USDA Natural Resources Conservation Service

Ecological site F022BI123CA
Frigid Flat Outwash Terraces

Accessed: 05/04/2024

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:
Landform: Outwash terrace
Elevation (feet): 6100-6300
Slope (percent): 1-15
Water Table Depth (inches): n/a
Flooding-Frequency: None
Ponding-Frequency: None
Aspect: North, South, East
Mean annual precipitation (inches): 43.0 to59 (1092 to 1499 mm)
Primary precipitation: Winter months in the form of snow
Mean annual temperature: 41 to 44 degrees F (5 to 6.6 degrees C)
Restrictive Layer: Duripan occurs at 20 to 60 inches
Temperature Regime: Frigid
Moisture Regime: Xeric
Parent Materials: Tephra over glacial outwash from volcanic rocks
Surface Texture: Ashy Loamy coarse sand
Surface Fragments <=3" (% Cover): 10-35
Surface Fragments > 3" (% Cover): 0-5

Soil Depth (inches): 20-60
Vegetation: Presently dominated by a Sierra lodgepole pine (*Pinus contorta* var. murrayana) forest, with a lesser presence of white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*) and quaking aspen (*Populus tremuloides*).
Notes: This ecological site is found on outwash terraces. This site is topographically higher in valley elevation than an adjacent Sierra lodgepole pine/aspen forest, ecological site F022BI105CA. The understory is less productive than the Sierra lodgepole pine-quaking aspen forest found along Hat Creek.

Classification relationships

Forest Alliance = *Abies concolor* - White fir forest; Association = (no matching species). (Sawyer, John O., Keeler-Wolf, Todd, and Evens, Julie M. 2009. A Manual of California Vegetation. 2nd ed. California Native Plant Society Press. Sacramento, California.)

Associated sites

F022BI105CA	**Frigid Sandy Loam Debris Flow On Stream Terraces** This site is found in lower positions closer to the stream channel and has more aspen.

Similar sites

F022BI117CA	**Frigid Coarse Glaciolacustrine Gentle Slopes** This is a similar site found at higher elevations with red fir in place of white fir.
F022BI126CA	**Cold Frigid Tephra Over Moraine Slopes** This is a Sierra lodgepole pine forest that is replaced by Jeffrey pine and ponderosa pine over time without disturbance.
F022BI120CA	**Frigid Gravelly Sandy Loam Outwash-Stream Terraces** This is a mixed white fir-Sierra lodgepole pine site found in wetter conditions.
F022BI125CA	**Cold Frigid Tephra Over Outwash Plains Or Lake Terraces** This is a Sierra lodgepole pine forest found in cold air drainages and basins.

Table 1. Dominant plant species

Tree	(1) *Abies concolor* (2) *Pinus contorta var. murrayana*
Shrub	Not specified
Herbaceous	(1) *Achnatherum occidentale*

Physiographic features

This ecological site is found on outwash terraces between 6,100 and 6,300 feet in elevation. Slopes range from 1 to 15 percent.

Table 2. Representative physiographic features

Landforms	(1) Outwash terrace
Flooding frequency	None
Ponding frequency	None
Elevation	1,859–1,920 m
Slope	1–15%
Aspect	SE, 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 43 to 59 inches (1,092 to 1,499 mm) and the mean annual temperature is between

41 and 44 degrees F (5 to 6.6 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.

The climate information in the tables below is from the Manzanita Lake climate station, which is 400 feet lower in elevation and about 8 miles to the west of this site.

Table 3. Representative climatic features

Frost-free period (average)	85 days
Freeze-free period (average)	190 days
Precipitation total (average)	1,499 mm

Influencing water features

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

Soil features

This site is associated with the Vitrixerands, low elevation soil component, which consists of moderately deep and deep, well drained soils that formed in tephra over glacial outwash from volcanic rocks. The surface texture is gravelly ashy loamy coarse sand, with sandy and sandy loam subsurface textures. There is greater than 35 percent rock fragments in most of the profile, with gravels in the upper horizons and stones and cobbles in the lower horizons. A duripan occurs at 20 to 60 inches. Permeability is rapid to moderately rapid through the upper horizons, but very slow through the duripan.

