

Ecological site F043AY577ID

Warm-Frigid, Very Moist-Udic Loamy Foothills/Mountainsides (Western redcedar, fern) Western Redcedar / Oakfern-Maidenhair fern

Last updated: 10/23/2020
Accessed: 04/18/2024

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.

MLRA notes

Major Land Resource Area (MLRA): 043A–Northern Rocky Mountains

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Description of MLRAs can be found in: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook

LRU notes

Modal LRU – 43A10 - Clearwater Mountains

This LRU is composed predominantly of mid to high elevation mountain slopes, and valley walls. The soils tend to be loamy andisols, and inceptisols with distinct ash surfaces. Colluvium or residuum from granitic or metamorphic rock are the dominant parent materials. Soil climate is a frigid or cryic temperature regime and udic moisture regime with average annual precipitation around 1330 mm (54 inches).

Others where occurring – 43A09 - Western Bitterroot Foothills
43A11 - Bitterroot Metasedimentary Zone

Classification relationships

Relationship to Other Established Classifications:

United States National Vegetation Classification (2008), A3612 Western Hemlock – Western Redcedar Cool-Mesic Central Rocky Mountain Forest & Woodland Alliance.

Washington Natural Heritage Program. Ecosystems of Washington State, A Guide to Identification, Rocchio and Crawford, 2015 - Northern Rocky Mt. Mesic Montane Mixed Conifer Forest (Cedar-Hemlock)

Description of Ecoregions of the United States, USFS PN # 1391, 1995 - M333 Northern Rocky Mt. Forest-Steppe-Coniferous Forest-Alpine Meadow Province

Level III and IV Ecoregions of WA, US EPA, June 2010 – 15y Selkirk Mountains, 15w Western Selkirk Maritime Forest.

This ecological site includes the following USDA Forest Service Plant Associations Western Redcedar Series: THPL/GYDR, THPL/ADPE, THPL/ATFI. (Williams et. al. 1995)

Ecological site concept

This ES group is distinguished by an overstory of western redcedar, grand fir and Douglas-fir and a diverse understory of ferns such as western oakfern, maidenhair fern and ladyfern; and herbs such as bride's bonnet, Idaho goldthread, coolwort foamflower, wild ginger and starry false solomon's seal. It occurs on lower slope of foothills or mountainsides, and in river valleys. These soils have developed in various thicknesses of Mazama tephra deposits (often highly mixed with loess) over a number of other parent materials. These parent materials are dominantly: alluvium and material weathered from granite, gneiss or schist. The soils have adequate available water holding capacity within 40 inches. About half of the components have either a perched or apparent water table within 30 inches of the soil surface. They are very poorly to well drained and are in positions of moisture accumulation.

Table 1. Dominant plant species

Tree	(1) <i>Thuja plicata</i> (2) <i>Abies grandis</i>
Shrub	(1) <i>Acer glabrum</i> (2) <i>Rubus parviflorus</i>
Herbaceous	(1) <i>Gymnocarpium dryopteris</i> (2) <i>Adiantum pedatum</i>

Physiographic features

Physiographic Features

This ecological site occurs mainly on foot slopes and drainageways of mountains and hills. Parent materials are alluvium or residuum and colluvium derived from igneous (granitic) and metamorphic rock mantled by volcanic ash and loess.

Landscapes: Mountains, Foothills, River Valleys

Landforms: Mountain slopes, Hillslope, Stream Terraces, Floodplains, Drainageways, Valley Floors

Elevation:

Total range = 488 to 1530 m

(1,600 to 5,020 feet)

Central tendency = 735 to 1060 m

(2,4105 to 3,470 feet)

Slope (percent):

Total range = 0 to 75 percent

Central tendency = 10 to 35 percent

Aspect: none dominant

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Foothills > Hillslope (3) River valley > Valley floor (4) Foothills > Drainageway (5) River valley > Stream terrace (6) River valley > Flood plain
Flooding duration	Not specified
Flooding frequency	None
Ponding frequency	None

Elevation	2,410–3,470 ft
Slope	10–35%
Water table depth	28 in
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Flooding duration	Very long (more than 30 days)
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	1,600–5,020 ft
Slope	0–75%
Water table depth	0–80 in

