

# **Ecological site F043AY566ID**

## **Warm-Frigid, Dry-Udic, Unglaciaded, Loamy, Hills and Mountains, Ashy surface (grand fir/moist herb) Grand Fir / Bride's Bonnet**

Last updated: 10/14/2020

Accessed: 05/18/2024

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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.

### **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](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook)

### **LRU notes**

Most commonly found in LRU 43A10 (Clearwater Mountains). Also found in adjacent areas of 43A09 (Western Bitterroot Foothills). Climate parameters were obtained from PRISM and other models for the area. Landscape descriptors are derived from USGS DEM products and their derivatives.

### **Classification relationships**

Relationship to Other Established Classifications:

United States National Vegetation Classification (2008) – A3362 Grand fir – Douglas-fir Central Rocky Mt. Forest and 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.

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 -15w Western Selkirk Maritime Forest. 15y Selkirk Mountains. 15u Inland Maritime Foothills and Valleys.

This ecological site includes the following USDA Forest Service Plant Associations: ABGR/ACGLD/CLUN, Forest Plant Associations of the Colville Nat. Forest (Williams et. al. 1995) and ABGR/CLUN (Forest Habitat Types of N. Idaho, A Second Approximation, USFS Revised 1991.

### **Ecological site concept**

This ES group is distinguished by an overstory of grand fir and Douglas-fir. Understory shrubs can include *Acer glabrum*, *Linnaea borealis*, *Menziesia ferruginea*, *Physocarpus malvaceus*, *Spiraea betulifolia*, *Symphoricarpos occidentalis*, and *Vaccinium membranaceum*. Herbaceous layers may be graminoid- or forb-dominated and may include *Bromus vulgaris*, *Calamagrostis rubescens*, *Carex geyeri*, *Clintonia uniflora*, *Coptis occidentalis*, *Cornus canadensis*, *Linnaea borealis*, and *Trautvetteria caroliniensis*. It occurs on foothills, mountainsides, and canyon walls. These soils have developed in thick (>7 inches) Mazama tephra deposits over sediments without a fragipan or residuum and colluvium from granite or metamorphic rock. The soils range from moderately deep to very deep and have adequate available water capacity to a depth of 40 inches. The soils are well-drained. This ES group fits into the National Vegetation Standard's Grand Fir - Douglas-fir Central Rocky Mountain Forest & Woodland Alliance and Washington State's Natural Heritage Program's Northern Rocky Mt. Mesic Montane Mixed Conifer Forest.

**Table 1. Dominant plant species**

Tree	(1) <i>Abies grandis</i> (2) <i>Pseudotsuga menziesii</i> var. <i>glauca</i>
Shrub	(1) <i>Rosa gymnocarpa</i> (2) <i>Linnaea borealis</i> ssp. <i>longiflora</i>
Herbaceous	(1) <i>Clintonia uniflora</i> (2) <i>Coptis occidentalis</i>

## Physiographic features

Physiographic Features

Landscapes: Mountains, Foothills

Landform: mountain slopes, hill slopes

Elevation (m): Total range = 535 to 1800 m

(1,755 to 5,900 feet)

Central tendency = 1010 to 1325 m

(3,310 to 4,345 feet)

Slope (percent): Total range = 0 to 105 percent

Central tendency = 25 to 55 percent

Aspect: Total range 65-210-340

Central tendency: 130-210-265

**Table 2. Representative physiographic features**

Landforms	(1) Mountains > Mountain slope (2) Foothills > Hillslope
Flooding frequency	None
Ponding frequency	None
Elevation	1,009–1,324 m
Slope	25–55%
Water table depth	203 cm
Aspect	W, SE, S, SW

**Table 3. Representative physiographic features (actual ranges)**

Flooding frequency	None
Ponding frequency	None
Elevation	535–1,798 m
Slope	0–100%

Water table depth	203 cm
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Climatic features

Climatic Features

Frost-free period (days): Total range = 35 to 130 days  
 Central tendency = 60 to 90 days

Mean annual precipitation (cm): Total range = 625 to 1705 mm  
 (25 to 67 inches)  
 Central tendency = 1030 to 1300 mm  
 (41 to 51 inches)

MAAT (C): Total range = 4.3 to 9.1  
 (40 to 48 F)  
 Central tendency = 6.1 to 7.3  
 (43 to 45 F)