This ecological site is associated with the following major soil components within the Lassen Volcanic National Park Soil Survey Area (CA789):

Map Unit / Component / Component %

138 / Vitrixerands, low elevation / 9
168 / Vitrixerands, low elevation / 90

Table 4. Representative soil features

Family particle size	(1) Sandy
Drainage class	Well drained
Permeability class	Rapid to very slow
Soil depth	51–152 cm
Surface fragment cover <=3"	10–35%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	3.23–9.37 cm
Soil reaction (1:1 water) (0-101.6cm)	5.1–6.5
Subsurface fragment volume <=3" (Depth not specified)	20–40%
Subsurface fragment volume >3" (Depth not specified)	0–18%

Ecological dynamics

This ecological site is presently dominated by a Sierra lodgepole pine (*Pinus contorta* var. murrayana) forest, with a lesser presence of white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*) and quaking aspen (*Populus tremuloides*). In the absence of disturbance, white fir will successionally replace or co-exist with the Sierra lodgepole pine on this site. This site is topographically higher in elevation than an adjacent Sierra lodgepole pine/aspen forest, ecological site F022BI105CA. The understory is less productive than the Sierra lodgepole pine-quaking aspen forest found along Hat Creek. Understory species include western needlegrass (*Achnatherum occidentale*), squirreltail (*Elymus elymoides*), rabbitbush (*Ericameria bloomeri*), California stickseed (*Hackelia californica*), lupine (Lupinus spp.), and goosefoot violet (*Viola purpurea*). This area was not heavily affected by the 1915 eruption of Lassen Peak and debris material from the eruption is confined to the lower valley site F022BI105CA. The tephra deposits overlying the buried soils on this site are from the development of Chaos Crags, over 1,000 years ago.

This ecological site is on outwash terraces with a root restrictive layer at varying depths between 20 to 60 inches. The roots of Sierra lodgepole pine are generally shallow, which enable them to grow on this site. Sierra lodgepole pine produces a taproot, but it may atrophy or grow horizontally in cases of high water tables or root restrictive layers.

Sierra lodgepole pine can be long-lived; however the overstory trees cored for this site index data were between 80 to 100 years old and relatively young. Sierra lodgepole pine does not usually gain much in girth with time and older trees averaged 16 to 21 inch diameters. It grows tall and narrow with short branches and 1.2 to 2.4 inch needles in fascicles of two. Its thin bark and shallow roots make it susceptible to fire. Sierra lodgepole pine is the only non-serotinous lodgepole pine. Therefore it does not need fire to open its cones to release seeds.

Sierra lodgepole pine has a complex disturbance regime that includes cyclic beetle infestations and fire. Fire studies in the lodgepole pine forest of the Caribou Wilderness report a fire return interval of 67 years between 1735 and 1929. Even low intensity fires resulted in high mortality rates for the lodgepole pine (Taylor and Solem, 1995). Sierra lodgepole pine regenerates prolifically after fire and evenly aged stands are formed. The mountain pine beetle (Dendroctonus ponderosae) is a natural pest that can kill a significant portion of the larger trees in a stand. Infestations can last for several years and often return in 20 to 40 year cycles (Cope, 1993). After an outbreak the forest may be dominated by standing dead trees. These trees eventually fall, creating layers of overlapping logs. Fuel loads are high, but the downed logs burn slowly at a low intensity. Even the low intensity fire can cause damage to the live trees however, and fire damaged trees are more susceptible to the next beetle attack. Pine beetle infestations, wind throw and other small scale disturbances create gaps for Sierra lodgepole pine or white fir regeneration. Over time these gaps will break up the uniformity of evenly aged stands that formed after the last large fire event. This site rarely develops into an old growth forest because white fir establishes in the understory and eventually dominates the overstory.

