Ecological site R022BI200CA
Talus Slope

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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: 20 to 65 percent.
Landform: Scoured glacial-valley walls
Soils: Very deep excessively drained soils that formed in tephra over colluvium from volcanic rock that has broken loose from glacially scoured bedrock outcrops.
Temp regime: Frigid
MAT: 25 to 45 inches (635 to 1,143 mm).
MAP: 42 to 44 degrees F (5.5 to 7 degrees C).
Soil texture: Extremely cobbly ashy loamy coarse sand
Surface fragments: 80-90 (minimum of 25 percent rock fragments is not common) percent rock fragments, with a representative composition of: 10 percent angular fine gravel, 5 percent angular medium and coarse gravel, 40 percent angular cobbles, 10 percent angular stones and 10 percent angular boulders.
Vegetation: Patchy cover of oceanspray (*Holodiscus discolor*) and bush chinquapin (*Chrysolepis sempervirens*) and other vegetation among the rocks. There are a few scattered Jeffrey pines (*Pinus jeffreyi*) across the slopes.

Associated sites

F022BI107CA	**Frigid Moderately Deep Slopes** This is a red fir- white fir forest site.
F022BI119CA	**Low Precip Frigid Sandy Moraine Slopes** This is a white fir- Jeffrey pine forest which often surrounds the rocky outcrops.

Table 1. Dominant plant species

Tree	(1) *Pinus jeffreyi*
Shrub	(1) *Holodiscus discolor* (2) *Chrysolepis sempervirens*
Herbaceous	(1) *Ageratina occidentalis* (2) *Hieracium horridum*

Physiographic features

This ecological site is situated on glacial-valley walls between 5,980 and 7,600 feet in elevation. Slopes are between 20 and 65 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	5,980–7,600 ft
Slope	20–65%
Water table depth	60 in
Aspect	SE, S, SW

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 25 to 45 inches (635 to 1,143 mm) and the mean annual temperature ranges from 42 to 44 degrees F (5.5 to 7 degrees C). The frost free (>32 degrees F) season is 60 to 85 days. The freeze free (>28 degrees F) season is 75 to 190 days.

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

Table 3. Representative climatic features

Frost-free period (average)	85 days
Freeze-free period (average)	190 days
Precipitation total (average)	45 in

Influencing water features

This site is not influenced by water features.

Soil features

The Talved series consists of very deep excessively drained soils that formed in tephra over colluvium from volcanic rock that has broken loose from glacially scoured bedrock outcrops. The surface texture is extremely cobbly ashy loamy coarse sand, with coarse subsurface textures intermixed with 20 percent gravels and 60 to 70 percent

stones, cobbles, and boulders. Available water capacity (AWC) ranges from 0.0 (very low) to 4.34 (low), with an RV of 0.6 (very low).

This ecological site has been correlated with the following map units within the Lassen Volcanic National Park Soil Survey (CA789):

Map Unit Component Percent
100 Talved 1
120 Talved 10

Table 4. Representative soil features

Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Moderately rapid
Soil depth	60 in
Surface fragment cover <=3"	10–30%
Surface fragment cover >3"	15–60%
Available water capacity (0-40in)	0–4.34 in
Soil reaction (1:1 water) (0-40in)	6.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	10–75%
Subsurface fragment volume >3" (Depth not specified)	20–45%

Ecological dynamics

This ecological site is found on talus slopes that exhibit a patchy cover of shrubs and Jeffrey pine (*Pinus jeffreyi*). Oceanspray (*Holodiscus discolor*) and bush chinquapin (*Chrysolepis sempervirens*) are common among the talus. Due to the relatively slow tree growth on this site the forest will remain open, providing opportunity for shrubs, grasses, and forbs to grow in open sun.

Vegetation on this ecological site will remain sparse throughout the successional process and Jeffrey pine represents the dominate tree species in this setting. The limited resources and relative harshness of the site will not allow for Jeffrey pine to be replaced by a later seral stage species. Recruitment of Jeffrey pine seedlings is in part inhibited by competition from shrubs for available soil moisture in the upper sections of the soil profile (Rose, 2003).

Oceanspray has been used as an indicator of climax conditions on rocky sites in both forested and non-forested communities throughout its range (McMurray, 1987). The plant assemblages associated with a climax oceanspray community change as it moves throughout its range. In this case oceanspray is associated with bush chinquapin, which is also considered to be a climax species on shallow rocky soils (Howard, 1992).