Climatic features

Climatic Features

The climate of this portion of the MLRA is controlled by a combination of large-scale and small-scale factors. The large-scale factors include latitude, relative position on the North American continent, prevailing hemispheric wind patterns, and extensive mountain barriers. Small-scale or local factors include the topographic setting and position (valley, slope, or ridge location), as well as orientation or aspect, and vegetative cover. Broadly, the climate is transitional between a northern Pacific coastal type and a continental type. The Pacific influence is noted particularly by the late autumn and winter maximum in cloudiness and precipitation and in the relatively moderate average winter temperatures, compared with areas east of the Rocky Mountains. Summer is characteristically sunny and dry, though July and August are the only distinct summer months. July and August are thus also the peak fire-danger months. Annual precipitation (rain and melted snow) averages as little as 10 inches at the lowest canyon floors; over 100 inches at the highest elevations. Wettest months are normally November, December, and January. Close to 60 percent of the annual total occurs during the period November through March. A slight, secondary peak in precipitation normally appears in May and June, followed by a sharp decrease in July. Snowfall accounts for more than 50 percent of the total precipitation at elevations above 4,800 ft. Snow cover usually persists in the mid elevation valleys from early December through the end of March. High-elevation snowpack reaches a depth of 5 ft or more in March and April and may linger into June. The main season of lightning (or thunderstorm) activity extends from late May through August. Storms occur on an average of 3 or 4 days each in June, July, and August. Monthly mean temperatures in populated valley locations range from 24 F (-4 C) in January to 65 F (18 C) in July; these are midpoint values between the average daily maximum and minimum temperatures. The annual mean is 43 F (6 C). A large diurnal range occurs in summer. Extreme temperatures have been as high as 103° to 105° F (about 40° C) and as low as -36° F (-38° C). Temperature inversions are commonplace, particularly on the clear summer and early autumn nights. The frost-free season, defined as the period with minimum temperatures staying above 32° F (0° C), varies widely with elevation and topographic position. The season is generally longer at lower elevation locations and on slope positions in the "thermal belt" around 3,500 ft. The season is shorter in positions affected by cold air drainage and slopes above the "thermal belt" at elevations >5,500 ft. Relative humidity is usually high throughout the day in late autumn and winter, averaging 70 to 80 percent or higher in midafternoon. In July and August, afternoon values average near 35 percent in the mid elevation valleys and 45 percent at 5,500 ft. Summer nighttime humidity in these valleys typically recovers to over 90 or 95 percent by dawn. On the slopes above the temperature inversion, at the same time, humidity may average only 50 to 60 percent. Winds have a prevailing (most frequent) direction from the southwest during all or most of the year. Local terrain effects modify the larger-scale wind that occurs in the adjacent free atmosphere. A nighttime drainage effect is common. Sunshine duration is at a minimum in December, when it may average only 20 percent of the maximum possible. July has close to 80 percent of the maximum possible.

(from Finklin, A. 1983. Climate of Priest River Experimental Forest, Northern Idaho. GTR-INT-159)

Frost-free period (days):

Total range = 60 to 135 days

Central tendency = 90 to 110 days

Mean annual precipitation (cm):

Total range = 530 to 1405 mm

(21 to 55 inches)

Central tendency = 770 to 1035 mm

(30 to 41 inches)

MAAT (C)

Total range = 4.9 to 9.9

(41 to 50 F)

Central tendency = 6.7 to 8.0

(44 to 46 F)

Climate stations: Enaville, Mullan

Influencing water features

Water Table Depth: 54% of components have no observed water table (> 80 inches)

Where water table occurs (46% of components): range is 0 to 30 inches (median = 18 inches) during Dec-May

Flooding:

Frequency: None to Frequent

Duration: None to Very Long

Ponding:

Frequency: None

Duration: None

Soil features

Representative Soil Features

This ecological site is associated with several soil components (e.g. Floodwood, Odonnell, Chatcolet, Aquic Udifluvents, Dorb, Grandad, Hubub, Boulder creek, Ramsdell, Seelovers, and Porrett). The soil components can be grouped into Endoaquepts, Endoaquolls, Epiaqualfs, Hapludalfs, Udifluvents, and Udivitrands. These soils have developed in various thicknesses of Mazama tephra deposits (often highly mixed with loess) over a number of other parent materials. These parent materials are dominantly: alluvium and material weathered from granite, gneiss or schist. The soils have adequate available water holding capacity within 40 inches. About half of the components have either a perched or apparent water table within 30 inches of the soil surface. They are very poorly to well drained and are in positions of moisture accumulation.

