11700

Klamath-Siskiyou Xeromorphic Serpentine Savanna and Chaparral

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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Reviewer: Darren Borgias, Clint Emerson, Lyndia Hammer, Patricia Hochhalter, Jimmy Kagen, Kerry Metlen, Jena Volpe

Vegetation Type

Steppe/Savanna

Map Zones

2, 3, 7

Geographic Range

Found in zone 2 and the parts of zones 3 and 7 where Jeffrey Pine is mapped on ultramafic soils.

This savanna and chaparral type occurs in the Klamath-Siskiyou region of Southwest Oregon and Northern California on serpentine soils derived from ultramafic rocks. It occurs on very mineralized areas, which will not support forests or woodlands. This type barely enters map zone 7, north of Grants Pass, Oregon, at its west edge.

This model applies primarily within the Klamath Mountains Ecoregion but can also apply to the Pacific Northwest Coast and California North Coast ecoregions on ultramafic soils. Jeffrey pine that is not associated with ultramafic soils is covered by BpS 10310 California Montane Jeffrey Pine (Ponderosa Pine) Woodland.

Biophysical Site Description

These dry sites are easily recognized due to the serpentine soils and are more pronounced on southern aspects but may be found on rocky ridges, ridgetops, river terraces, or gravelly valley bottomlands. At elevations from 200-4,550ft above sea level, the sites will likely be dominated by Jeffrey pine. Soils are usually shallow and poorly drained with surface rock averaging 8-27%. However, the defining character for the soil is the mineral nutrition rather than its depth. Rainfall (over 130cm/yr) is adequate to support dense forests, but few plants can tolerate the xeromorphic environment.

This type represents about 20% of the total range of Jeffrey pine.

Vegetation Description

This BpS is characterized by a mosaic of savanna or shrub-dominated chaparral. Savannas are dominated almost entirely by Jeffrey pine with an understory of either a grass, with more frequent fire, or of shrub, with less frequent fire. Trees may have a stunted growth form. Herbaceous layer strongly dominated by grasses, notably *Festuca roemeri*, *Stipa lemmonii* (*Achnatherum lemmonii*), and *Danthonia californica* and serpentine-adapted herbs. Varied shrubs can include *Quercus vacciniifolia*, *Quercus sadleriana*, *Lithocarpus densiflorus* var. *echinoides*, *Quercus garryana* var. *breweri*, *Ceanothus cuneatus*, *Ceanothus pumilus*, *Arctostaphylos viscida*, *Arctostaphylos x cinerea*, *Arctostaphylos canescens*, *Arctostaphylos nevadensis*, *Frangula californica* (*Rhamnus californica*), and *Garrya buxifolia*.

Plant associations include PIJE/ARCA5/FEID, PIJE/CECU/FEID, PIJE/FEID, PIJE/CEPU -- Jeffrey pine subtype associated with incense-cedar and Douglas-fir.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIJE | *Pinus jeffreyi* | Jeffrey pine |
| ARVI4 | *Arctostaphylos viscida* | Sticky whiteleaf manzanita |
| CEPU | *Ceanothus pumilus* | Dwarf ceanothus |
| FERO | *Festuca roemeri* | Roemer's fescue |

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

Historically, savanna patches had frequent low-severity fire (Fire Regime I), and grass and chaparral patches experienced more high-severity fire. Today there is higher susceptibility to stand-replacing fire because of fire exclusion.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 200 | 7 | 100 | 300 |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) | 14 | 93 | 10 | 20 |
| All Fires | 13 | 100 |  |  |

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

Regionally a relatively small part of the landscape but of great value for plant diversity. Patches in 1,000s of acres. However, disturbance patches were occasionally smaller in mixed-severity fires. In a few areas, these occur on gravel deposits or very mineralized soils that will not support fine fuels (grasslands). These open savannas and shrublands have long return intervals and mixed fires rather than underburns.

Adjacency or Identification Concerns

These woodlands are usually found at low elevations within a matrix of mixed conifer and mixed evergreen stands. However, their identity lies in the soil conditions, rather than environmental gradients.

This type has a very dry, open appearance that distinguishes it from the Klamath-Siskiyou Lower Montane Serpentine Mixed Conifer Woodland, which is found on less xeric sites and has a woodland physiognomy.

Note this type is defined as only occurring on ultramafic geology-- model does not apply to Jeffrey pine in other areas. Also, *Festuca roemeri* is only recently described, and most southwestern Oregon plot data will include this species as *Festuca idahoensis.*

Issues or Problems

Other disturbances in this type include wind-weather-stress, insects-disease, and competition-lack of seed. However, these disturbances were not modeled in the state-and-transition model.