White fir is a large long-lived tree in this area. It commonly reaches 300 to 400 years in age and heights of 120 to 140 feet. It produces single needles1.2 to 2.8 inches long that are distributed along young branches. Because the female seed cones open and fall apart while still attached to the tree, cones are not often seen on the forest floor. White fir tends to develop a shallow root system that can graft to other white fir roots and spread root rots (Zouhar, 2001). White fir is a shade tolerant conifer and is able to establish in the understory of Sierra lodgepole pine on this site. It continues to grow and reproduce in the understory and will eventually dominate the forest in the absence of disturbance. In the past the natural fire regime kept forests from developing into the later successional stages dominated by white fir or red fir (Taylor, and Solem, 2001). White fir and Sierra lodgepole pine are both relatively fire intolerant species and tend to have high mortality rates after fire.

Quaking aspen (*Populus tremuloides*) is a minor component in this area, but has some potential to expand after canopy disturbance. It is not included in the dynamics of this site because the site characteristics indicate that it would not dominate this area even after disturbance. Please refer to Sierra lodgepole pine/aspen ecological site F022BI105CA for more information on aspen. Although aspen doesn't regenerate often from seed, it spreads prolifically by root sprouts called suckers. The suckers are part of a clone. The clones regenerate after sudden canopy removal caused by disturbances such as fire, disease or insect infestations. Without fire or other disturbances, aspen stands fail to produce suckers because of hormonal inhibitors. Young aspen clones and mature trees grow best in full sunlight. Aspen trees can to live to be 150 years or older, but often aspen stands tend to deteriorate after 80 to 100 years without disturbance. Sierra lodgepole pine and eventually white fir overtop and shade out aspen on this site.

The mountain pine beetle is the most significant forest pathogen affecting this site, but several other pathogens have potential to cause mortality or diminished productivity. Most of these pathogens are a natural cycle of regulation and can push the closed forest types into more open forest types. Large outbreaks are often associated with drought years or overstocked forests.

There is evidence that warming temperatures are allowing mountain pine beetles to exist farther north and into upper elevations. Warmer temperatures are altering the reproduction cycles and distribution of the mountain pine beetle. It is possible that the warmer temperatures will increase mountain pine beetle infestations for several decades. The southern mountain pine beetle may move northward due to temperature change as well (Carroll et al, 2003)

Pathogens that affect Sierra lodgepole pine include other insects such as the pine engraver (Ips pini), the lodgepole terminal weevil (Pissodes terminalis), the Warren's collar weevil (Hylobius warreni), the defoliating weevil (Magdalis gentiles), the pine needle scale (Chionaspis pinifoliae), the black pineleaf scale (Nuculaspis californica), the spruce spider mite (Oligonychus ununguis), the lodgepole sawfly (Neodiprion burkei), the lodgepole needle miner (Coleotechnites milleri), the sugar pine tortrix (Choristoneura lambertiana), the pine tube moth (Argyrotaenia pinatubana), and the pandora moth (Coloradia pandora). Ips commonly develops in logging slash, especially slash that is shaded and does not dry quickly. Prompt slash disposal is an effective control measure. Ips also can build up in windthrows. Fungal diseases that affect lodgepole pine productivity include the stem cankers caused by atropelius canker (Atropellis piniphilia), comandra blister rust (Cronartium comandrae), and western gall rust (Peridermium harknessii). The honey mushroom (Armillaria mellea) and annosus root disease (Heterobasidion annosum) are sources of root rot, and wood decay is caused by such fungi as red rot (Phellinus pini) and red heart wood stain (Peniophora pseudo-pini). Dwarf mistletoe (*Arceuthobium americanum*) is a common parasite that affects large areas of lodgepole pine (Lotan and Critchfield, 1990).