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Alluvium (3) Colluvium–granite (4) Colluvium–metamorphic rock
Surface texture	(1) Ashy silt loam (2) Medial silt loam (3) Cobbly, ashy silt loam
Drainage class	Moderately well drained
Permeability class	Moderately slow
Depth to restrictive layer	80 in
Surface fragment cover >3"	0%

Available water capacity (0-40in)	6.8 in
Calcium carbonate equivalent (0-60in)	0%
Electrical conductivity (0-60in)	0 mmhos/cm
Soil reaction (1:1 water) (0-60in)	6.2
Subsurface fragment volume >3" (10-60in)	2%

Table 5. Representative soil features (actual values)

Drainage class	Very poorly drained to well drained
Permeability class	Slow to moderate
Depth to restrictive layer	20–80 in
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3.7–8.5 in
Calcium carbonate equivalent (0-60in)	0%
Electrical conductivity (0-60in)	0 mmhos/cm
Soil reaction (1:1 water) (0-60in)	5.3–7.3
Subsurface fragment volume >3" (10-60in)	0–65%

Ecological dynamics

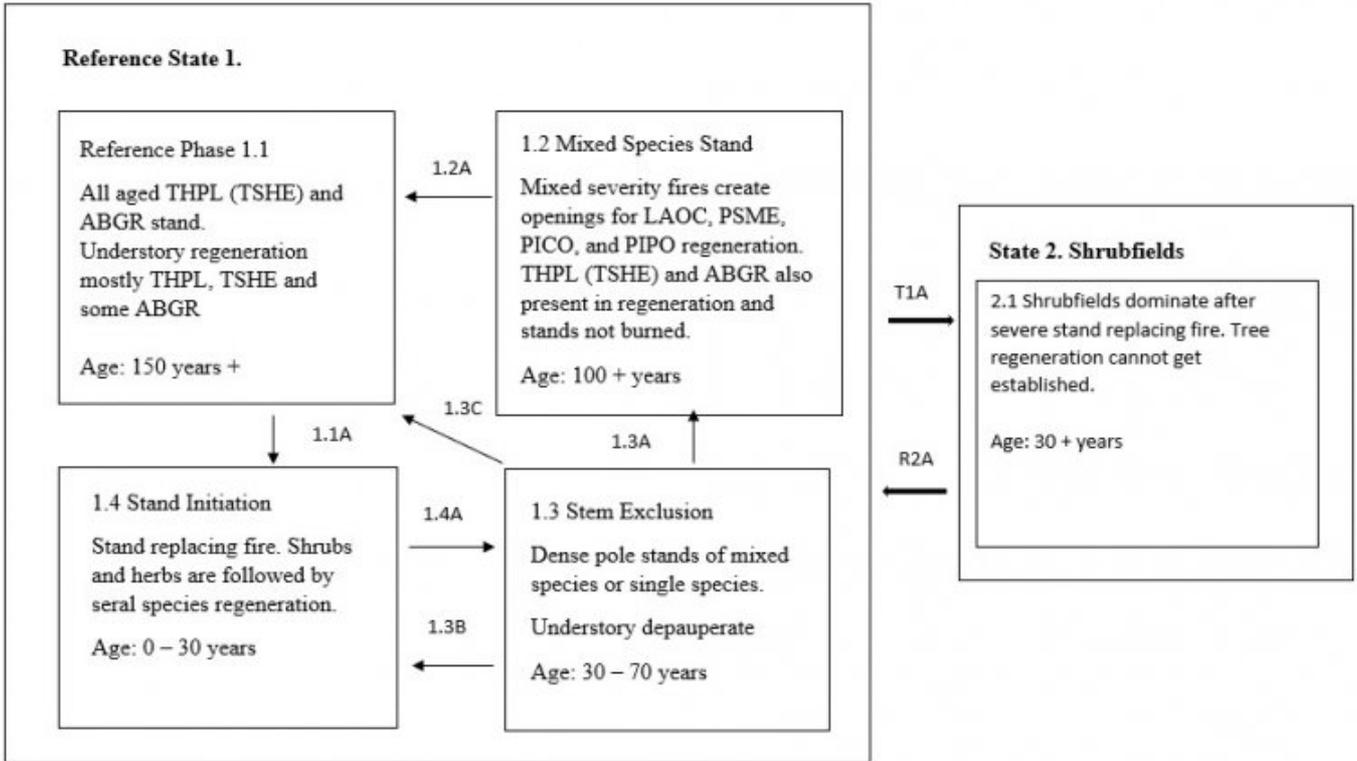
Ecological Dynamics of the Site

This ecological site is highly diverse in tree species, shrub and forb composition. Forest composition is dependent of fire severity, occurrence, and tree species seed source after fire. Western white pine used to dominate stands after stand replacing fires before the white pine blister rust. Now, western larch, Douglas-fir, lodgepole, and ponderosa pine (dry exposures) have replaced it. Grand fir western hemlock, and western red cedar also get established but sit in understory underneath the other species until release from canopy openings. Hemlock occurrence is limited to stands north of the North Fork Clearwater River. Engelmann spruce occurs in areas affected by cold air drainage. In early stands after fire Quaking aspen, paper birch, and black cottonwood will be present only to be overtopped in later years. Shrub competition can be severe after fire with many shrub species dominating the site. Red stem ceanothus or snowbrush ceanothus (drier areas) or Scouler willow (wetter sites) can dominate sites with severe burns. Mixed severity fires create a patchy mosaic of all tree species being present. Reference condition comprise the “giant cedar groves” with high canopies and moist understories. Very large western redcedar and grand fir dominate old growth and often younger stands as well. Seral species vary, depending on temperature and drainage conditions. These sites will have fire intervals of over 200 years for stand replacing fires. Relic western larch, Douglas-fir, and ponderosa pine may be present.