Climate Stations: none

Influencing water features

Water Table Depth: >80 inches

Flooding:  
 Frequency: None  
 Duration: None

Ponding:  
 Frequency: None  
 Duration: None

Soil features

Representative Soil Features

This ecological subsite is associated with several soil components (e.g. Jacot, Poorman, Grangemont, Township, Boulder creek, Garveson, Jaype, Boulderjud, Rettig, Jury, Brodeer, Dullaxe, and Brequito). The soil components can be grouped into: Andic Dystrudepts, Typic Udivitrands, Alfic Udivitrands, Andic Hapludalfs, and Andic Glossudalfs. These soils have developed in Mazama tephra deposits over sediments without a fragipan or residuum and colluvium from granite or metamorphic rock. The tephra layers are important for forest productivity in that they retain large amounts of water compared to other parent materials, have high cation exchange capacity and high availability of organically bound plant nutrients. The soils range from moderately deep to very deep and have adequate available water capacity to a depth of 40 inches. The soils are well-drained.

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Alluvium (3) Residuum–granite (4) Residuum–metamorphic rock (5) Colluvium–granite (6) Colluvium–metamorphic rock
Surface texture	(1) Ashy silt loam (2) Ashy loam (3) Gravelly, ashy silt loam

Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	203 cm
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	13.97 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Electrical conductivity (0-152.4cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-152.4cm)	6.1
Subsurface fragment volume <=3" (25.4-152.4cm)	2%
Subsurface fragment volume >3" (25.4-152.4cm)	0%

**Table 5. Representative soil features (actual values)**

Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	51–203 cm
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	9.14–21.59 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Electrical conductivity (0-152.4cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-152.4cm)	5.2–7.3
Subsurface fragment volume <=3" (25.4-152.4cm)	0–20%
Subsurface fragment volume >3" (25.4-152.4cm)	0–10%

## Ecological dynamics

### Ecological Dynamics of the Site

This grand fir site is on the moister end of the grand fir series and can have many tree species occurring depending on disturbance and seed source. Douglas-fir is the main seral species and will occur in mature stands with grand fir with fire exclusion. Engelmann spruce can also be present in fire excluded mature stands. With stand replacing or mixed severity disturbance Douglas-fir, western larch, ponderosa pine, western white pine, and lodgepole pine can occur in mixed stands. Quaking aspen, paper birch, and black cottonwood can be present in early to mid-seral stands.

Key understory species include Douglas maple, ninebark, oceanspray, serviceberry, snowberry, twinflower, honeysuckle, Oregon grape, rose, thimbleberry, pachistima, Scouler willow, spirea, pinegrass, brides bonnet, pathfinder, sweetroot, starry solomonplume, western princes pine, and white hawkweed.

Root rot and beetle kill will occur in the mature grand fir – Douglas fir stands. Western white pine once would have

been more prevalent in the seral to mature stands, however, blister rust has made it a minor component of current stands. Low intensity frequent fires will favor more open western larch, Douglas-fir, and ponderosa pine stands. Mixed severity fires will create a mosaic of mixed stands of all tree species. Severe fires may create ceanothus brush fields with tree regeneration slow to reclaim the site.