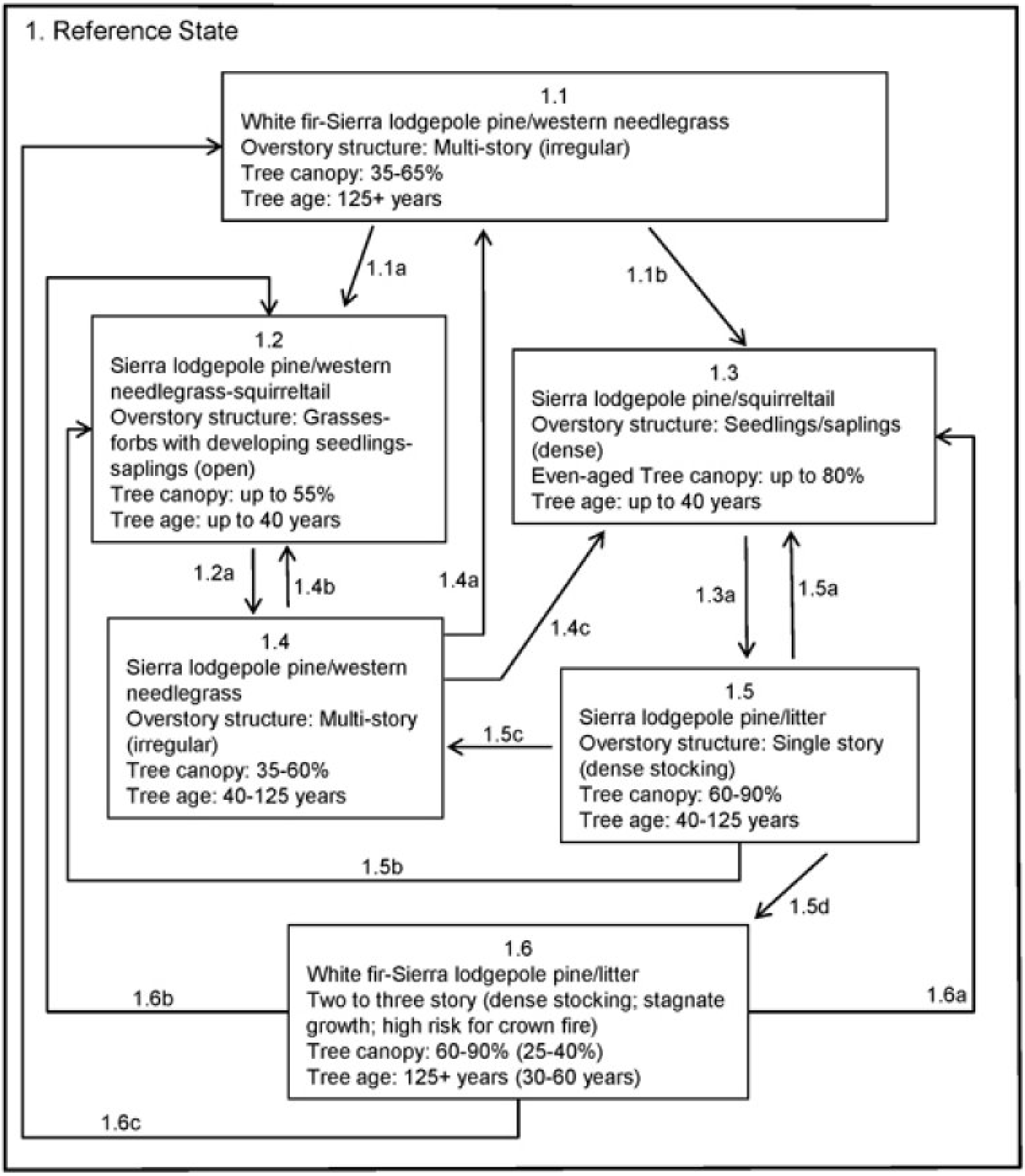
Pathogens that affect white fir are the dwarf mistletoe (*Arceuthobium abietinum* f. sp. concoloris), Cytospora canker (Cytospora abietis), broom rust (Melamsporella caryophyllacearum), annosus root disease (Heterobasidium annosum), armillaria root disease (Armillaria sp.), trunk rot (Echinodontium tinctorium) and the fir engraver (Scotylus ventralis). The most threatening of these is the combination of the fir engraver and annosus root disease. These pathogens can kill large areas of white fir (Bohne, 2006; Laacke, 1990).

