
	rubber rabbitbrush	ERNAS2	*Ericameria nauseosa ssp. nauseosa var. speciosa*	67–157	10–40
	antelope bitterbrush	PUTR2	*Purshia tridentata*	11–135	1–10
	oceanspray	HODI	*Holodiscus discolor*	6–112	2–15
	greenleaf manzanita	ARPA6	*Arctostaphylos patula*	0–34	0–2
Grass/Grasslike					
1	**grass-grasslike**			11–84	
	squirreltail	ELEL5	*Elymus elymoides*	11–67	2–12
	western needlegrass	ACOC3	*Achnatherum occidentale*	0–17	0–3
Forb					
1	**Forbs**			4–193	
	granite prickly phlox	LIPU11	*Linanthus pungens*	0–45	0–20
	Pacific lupine	LULE2	*Lupinus lepidus*	0–45	0–7
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	2–45	1–6
	marumleaf buckwheat	ERMA4	*Eriogonum marifolium*	2–34	1–5
	thickstem aster	EUIN9	*Eurybia integrifolia*	0–18	0–2
	dwarf alpinegold	HUNA	*Hulsea nana*	0–6	0–3
	Indian paintbrush	CASTI2	*Castilleja*	0–1	0–1
	beardtongue	PENST	*Penstemon*	0–1	0–1

Animal community

This scrubland community provides forage and cover for a variety of wildlife species. Antelope bitterbrush is a highly preferred forage species by mule deer. These shrub fields fulfill important habitat requirements for small mammals including montane vole, deer mice, mountain cottontail, chipmunks, and ground squirrels. Non-game birds like Clark’s nutcracker and the dark-eyed junco find key nesting environment on this site.

Recreational uses

This ecological site provides beautiful vistas and hiking opportunities.

Wood products

Not applicable, trees growing on this ecological site are not of sufficient quality for wood products.

Other information

Many of the dominate shrubs on this site have known ethno-botanical uses including treating burns and sores, pain relief, chronic diseases, as well as, other medical applications.

Inventory data references

The following NRCS vegetation plots were used to describe this ecological site:

789266
789267
789330- modal pit and site location

Type locality

Location 1: Shasta County, CA	
Township/Range/Section	T31 N R4 E S32
UTM zone	N
UTM northing	4483073
UTM easting	622952
General legal description	The site location is about 0.3 mile northwest from the highest point of Loomis Peak, on the summit.

Other references

Archer, Amy J. 2000. *Holodiscus discolor*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2009, December 8].

Gucker, Corey L. 2007. *Pinus jeffreyi*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2009, December 10].

Howard, Janet L. 2002. *Pinus albicaulis*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2009, December 10].

Tirmenstein, D. 1999. Chrysothamnus nauseosus. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2009, December 8].

Wilken, Dieter and Julie Burgher. Ed. “Greenleaf Manzantia *Arctostaphylos patula* E. Green. Plant Guide. 13 May 2006. USDA. 8 December 2009. http://plants.usda.gov/plantguide/pdf/pg_arpa6.pdf

Zlatnik, Elena. 1999. *Purshia tridentata*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2009, December 8].

Contributors

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