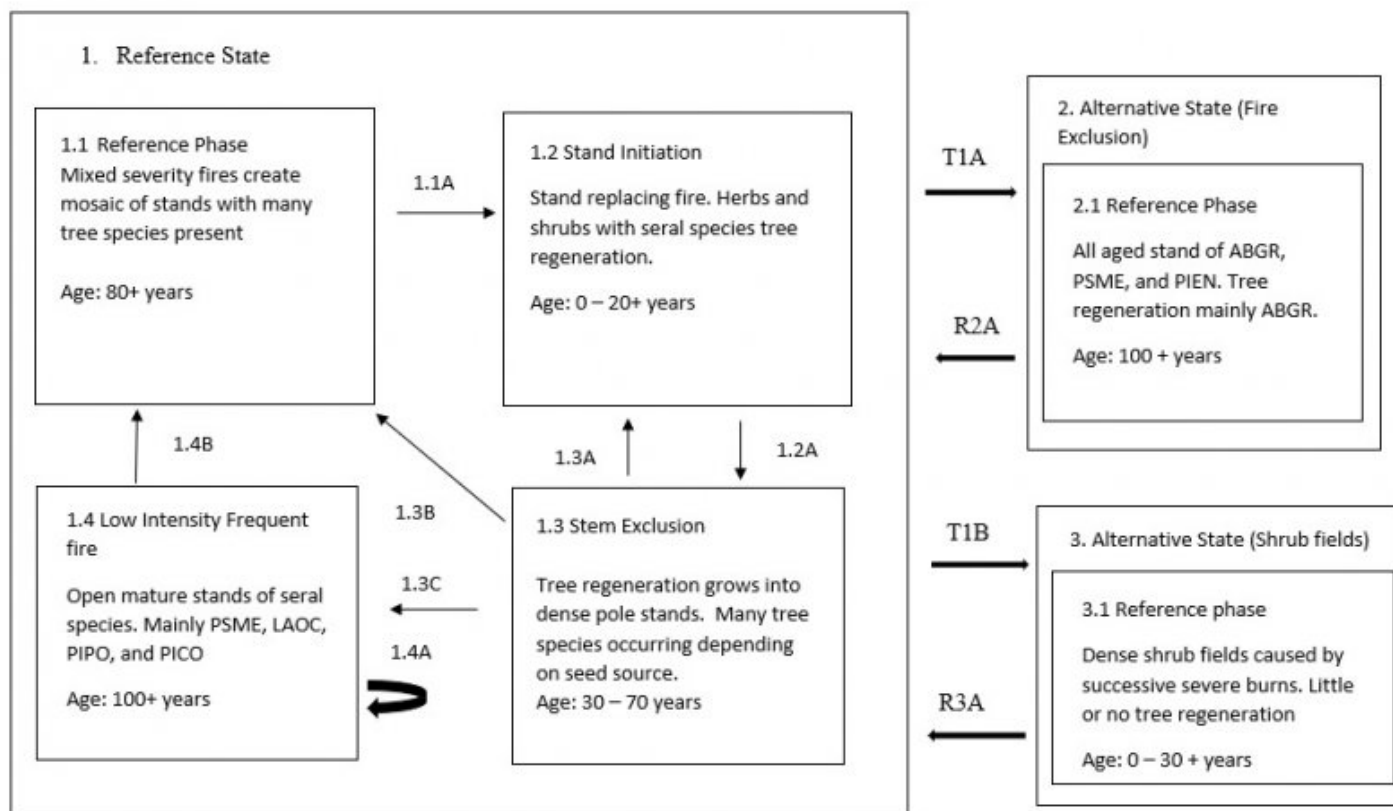
## State and transition model

### State and Transition Diagram

Ecological Site

Frigid Udic Loamy Foothills/Mountainsides (Grand Fir Moist Herb)

*Abies grandis*/*Clintonia uniflora* (Grand Fir / Bride's Bonnet)



## State 1

### Reference State

This state is dependent on fire severity and time intervals of fire. Many tree species will grow on this moist grand fir site. Douglas-fir, western larch, western white pine, ponderosa pine, lodgepole pine, Engelmann spruce, and grand fir are the major conifer species. Quaking aspen, paper birch and black cottonwood can also be present. This ecological site has good forest productivity for Douglas-fir, western larch, and ponderosa pine. In N. Idaho western white pine would have good productivity. Low severity frequent fires create open stands of larch, Douglas-fir, ponderosa pine, and lodgepole pine. Mixed severity fires create a mosaic of a variety of tree species and different age groups. Tree regeneration after stand replacing fires will be variable depending on seed source. Western larch, western white pine, Douglas-fir, ponderosa pine, and lodgepole pine will be the main species. Western white pine used to play a major role in regeneration, however, the white pine blister rust has reduced its occurrence in regenerating stands. Western larch, Douglas-fir, and ponderosa pine are more prevalent. Reoccurring severe fires in the stand initiation phase can create shrub fields of ceanothus spp., and a variety of other shrubs. Fire exclusion for long periods allow the forest to move to an all aged grand fir, Douglas-fir, and Engelmann spruce stand. Root rot and defoliating insects then becomes a concern in the grand fir and Douglas-fir causing much downed wood and fuel loads.