The reference state consists of the most successionally advanced community phase (numbered 1.1) as well as other community phases which result from natural and human disturbances. Community phase 1.1 is deemed the phase representative of the most successionally advanced pre-European plant/animal community including periodic natural surface fires that influenced its composition and production. Because this phase is determined from the oldest modern day remnant forests and/or historic literature, some speculation is necessarily involved in describing it.

All tabular data listed for a specific community phase within this ecological site description represent a summary of one or more field data collection plots taken in communities within the community phase. Although such data are valuable in understanding the phase (kinds and amounts of ground and surface materials, canopy characteristics, community phase overstory and understory species, production and composition, and growth), it typically does not represent the absolute range of characteristics nor an exhaustive listing of species for all the dynamic communities within each specific community phase.

State and transition model

State-Transition Model - Ecological Site F022BI123CA
Abies concolor-Pinus contorta var. murrayana/Achnatherum occidentale
(White fir-Sierra lodgepole pine/western needlegrass)



State 1
Reference

Community 1.1
White fir-Sierra lodgepole pine/western needlegrass

This mature white fir-Sierra lodgepole pine forest develops with small scale disturbances that create gaps in the canopy. These gaps (a single tree-fall to 0.25 acres in size) provide suitable sites for Sierra lodgepole pine regeneration and, over time, create an uneven forest structure and composition characterized by varying age classes of both species. Taller overstory Sierra lodgepole pine will persist and provide a seed source for gap areas. Data was not collected on this community phase since it has not had time to develop within this site. There is visible evidence of white fir increasing in cover throughout this area, and it will presumably continue to increase in cover and dominance over time. This community phase will benefit from occasional small scale, low intensity understory burns. These fires will kill the young understory of white fir and some of the overstory trees.

Community 1.2
Sierra lodgepole pine/western needlegrass-squirreltail

After a stand replacing event such as a high mortality fire or mountain pine beetle infestation, Sierra lodgepole pine will regenerate from wind dispersed seed. This community phase generally has less than 500 stems per acre and will grow into a relatively open forest. Seedlings can develop into pole-sized trees with up to 55 percent canopy cover. Grasses and forbs may increase in cover for a few years, and patches of aspen clones may resprout as well.

Community 1.3
Sierra lodgepole pine/squirreltail

This regeneration community phase is defined by dense Sierra lodgepole pine seedlings. Fires leave bare soil and disturbed duff in open sunlight, which are ideal conditions for Sierra lodgepole pine seed germination. More research is needed to determine the cause of dense versus open seedling establishment, and appropriate indicators need to be defined to distinguish the two regeneration patterns. For now, it has been observed that more than 500 to 700 stems of Sierra lodgepole pine per acre can cause stagnant forest growth. There are many variables which influence seedling density. Sierra lodgepole pine produces good seed crops every 1 to 3 years, and seeds are dispersed from late August to mid-October. These seeds can be stored in the soil for several years, however seedlings tend to regenerate from wind dispersed seeds after fire. Therefore, the season and timing of a burn in relation to seed crop cycles may affect seedling density. Smaller fires may produce higher seedling densities due to the proximity of available seed sources. Seasonal precipitation patterns and air temperatures during germination influence seedling survival. As the seedlings develop they form dense thickets. As the trees grow taller, they thin their lower branches. Most trees persist even with limited sunlight on their canopy. Growth becomes stagnant when chronic competition for light, water and nutrients exists. After a certain point of stagnation Sierra lodgepole pine may not respond to competitive release from thinning, disease, or fire.