The soils associated with this site are very deep, but have 80 to 90 percent rock fragments. There is very little soil on the surface suitable for seedling development and survival. Plants must establish in soil pockets among the cobbles, boulders and stones. The soils have very low available water holding capacity, so any moisture drains out quickly. The plants on this site have a short growing period during and after snow melt, before the soils dry out. The stones and boulders provide small nooks with shade, which slow the rate of snow melt and water loss through evaporation, thereby creating pockets of soil that remain moist for longer into the summer months. Jeffrey pine is able to survive on sites like these by developing extensive root systems that can reach into fractured bedrock in order to extract moisture. This technique of removing water from deeper and deeper within the profile as the summer progresses allows Jeffrey pine to persist on this site (Meyer, 2007).

Plant- water relations vary by species. A thin leaved deciduous species like oceanspray experiences greatly

decreased water potential during times of moisture stress. The root system of oceanspray does not extend into the lower soil profile and is limited to extracting water from the upper portion of the soil profile, which is severely depleted in late summer. However due to its high leaf area index (which increases the removal of soil- water) and its' shallow rooting habit, it is very competitive in the upper soil profile (Conard, 1970). Thicker leaved evergreen shrubs like bush chinquapin will maintain a relatively high conductance even under stressful environmental conditions.

State and transition model

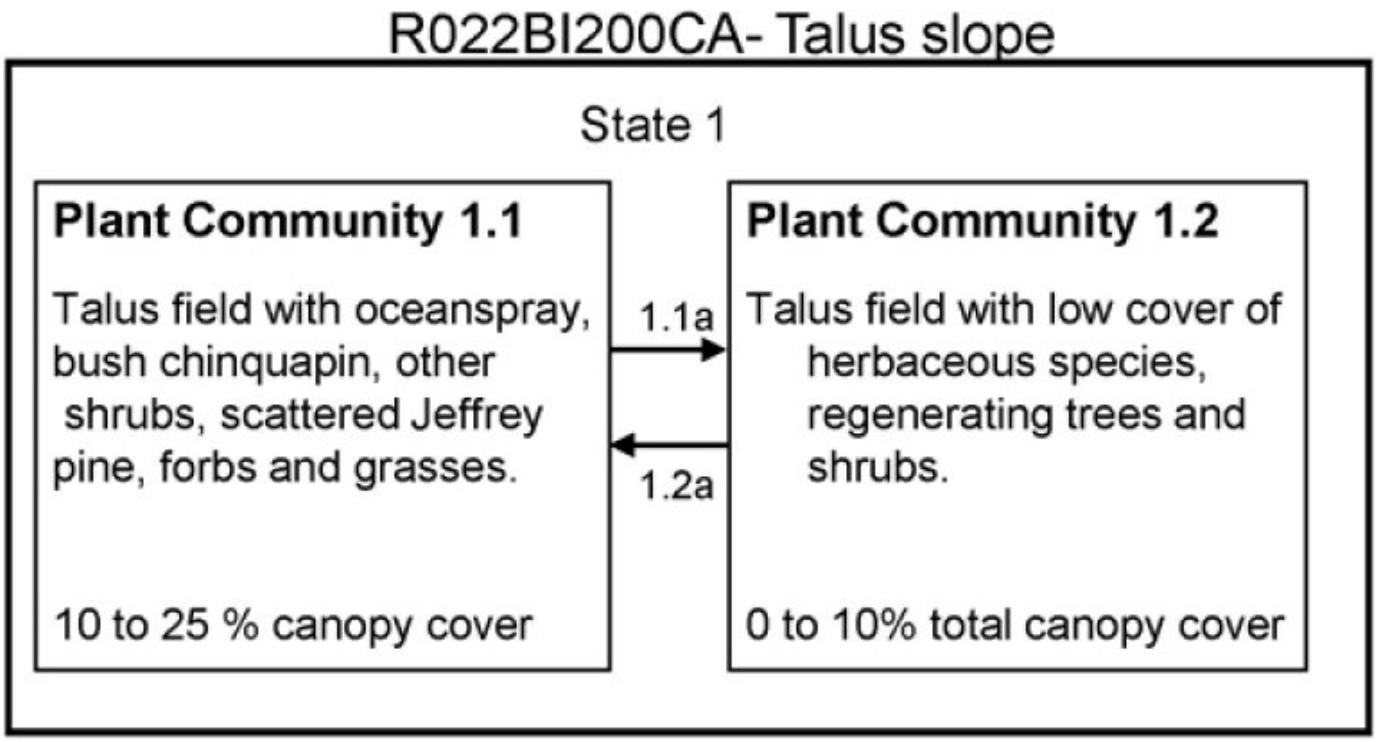

Figure 2. Talus Slope Model

State 1
Talus slope

This state represents the natural conditions for this ecological site.