**Characteristics and indicators.** Plant List Overstory Trees Douglas-fir (*Pseudotsuga menziesii*) Western Larch

(*Larix occidentalis*) Grand fir (*Abies grandis*) Understory trees Grand fir (*Abies grandis*) Understory Shrubs Douglas maple (*Acer glabrum* Douglasii) Western prince's pine (*Chimaphila umbellata*) Serviceberry (*Amelanchier alnifolia*) Oregon grape (*Berberis aquifolium*) Snowberry (*Symphoricarpos albus*) Twinflower (*Linnaea borealis*) Pachistima (*Pachistima myrsinites*) Ninebark (*Physocarpus malvaceus*) Oceanspray (*Holodiscus discolor*) Shiny leaf spirea (*Spiraea betulifolia*) Big huckleberry (*Vaccinium membranaceum*) (cooler sites) Scouler willow (*Salix scouleriana*) Utah honeysuckle (*Lonicera utahensis*) Mountain ash (*Sorbus scopulina*) (cooler sites) Understory Herbs Pathfinder (*Adenocaulon bicolor*) Sweetroot (*Osmorhiza chilensis*) Starry solomonplume (*Smilacina stellata*) Queencup beadleily (*Clintonia uniflora*) White hawkweed (*Hieracium albiflorum*) Western meadowrue (*Thalictrum occidentale*)

### **Dominant plant species**

- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*), tree
- western larch (*Larix occidentalis*), tree
- grand fir (*Abies grandis*), tree
- Rocky Mountain maple (*Acer glabrum*), shrub
- pipsissewa (*Chimaphila umbellata*), shrub
- Saskatoon serviceberry (*Amelanchier alnifolia*), shrub
- hollyleaved barberry (*Mahonia aquifolium*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- longtube twinflower (*Linnaea borealis* ssp. *longiflora*), shrub
- Oregon boxleaf (*Paxistima myrsinites*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub
- white spirea (*Spiraea betulifolia*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- Scouler's willow (*Salix scouleriana*), shrub
- common lomatium (*Lomatium utriculatum*), shrub
- Greene's mountain ash (*Sorbus scopulina*), shrub

## **Community 1.1**

### **Reference Phase**

Mixed severity fires create a mosaic of mixed stands of seral species mixed with grand fir. Regeneration could include all the species depending on exposed mineral soil and seed source. Western larch, ponderosa pine, Douglas-fir, and lodgepole pine would be first to regenerate. Western white pine will also be present, but not as prevalent as before due to blister rust. Grand fir will be present, however will come underneath the seral species in time. Quaking aspen can establish after these mixed fires and be a component in the stand. Age: 80+ years

### **Dominant plant species**

- grand fir (*Abies grandis*), tree
- western larch (*Larix occidentalis*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*), tree
- hollyleaved barberry (*Mahonia aquifolium*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- longtube twinflower (*Linnaea borealis* ssp. *longiflora*), shrub
- Oregon boxleaf (*Paxistima myrsinites*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub
- white spirea (*Spiraea betulifolia*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- Scouler's willow (*Salix scouleriana*), shrub
- common lomatium (*Lomatium utriculatum*), shrub
- Greene's mountain ash (*Sorbus scopulina*), shrub

## **Community 1.2**

### **Stand Initiation**

Herbs and shrubs reestablish on site. Ceanothus species can dominate if fire caused soil degradation. Tree

regeneration can be mixed or dominated by western larch and lodgepole pine. Ponderosa pine and Douglas-fir can also be present. White pine was a major factor in regeneration before the blister rust reduced its significance. Age: 0 – 20+ years

### **Community 1.3**

#### **Stem Exclusion**

Dense stands of mixed seral species or dominated by larch or lodgepole pine. Douglas-fir, ponderosa pine, and western white pine, can be in the stand. Age: 100+ years

#### **Dominant plant species**

- western larch (*Larix occidentalis*), tree
- lodgepole pine (*Pinus contorta* var. *latifolia*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*), tree
- ponderosa pine (*Pinus ponderosa*), tree
- western white pine (*Pinus monticola*), tree

### **Community 1.4**

#### **Frequent Low Intensity Fires**

Frequent low severity fires create an open stand of mature Douglas-fir, Western larch, ponderosa pine, and lodgepole pine. This condition is perpetuated with continual ground fires. Age: 30 – 70 years

#### **Dominant plant species**

- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*), tree
- western larch (*Larix occidentalis*), tree
- lodgepole pine (*Pinus contorta* var. *latifolia*), tree
- ponderosa pine (*Pinus ponderosa*), tree

### **Pathway 1.1A**

#### **Community 1.1 to 1.2**

Stand replacing fire back to the herbs and shrub stage. Regeneration dependent on seed source and brush competition.

### **Pathway 1.2A**

#### **Community 1.2 to 1.3**

Tree regeneration grows into dense pole stand. Species can be mixed or dominated by larch or lodgepole.