Community 1.4
Sierra lodgepole pine/western needlegrass

This forest is multi-aged with an irregular canopy distribution due to small scale or patchy disturbances. This is the common community phase at this time. The most significant forest disturbances that lead to the creation of canopy gaps are provided by Mountain pine beetle infestations. After a pest infestation, patches of the stand die and leave gaps for lodgepole pine regeneration. Fire created canopy gaps are uncommon. Because low intensity fire is often fatal to mature lodgepole pine, even a low severity fire can be a stand replacing event; however low intensity smoldering fires have been documented which spread through downed trees after mountain pine beetle infestations. Although damage to live trees was minor, those with fire scars were more susceptible to the next mountain pine beetle attack. Canopy gaps may also be created by wind throw, a susceptibility of Sierra lodgepole pine due to its shallow root system. White fir is present in understory areas that have not experienced fire. It can regenerate in undisturbed areas, and in the shade of beetle killed lodgepole snags. White fir is multi-aged and has a patchy distribution due to stand disturbances.

Forest overstory. Sierra lodgepole pine dominates the canopy, with a small portion of white fir and an occasional quaking aspen or Jeffrey pine in the area. Canopy cover ranges from 35 to 60 percent. The upper canopy is 90 to 100 feet above the forest floor. There are older gaps with young Sierra lodgepole pine trees and new gaps with saplings. Basal area ranges from 150 to 200 ft2/ acre.

Forest understory. The understory cover is dominated by western needlegrass (Achnatherum occidentale) and squirreltail (Elymus elymoides). Other species are rabbitbush (Ericameria bloomeri), California stickseed (Hackelia californica), lupines (Lupinus spp.), and goosefoot violet (Viola purpurea).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	–	66	213
Tree	–	17	41
Forb	–	9	22
Shrub/Vine	–	3	7
Total	**–**	**95**	**283**

Community 1.5
Sierra lodgepole pine/litter

This dense Sierra lodgepole pine forest develops after dense seedling establishment and absence of canopy disturbance. This forest is even-aged with a high basal area of tall thin trees. The forest is stagnant. Only the upper crowns get sunlight, and the understory branches die back. The self-thinning process is slow and does not eliminate competition. There is almost no regeneration due to the lack of openings in the forest. Understory production and cover decreases due to the lack of sunlight. The potential for a severe pest infestation or disease is high because the trees are stressed from competition for sunlight, water, and nutrients. The close proximity of the trees will enable the pathogens to spread quickly. Severe fire is likely during this phase because of the high accumulation of fuels on the forest floor. White fir establishes under the Sierra lodgepole pine overstory.

Community 1.6
White fir-Sierra lodgepole pine/litter

The dense white fir-Sierra lodgepole pine forest develops with the continued exclusion of fire or other disturbances, allowing tree density to increase to unhealthy levels. Competition for water and sunlight continues and tree health and vigor decreases. Sierra lodgepole pine persists in the understory of the white fir for some time, but eventually declines due to the lack of sunlight and natural senescence. Fuel loads are high from the trees dying in the understory. Understory vegetation is absent due to the high cover of litter and debris and the lack of sunlight on the forest floor.

Pathway 1.1a
Community 1.1 to 1.2

This pathway is created by a high mortality fire or forest infestation, followed by relatively open Sierra lodgepole pine seedling regeneration (Community Phase 1.2).

Pathway 1.1b
Community 1.1 to 1.3

This pathway is created by a high mortality fire or forest infestation, followed by relatively dense Sierra lodgepole pine seedling regeneration (Community Phase 1.3) provided there is ample presence of cones and seed and optimum germination of seeds.

Pathway 1.2a
Community 1.2 to 1.4

This pathway is followed with time and growth and small scale canopy disturbances. An open multi-age lodgepole pine forest develops (Community Phase 1.4).

Pathway 1.3a
Community 1.3 to 1.5

With time and growth the stand remains dense and evenly aged (Dense lodgepole pine forest, Community Phase 1.5). Trees are generally healthy and few gaps are created from tree mortality in this young forest.

Pathway 1.4a
Community 1.4 to 1.1

With time and growth and small scale disturbances, this forest continues to develop into an open White fir-Sierra lodgepole pine forest (Community Phase 1.1) with a multi-aged, complex forest structure.

Pathway 1.4b
Community 1.4 to 1.2

This pathway is triggered by a high mortality fire, which initiates open Sierra lodgepole pine regeneration (Community Phase 1.2).