State and transition model

State and Transition Diagram

Ecological Site
 Frigid Udic Loamy Foothills/Mountainsides (Western redcedar, fern)



State 1 Reference



This state with extended fire intervals turns into an all aged western redcedar stand with some grand fir and/or western hemlock present. Stand development after fire depends on fire size and severity, as well as changes in drainage and microclimate. Since severe fires are accompanied by stand removal over a large geographic area, stand-replacing fire may be followed by a significant rise in the water table. *Salix scouleriana* often dominates such wet sites. Canopy removal also increases the likelihood of frosty conditions, favors shrub dominance, and retards establishment of the ferns and herbs characteristic of climax stands. Reforestation may require more than 100 years. The tree species that establish on burns vary with postburn conditions. Shade-tolerant species are favored in small openings, especially if duff is not removed. In larger openings, hardwoods and shade-intolerant conifers can overtop climax species and so dominate early seral stages. Black cottonwood is often important in such stands. On sites with good drainage, western white pine, western larch, and Douglas-fir all occur. Cold conditions favor Engelmann spruce and occasional lodgepole pine. Rotting logs are the best microsites for tree establishment; root

crowns of fallen trees are also good seedbeds. With successful tree regeneration a mix of seral tree species can occupy the stand or in some cases, a single species like western larch will dominate the stand. These stands go into the stem exclusion phase with tree to tree competition. Understory vegetation will be sparse. As these stands mature mixed severity fires create a mosaic of stand structure and species composition with a combination of seral species and shade tolerant cedar, hemlock and grand fir. Old-growth stands develop an open canopy composed of large, evenly spaced trees, with mostly cedar or hemlock regeneration beneath. The most vigorous understory trees originate in canopy gaps, not in shade (Smith and Fisher, 1997).