Native Uncharacteristic Conditions

Comments

There are sites within this BpS, especially on rocky outcrops and ridges, that are more edaphically controlled and, for the most part, do not burn. These sites could be modeled using a single state. Most other sites do burn and can support a savanna with grass understory with more frequent fire or savanna with shrub understory with less frequent fire. The LANDFIRE state-and-transition model describes the savanna potential of this BpS with three classes: an early seral grass/shrub community, a mid-seral-developing savanna community, and a late-seral mature savanna community. The distinction between the understory in the savanna stage is not represented in the model because it may not be possible to discern the composition using 30m imagery and LANDFIRE’s mapping methods. Future or local refinement should consider the possibility of distinguishing the grass versus the shrub savanna in separate classes to better represent the differences in fire severity and to distinguish different habitats important from a wildlife perspective.

During 2016 review, Kori Blankenship revised the model and description based on feedback from the original modeler, Jimmy Kagen, and reviewers: Darren Borgias, Clint Emerson, Lyndia Hammer, Patricia Hochhalter, Kerry Metlen, and Jena Volpe. The model was changed from one with four states that distinguished grass vs. shrub savanna to one with three states that did not make this distinction. This was done to try to improve the mappability of the succession classes.

LANDFIRE National Review Comment:

One reviewer suggests that the range of fire frequency be qualified by the biomass productivity, which is keyed to soil chemistry.

Succession Classes

**Mapping Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Upper Layer Lifeform** | **Height (m)** | **Canopy Cover (%)** | | | | | | | | | |
| **0-10** | **11-20** | **21-30** | **31-40** | **41 - 50** | **51-60** | **61-70** | **71-80** | **81-90** | **91-100** |
| Herb | 0-0.5 | A | A | A | A | A | A | A | A | A | A |
| Herb | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Herb | >1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0-0.5 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 1.0-3.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | >3.0 | A | A | A | A | A | A | A | A | A | A |
| Tree | 0-5 | A | A | A | A | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | B | B | B | B | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | C | C | C | C | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | C | C | C | C | UN | UN | UN | UN | UN | UN |
| Tree | >50 | C | C | C | C | UN | UN | UN | UN | UN | UN |

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

**Description**

Class A 14 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CEPU | Ceanothus pumilus | Dwarf ceanothus | Upper |
| FERO | Festuca roemeri | Roemer's fescue | Upper |
| ACLE8 | Achnatherum lemmonii | Lemmon's needlegrass | Upper |
| DACA3 | Danthonia californica | California oatgrass | Upper |

Description

Scattered Jeffrey pine seedlings and saplings with herbaceous or shrub understory. Herb and forb cover rarely exceeds 40%, and shrub cover rarely exceeds 60%. Dominant life form is always either grasses or chaparral shrublands, based on the fire return interval (FRI). Areas with high FRIs support grass savanna, while areas with lower FRIs support chaparral.

*Maximum Tree Size Class*  
Sapling >4.5ft; <5" DBH

Class B 31 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIJE | Pinus jeffreyi | Jeffrey pine | Upper |
| CEPU | Ceanothus pumilus | Dwarf ceanothus | Middle |
| ARVI4 | Arctostaphylos viscida | Sticky whiteleaf manzanita | Middle |
| FERO | Festuca roemeri | Roemer's fescue | Lower |

Description

Open stands of Jeffrey pine, with grass and forb or shrub understory. DBH is the best way to distinguish Classes B and C.

*Maximum Tree Size Class*  
Medium 9-21" DBH

Class C 55 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIJE | Pinus jeffreyi | Jeffrey pine | Upper |
| CEPU | Ceanothus pumilus | Dwarf ceanothus | Middle |
| DACA3 | Danthonia californica | California oatgrass | Lower |
| FERO | Festuca roemeri | Roemer's fescue | Lower |

Description

Scattered large Jeffrey pine, with either grass and forb understory or shrub understory. The grass understory is maintained by frequent, low-intensity fires and is characterized as a grass savanna. Dominant species include *Festuca roemeri* (*F. idahoensis* in plot data), *Achnatherum lemmonii*, and *Danthonia californica*. The shrub understory develops in areas with lower fire frequencies and is characterized as an open chaparral shrubland with trees. Species include *Arctostaphylos viscidus*, *A. canescens*, *Quercus breweri*, *Ceanothus cuneatus*, and the low-growing *Ceanothus pumilus*, with grasses and forbs. DBH is the best way to distinguish Classes B and C.

*Maximum Tree Size Class*  
Large 21-33"DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:OPN | 29 |
| Mid1:OPN | 30 | Late1:OPN | 119 |
| Late1:OPN | 120 | Late1:OPN | 999 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.07 | 14 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.07 | 14 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.07 | 14 | No | 0 |

References

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