Pathway 1.4c
Community 1.4 to 1.3

This pathway is triggered by a high mortality fire, which initiates dense lodgepole pine regeneration (Community Phase 1.3) provided there is ample presence of cones and seed and optimum germination of seeds.

Pathway 1.5b
Community 1.5 to 1.2

This pathway is triggered by a high mortality fire with appropriate conditions for open lodgepole pine regeneration (Community Phase 1.2). Pathways 1.5a and 1.5b are common with the natural fire cycle. The historic fire return interval for a nearby Sierra lodgepole pine forest is 67 years. Such a fire return interval, if naturally operating, usually does not allow for later successional community phases (i.e. Community phases 1.1 and 1.6) to develop.

Pathway 1.5a
Community 1.5 to 1.3

This pathway is triggered by a high mortality fire with appropriate conditions for dense lodgepole pine regeneration (Community Phase 1.3) based on ample presence of cones and seed and optimum germination of seeds.

Pathway 1.5c
Community 1.5 to 1.4

This pathway is initiated by repeated small scale canopy disturbances caused by mountain pine beetle infestations, low-mortality fires, or wind throw. The forest becomes a more open Sierra lodgepole pine forest (Community Phase 1.4) with several age classes. With continued small scale disturbances, it can eventually develop into Community Phase 1.1.

Pathway 1.5d
Community 1.5 to 1.6

With time and growth and the absence of disturbance the stand remains evenly aged and dense. White fir, which has established in the understory, becomes increasingly prevalent in the canopy and creates a dense white fir-Sierra lodgepole pine forest with little to no understory (Community Phase 1.6).

Pathway 1.6c
Community 1.6 to 1.1

This pathway is created in time with a high incidence of small scale disturbances, which break up the uniformity and density of this forest. With continued disturbances the open multi-aged white fir-Sierra lodgepole pine forest (Community Phase 1.1) may develop. However, the natural event of a moderate or surface fire in this forest is unlikely due to the high fuels and low fire tolerance of the dominant tree species. Considerable management efforts would be needed to create the open forest conditions that should exist in this forest had it developed with small scale disturbances over time.

Pathway 1.6b
Community 1.6 to 1.2

The occurrence of severe fire would initiate open lodgepole pine regeneration (Community Phase 1.2) provided seed amounts are moderate.

Pathway 1.6a
Community 1.6 to 1.3

The occurrence of severe fire would initiate dense lodgepole pine regeneration (Community Phase 1.3) provided there is ample presence of cones and seed and optimum germination of seeds.

Additional community tables

Table 6. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Tree					
0	**Tree (understory only)**			0–41	
	Sierra lodgepole pine	PICOM	*Pinus contorta var. murrayana*	0–17	0–3
	quaking aspen	POTR5	*Populus tremuloides*	0–11	0–5
	white fir	ABCO	*Abies concolor*	0–11	0–4
	Jeffrey pine	PIJE	*Pinus jeffreyi*	0–2	0–1
Shrub/Vine					
0	**Shrub**			0–7	
	rabbitbush	ERBL2	*Ericameria bloomeri*	0–7	0–3
Grass/Grasslike					
0	**Grass/Grasslike**			0–213	
	western needlegrass	ACOC3	*Achnatherum occidentale*	0–168	0–30
	squirreltail	ELEL5	*Elymus elymoides*	0–45	0–10
Forb					
0	**Forb**			0–22	
	lupine	LUPIN	*Lupinus*	0–18	0–2
	California stickseed	HACA	*Hackelia californica*	0–3	0–1
	goosefoot violet	VIPU4	*Viola purpurea*	0–1	0–1

Table 7. Community 1.4 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
Sierra lodgepole pine	PICOM	*Pinus contorta var. murrayana*	Native	–	34–55	–	–
white fir	ABCO	*Abies concolor*	Native	–	1–3	–	–
Jeffrey pine	PIJE	*Pinus jeffreyi*	Native	–	0–1	–	–
quaking aspen	POTR5	*Populus tremuloides*	Native	–	0–1	–	–