Community 1.1

Reference



These are very moist forests in northern Idaho. They comprise the “giant cedar groves” with high canopies and moist understories. Most are in valley bottoms or on lower slopes with high water tables. Very large western redcedar and grand fir dominate old growth and often younger stands as. Seral species vary, depending on temperature regime and drainage conditions. In these stands, *Acer glabrum*, *Alnus sinuata*, *Oplopanax horridum*, *Salix scouleriana*, and *Taxus brevifolia* can grow very large. Ferns, especially *Adiantum pedatum*, *Athyrium filix-femina*, and *Gymnocarpium dryopteris*, are conspicuous in the understory. Woody fuels may be light or heavy, depending on site history, stand structure, and moisture conditions. High rates of decomposition, especially in old-growth stands, often contribute to relatively low woody fuel loadings. Most of these stands persist for many centuries without severe fire. Widespread occurrence of shade-intolerant species, however, indicates a history that included occasional severe fire. (Smith and Fischer, 1997)

Dominant plant species

- western redcedar (*Thuja plicata*), tree
- grand fir (*Abies grandis*), tree
- Engelmann spruce (*Picea engelmannii*), tree
- Rocky Mountain maple (*Acer glabrum*), shrub
- thimbleberry (*Rubus parviflorus*), shrub
- longtube twinflower (*Linnaea borealis* ssp. *longiflora*), shrub
- dwarf rose (*Rosa gymnocarpa*), shrub
- Utah honeysuckle (*Lonicera utahensis*), shrub
- Pacific yew (*Taxus brevifolia*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- Columbia brome (*Bromus vulgaris*), grass
- western oakfern (*Gymnocarpium dryopteris*), other herbaceous
- common ladyfern (*Athyrium filix-femina*), other herbaceous
- northern maidenhair (*Adiantum pedatum*), other herbaceous
- Idaho goldthread (*Coptis occidentalis*), other herbaceous
- threeleaf foamflower (*Tiarella trifoliata*), other herbaceous
- bride's bonnet (*Clintonia uniflora*), other herbaceous
- threepetal bedstraw (*Galium trifidum*), other herbaceous
- British Columbia wildginger (*Asarum caudatum*), other herbaceous

- starry false lily of the valley (*Maianthemum stellatum*), other herbaceous
- Pacific trillium (*Trillium ovatum*), other herbaceous

Community 1.2 Mixed Species Stand



Mixed severity fires create a mosaic of mixed tree species. Western larch, Douglas-fir, western white pine, ponderosa pine (drier sites), and lodgepole pine can compose the stand. Cedar and grand fir will be mixed into the stand structure. Quaking aspen, black cottonwood and paper birch can be part on these mosaic stands.

Dominant plant species

- grand fir (*Abies grandis*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- western redcedar (*Thuja plicata*), tree
- western larch (*Larix occidentalis*), tree
- western white pine (*Pinus monticola*), tree

Community 1.3 Stem Exclusion



Dense pole size stand competition. Stands composed of mixed seral species or in some cases only cedar

Dominant plant species

- grand fir (*Abies grandis*), tree
- western redcedar (*Thuja plicata*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree

Community 1.4 Stand Initiation



Shrub and herb phase with tree regeneration depending on seed source. Single species regeneration such as western larch or mixed with larch, Douglas-fir, white pine, grand fir and cedar. Ponderosa pine establishment mostly on drier warmer sites. Lodgepole pine establishment possible on hotter burn sites. Shrubs can dominate for long periods preventing tree establishment

Pathway 1.1A Community 1.1 to 1.4



Reference



Stand Initiation

Stand replacing fire

Pathway 1.2A Community 1.2 to 1.1



Mixed Species Stand



Reference

Fire interval extended to allow shade tolerant cedar and grand fir to grow up from understory to dominate stand.

Pathway 1.3C Community 1.3 to 1.1



Stem Exclusion



Reference

Time, fire interval extended to allow cedar and grand fir to dominate stand. No disturbance to allow seral species to dominate.

Pathway 1.3A Community 1.3 to 1.2



Stem Exclusion



Mixed Species Stand

Time, allowing stands to reach maturity before a stand replacing fire. Mixed severity fires then occur.