### **Pathway 1.3B**

#### **Community 1.3 to 1.1**

Mixed severity fires create patchy mosaic as in reference plant community phase

### **Pathway 1.3A**

#### **Community 1.3 to 1.2**

Stand replacing fire.

### **Pathway 1.3C**

#### **Community 1.3 to 1.4**

Frequent low severity fires create open pole stands.

## Pathway 1.4B

### Community 1.4 to 1.1

Fire interval lengthens, and tree regeneration becomes established. Mixed severity fires create patchy mosaic of seral species and grand fir.

## State 2

### Fire Exclusion

An all aged stand of grand fir and Douglas-fir with Engelmann spruce mixed in occurs when fire interval is extended 100 years or more. Grand fir will dominate the regeneration in the understory. In the drier areas of this site root rot and defoliating insects can be a problem. Snags and downed wood will be common in these areas. This state will be susceptible to stand replacing fires.

#### Dominant plant species

- grand fir (*Abies grandis*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*), tree
- Engelmann spruce (*Picea engelmannii*), tree

## Community 2.1

### Fire Exclusion

An all aged stand of grand fir and Douglas-fir with Engelmann spruce mixed in occurs when fire interval is extended 100 years or more. Grand fir will dominate the regeneration in the understory. In the drier areas of this site root rot and defoliating insects can be a problem. Snags and downed wood will be common in these areas. This state will be susceptible to stand replacing fires.

#### Dominant plant species

- grand fir (*Abies grandis*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*), tree
- Engelmann spruce (*Picea engelmannii*), tree

## State 3

### Shrubfields

Successive severe ground fires create shrub fields for long time periods. Ceanothus species, ninebark, oceanspray, snowberry, spirea, Douglas maple, Scouler willow and serviceberry will dominate preventing tree regeneration.

#### Dominant plant species

- snowbrush ceanothus (*Ceanothus velutinus*), shrub
- redstem ceanothus (*Ceanothus sanguineus*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- white spirea (*Spiraea betulifolia*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub
- Scouler's willow (*Salix scouleriana*), shrub
- Saskatoon serviceberry (*Amelanchier alnifolia*), shrub

## Community 3.1

### Shrubfields

Successive severe ground fires create shrub fields for long time periods. Ceanothus species, ninebark, oceanspray, snowberry, spirea, Douglas maple, Scouler willow and serviceberry will dominate preventing tree regeneration.

#### Dominant plant species



- snowbrush ceanothus (*Ceanothus velutinus*), shrub
- redstem ceanothus (*Ceanothus sanguineus*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- white spirea (*Spiraea betulifolia*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub
- Scouler's willow (*Salix scouleriana*), shrub
- Saskatoon serviceberry (*Amelanchier alnifolia*), shrub

## **Transition T1A**

### **State 1 to 2**

100+ years of fire exclusion will move the site to a mature grand fir – Douglas-fir site.

## **Transition T1B**

### **State 1 to 3**

Successive severe burns kill regeneration and maintaining sprouting shrubs dominance.

## **Restoration pathway R2A**

### **State 2 to 1**

Overstory management with ground burning will favor seral species.

## **Restoration pathway R3A**

### **State 3 to 1**

Careful site selection and fire control allow tree regeneration to establish

## **Additional community tables**

## **References**

. 1998. NRCS National Forestry Manual.

. 2017. NRCS Soil and Site Index data for NE WA and N. Idaho.

Cooper, S.V., K.E. Neiman, R. Steele, and D.W. Roberts. 1991. Forest Habitat types of Northern Idaho, A Second Approximation.

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Smith and Fischer. 1997. Fire Ecology of the Forest Habitat Types of Northern Idaho.

Williams, C.K., B.F. Kelley, B.G. Smith, and T.R. Lillybridge. October, 1995. Forested Plant Associations of the Colville National Forest.

Zack, A. 1997. Biophysical Classification- Habitat Groups and Description of Northern Idaho and Northwestern Montana, Lower Clarkfork and Adjacent Areas..

## Approval

Curtis Talbot, 10/14/2020

### 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	05/18/2024
Approved by	Curtis Talbot
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

### Indicators

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

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

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

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

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

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

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

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

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

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

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

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

Dominant:

Sub-dominant:

Other:

Additional:

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

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

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

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

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17. **Perennial plant reproductive capability:**

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