Table 8. Community 1.4 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
western needlegrass	ACOC3	*Achnatherum occidentale*	Native	–	0–30
squirreltail	ELEL5	*Elymus elymoides*	Native	–	0–10
Forb/Herb					
lupine	LUPIN	*Lupinus*	Native	–	0–2
goosefoot violet	VIPU4	*Viola purpurea*	Native	–	0–1
California stickseed	HACA	*Hackelia californica*	Native	–	0–1
Shrub/Subshrub					
rabbitbush	ERBL2	*Ericameria bloomeri*	Native	–	0–3
Tree					
quaking aspen	POTR5	*Populus tremuloides*	Native	–	0–5
white fir	ABCO	*Abies concolor*	Native	–	0–4
Sierra lodgepole pine	PICOM	*Pinus contorta var. murrayana*	Native	–	0–3
Jeffrey pine	PIJE	*Pinus jeffreyi*	Native	–	0–1

Animal community

Sierra lodgepole pine forests provide food, cover and habitat for a variety of species. Thirty-one mammals and almost fifty bird species have been documented to use Sierra lodgepole pine forests. Snags and down logs are important for cavity-nesting birds and mammals. Other animals feed on the Sierra lodgepole pine needles and consume the seeds (Cope, 1993).

Recreational uses

This area is suitable for trails and camping.

Wood products

Sierra lodgepole pine wood is used for framing, paneling, trim, posts, and other construction products. The forests are often uniform is size, which makes harvesting easier. The wood tends to be light and straight grained with consistent texture (Cope 1993).

Other information

SITE INDEX DOCUMENTATION:

Schumacher (1926), Alexander (1966) and Meyer (1961) were used to determine forest site productivity for white fir, lodgepole pine and Jeffrey pine, respectively. Low to High values of Site index and CMAI (culmination of mean annual increment) give an indication of the range of inherent productivity of this ecological site. Site index relates to height of dominant trees over a set period of time and CMAI relates to the average annual growth of wood fiber in the boles/trunks of trees. Site index and CMAI listed in the Forest Site Productivity section are in units of feet and cubic feet/acre/year, respectively. Both site index and CMAI are estimates; on-site investigation is recommended for specific forest management units for each soil classified to this ecological site. The historical and actual basal area of trees within a growing stand will greatly influence CMAI.

Conifer trees appropriate for site index measurement typically occur in community phase 1.4 and older stands in 1.2 and 1.3. They are selected according to guidance listed in the site index publications.

Table 9. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
white fir	*ABCO*	49	49	88	88	70	030	–	
white fir	*ABCO*	49	49	88	88	–	–	100TA	Meyer, Walter H. 1961. Yield of even-aged stands of ponderosa pine. USDA Technical Bulletin 630. (1938 version revised in 1961).
Sierra lodgepole pine	*PICOM*	79	79	86	86	100	520	–	
Jeffrey pine	*PIJE*	86	86	79	79	40	600	–	
Jeffrey pine	*PIJE*	86	86	78	78	–	–	100TA	Meyer, Walter H. 1961. Yield of even-aged stands of ponderosa pine. USDA Technical Bulletin 630. (1938 version revised in 1961).
Sierra lodgepole pine	*PICOM*	79	79	68	68	–	–	100TA	Meyer, Walter H. 1961. Yield of even-aged stands of ponderosa pine. USDA Technical Bulletin 630. (1938 version revised in 1961).

Inventory data references

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

789228
789332
789334
789367- Site location for ecological site.

Type locality

Location 1: Lassen County, CA	
UTM zone	N
UTM northing	4490409
UTM easting	631429
General legal description	The type location is west of Hat Creek near the northern boundary of Lassen Volcanic National Park.

Other references

Agee, James K.1994. The Lodgepole Pine Series in Fire and Weather Disturbances in Terrestrial Ecosystems of the Eastern Cascades. From volume III:Assessment. USDA, Forest Service, Pacific Northwest Research Station. Gen. Tech. Report.

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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:

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

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

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

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:**

17. **Perennial plant reproductive capability:**