Pathway 1.3B Community 1.3 to 1.4



Stem Exclusion



Stand Initiation

Stand replacing fire in dense pole stands.

Pathway 1.4A Community 1.4 to 1.3



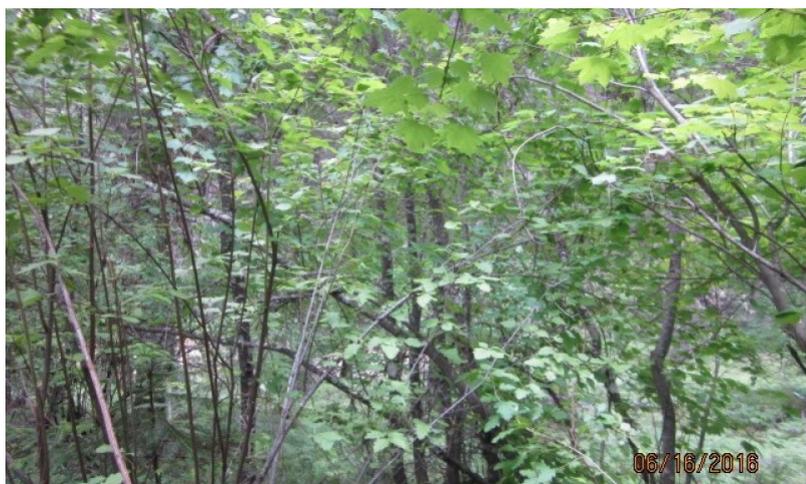
Stand Initiation



Stem Exclusion

Time, allowing tree regeneration to grow into pole stands

State 2 Shrubfields



Severe fires change reference state to a shrubfield site. No tree regeneration due to shrub competition and soil conditions. Major shrubs include snowbrush and redstem ceanothus, serviceberry, ninebark, Scouler willow, elderberry species, snowberry, spirea, and Douglas maple

Dominant plant species

- ceanothus (*Ceanothus*), shrub

- Saskatoon serviceberry (*Amelanchier alnifolia*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- Scouler's willow (*Salix scouleriana*), shrub
- red elderberry (*Sambucus racemosa*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- white spirea (*Spiraea betulifolia*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub

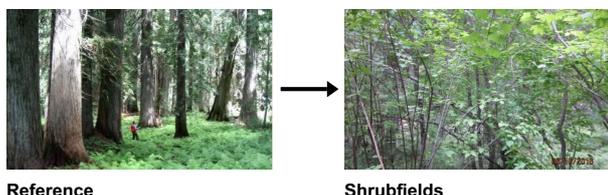
Community 2.1

Reference

Severe fires change reference state to a shrubfield site. No tree regeneration due to shrub competition and soil conditions. Major shrubs include snowbrush and redstem ceanothus, serviceberry, ninebark, Scouler willow, elderberry species, snowberry, spirea, and Douglas maple

Transition T1A

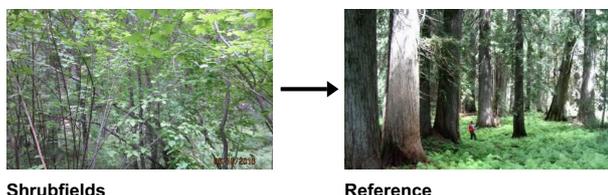
State 1 to 2



Severe fires creating shrubfields preventing tree establishment for long time periods.

Restoration pathway R2A

State 2 to 1



Site by site analysis to determine tree planting survival. Tree planting species mostly seral species like, larch, Douglas-fir, ponderosa pine, and white pine (blister rust resistant).

Additional community tables

Table 6. 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
western white pine	PIMO3	75	110	144	201	100	–	–	
grand fir	ABGR	76	124	106	201	95	–	–	
Rocky Mountain Douglas-fir	PSMEG	64	98	65	152	104	–	–	
western larch	LAOC	56	93	74	146	70	–	–	
Rocky Mountain Douglas-fir	PSMEG	66	100	56	130	88	–	–	

References

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Approval

Curtis Talbot, 10/23/2020

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	04/18/2024
Approved by	Curtis Talbot
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:**
-