Community 1.1
Talus slope shrubland with scattered trees, forbs, and grasses

Figure 3. Talus Slope

Plant community 1.1 is the climax community associated with this ecological site. Dominant shrubs include oceanspray (*Holodiscus discolor*) and bush chinquapin (*Chrysolepis sempervirens*). These are common climax species on harsh rocky sites. Total shrub cover will remain low, growing in patches. Jeffrey pine (*Pinus jeffreyi*) is present, growing and regenerating at a very slow rate; total canopy cover will remain below 25% in the late seral sages. Jeffrey pine can be a climax species, especially on harsh sites (Gucker, 2007) where they will not be crowded out by more shade tolerant species. Grasses and forbs are a minor component of this plant community and include western snakeroot (*Ageratina occidentalis*), prickly hawkweed (*Hieracium horridum*), scabland penstemon (*Penstemon deustus*), whiteveined wintergreen (*Pyrola picta*), western needlegrass (*Achnatherum occidentale*) and squirreltail (*Elymus elymoides*). The limiting resources on this site prevent most of these species from reaching their maximum productivity potential.

Forest overstory. There is 2-10 percent cover of Jeffrey pine. The distribution of the trees is patchy and the trees present are very slow growing. Two trees were aged at 260 and 300+ years old. They were 90 and 74 feet tall respectively.

Forest understory. Total ground cover is between 15-30% and made up mostly of oceanspray (Holodiscus discolor) and Sierra chinquapin. Various other shrubs, as well as some grass and forb species, make up the rest of the understory composition.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	55	210	530
Forb	20	35	48
Grass/Grasslike	7	23	35
Tree	0	10	20
Total	**82**	**278**	**633**

Table 6. Soil surface cover

Tree basal cover	0-2%
Shrub/vine/liana basal cover	0-2%
Grass/grasslike basal cover	0-1%
Forb basal cover	0-1%
Non-vascular plants	0-3%
Biological crusts	0%
Litter	10-25%
Surface fragments >0.25" and <=3"	10-30%
Surface fragments >3"	15-60%
Bedrock	0-1%
Water	0%
Bare ground	3-12%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	0-5%	0-1%
>0.5 <= 1	–	–	0-5%	0-1%
>1 <= 2	–	0-5%	2-5%	2-10%
>2 <= 4.5	–	5-15%	–	–
>4.5 <= 13	–	0-5%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	5-10%	–	–	–
>80 <= 120	2-8%	–	–	–
>120	–	–	–	–

Community 1.2
Talus slope with low herbaceous cover and regenerating shrubs and trees

A small or large scale disturbance such as a rock slide or fire would remove patches of vegetation. These disturbed areas create openings for regeneration of grasses, forbs, shrubs and, later, trees. It is unlikely that a crown fire would carry across this site, but it would be possible if the vegetative and climatic conditions were ideal. It is more probable that fire would originate from a lightning strike and be relatively small, creating patchiness on the landscape. The grasses and forbs would be the first foliage to come back, followed by the shrubs. Later, seedlings and saplings would begin to reappear on the site, most likely establishing from an off site seed source. Much of this propagation on this site will result from animal and/or wind dispersed seed. Squirreltail (*Elymus elymoides*) is generally tolerant of disturbance and can be present in early, mid- or late seral stages, depending on the habitat type (Simonin, 2001). Squirreltail would be a pioneering species after a fire due to its ability to regenerate from the remaining root crown and the abundance of off site seed sources (Simonin, 2001). Squirreltail will be a persistent species throughout the successional process on this ecological site. Bush chinquapin (*Chrysolepis sempervirens*) frequently sprouts from the roots, root crown and stump following a fire (Howard, 1992). This adaptation to begin sprouting relatively soon after a fire would allow bush chinquapin to be one of the earliest species to reappear on this site following a fire of any size. After disturbance, it is most likely that oceanspray (*Holodiscus discolor*) will reproduce naturally through wind dispersed seed. Currently there are no reports that establish the ability of oceanspray to resprout from existing plants after a fire, but it has been documented as a dominate species in the shrub layer in the years immediately following a fire (McMurray, 1987).

Forest overstory. A small scale disturbance may leave a few residual mature Jeffrey pine (Pinus jeffreyi), equaling

0-5% of the overstory canopy cover. A larger disturbance could remove all the forest overstory and most of the understory vegetation.

Forest understory. The small herbaceous component is made up of mostly grass species like squirreltail, with a trace amount of forbs. Shrubs in various stages of growth and regeneration are scattered across the site comprising 0-10% of the total canopy cover. Cover and production data was not collected on this community phase.

Table 8. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	0-5%	–
>0.5 <= 1	–	–	5-10%	0-5%
>1 <= 2	–	–	–	5-10%
>2 <= 4.5	0-5%	0-5%	–	–
>4.5 <= 13	0-5%	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	0-5%	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Pathway 1.1a
Community 1.1 to 1.2

1.1a – A disturbance such as a lighting strike or rockfall that removes part of the vegetation will move the plant community toward a new phase (1.2).

Pathway 1.2a
Community 1.2 to 1.1

1.2a- This pathway is followed with time and growth of the shrubs and trees, moving towards plant community 1.1.

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**native grasses/grass likes**			7–35	
	western needlegrass	ACOC3	*Achnatherum occidentale*	5–20	1–5
	squirreltail	ELEL5	*Elymus elymoides*	2–10	0–3
	sedge	CAREX	*Carex*	0–5	0–2
Forb					
2	**native forbs**			20–48	
	western snakeroot	AGOC2	*Ageratina occidentalis*	10–20	0–4
	prickly hawkweed	HIHO	*Hieracium horridum*	10–20	0–2
	scabland penstemon	PEDE4	*Penstemon deustus*	0–6	0–2
	whiteveined wintergreen	PYPI2	*Pyrola picta*	0–2	0–1
Tree					
3	**native trees**			0–20	
	Jeffrey pine	PIJE	*Pinus jeffreyi*	0–15	0–8
	white fir	ABCO	*Abies concolor*	0–5	0–1
Shrub/Vine					
4	**native shrubs**			55–530	
	oceanspray	HODI	*Holodiscus discolor*	50–400	3–20
	bush chinquapin	CHSE11	*Chrysolepis sempervirens*	5–75	1–15
	bitter cherry	PREM	*Prunus emarginata*	0–30	0–2
	Sierra gooseberry	RIRO	*Ribes roezlii*	0–25	0–2

Animal community

Grazing pressure on this site is relatively low. Wild ungulates are present throughout this area of Lassen Volcanic National Park however the majority of plants growing here are not choice forage species. There is no permitted livestock grazing within the park.

The palatability of oceanspray (*Holodiscus discolor*) is generally considered to be low (McMurray, 1987), therefore reducing its importance as a forage species for wildlife and livestock. Sierra chinquapin (*Chrysolepis sempervirens*) is considered useless for wildlife and livestock but is a staple diet item for small rodents and various birds (Howard, 1992).

Squirreltail (*Elymus elymoides*) is considered to be moderately palatable, however it would be basically unaffected by grazing pressure on this site due to its relative scarcity.

Hydrological functions

This site is in hydrologic soil group a, which is defined by very high or high saturated hydraulic conductivity, with very deep free water.

Recreational uses

This site is difficult to walk across due to the high percentage of boulders and stones on the surface. It may provide for nice views because trees do not establish well on this site.

Inventory data references

There is one NRCS soil pit for this site with vegetation data: Soils 232 No 106.

Type locality

Location 1: Lassen County, CA	
UTM zone	N
UTM northing	4492599
UTM easting	644461
General legal description	Located north-northeast of Butte Lake in Lassen Volcanic National Park.

Other references

Conard, Susan G., Steven R. Sparks and Jon C. Regelbrugge. Comparative plant water relations and soil water depletion patterns of three seral shrub species on forest sites in southern Oregon. Forest Science 43(3) 1997.

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Meyer, Marc D., Malcolm P. North, Andrew N. Gray and Harold S.J. Zald. Influence of soil thickness on stand characteristics in a Sierra Nevada mixed-conifer forest. Plant Soil 294:113-123 (2007).

Rose, K. L., R. C. Graham and D. R. Parker. Water source utilization by *Pinus jeffreyi* and Arctostaphylos patula on thin soils over bedrock. Oecologica 134:46-54 (2003).

Simonin, Kevin A. 2001. *Elymus elymoides*. 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/ [2008, October 29].

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:**

    _____

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

    _____

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:**
