

Ecological site R043AY506WA

Cool-Mesic Dry-Xeric Loamy Hills and Mountains (PSSP/FECA/FEID)

Last updated: 10/15/2020
Accessed: 04/11/2026

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

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

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.

LRU notes

Major land resource area (MLRA): 043A-Northern Rocky Mountains

Modal LRU – 43A01 - Okanogan Plateau

This LRU is composed predominantly of glaciated mountains and foothills. The soils tend to be loamy to sandy andisols, inceptisols, and mollisols with mixed or distinct ash surfaces. Recent alluvium, till, outwash and residuum from granitic or metamorphic rock are the dominant parent materials. Soil climate is a frigid or cryic temperature regime and xeric moisture regime with average annual precipitation around 450 mm (18 inches).

Others where occurring: 43A03 Columbia-Colville Valleys

44A01 Spokane-Rathdrum Outwash Plains

Classification relationships

This ES group fits into the National Vegetation Standard's Central Rocky Mountain Foothill Grassland Group and is most closely related to Washington State's Natural Heritage Program's Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland. (Compare to previous Washington range sites: R043AY102WA, LOAMY 16-24 PZ and R043AY103WA, COOL LOAMY 16-24 PZ)

Ecological site concept

Ecological Site Concept:

This ES is found on well drained, loamy sites with mesic temperatures and a plant community dominated by grass species such as bluebunch wheatgrass, rough fescue and Idaho fescue.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Symphoricarpos albus</i> (2) <i>Amelanchier alnifolia</i>
Herbaceous	(1) <i>Pseudoroegneria spicata</i> (2) <i>Festuca idahoensis</i>

Physiographic features

Physiographic Features

This ecological site occurs mainly on hillslopes, lower mountain slopes, outwash terraces and stream terraces. Parent materials are primarily till, outwash or colluvium and residuum from metamorphic rock with a mantle of volcanic ash and loess.

Landscapes: Mountains, Foothills, Valleys and Scablands

Landforms: hillslopes, mountain slopes, outwash terraces

Elevation:

Total range = 350 to 1510 m

(1,150 to 4,955 feet)

Central tendency = 730 to 1045 m

(2,400 to 3,425 feet)

Slope (percent):

Total range = 0 to 75 percent

Central tendency = 10 to 40 percent

Water Table Depth:

>200cm

(>80 in)

Flooding:

Frequency: None

Duration: None

Ponding:

Frequency: None

Duration: None

Aspect: 65-210-340

Central tendency: 150-210-305

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Foothills > Hillslope (3) Valley > Outwash terrace
Elevation	2,400–3,425 ft
Slope	10–40%
Water table depth	0 in
Aspect	W, NW, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Elevation	1,150–4,955 ft
Slope	0–75%
Water table depth	0 in

Climatic features

Climatic Features

During the spring and summer, a circulation of air around a high-pressure center brings a prevailing westerly and northwesterly flow of comparatively dry, cool and stable air into the region. As the air moves inland, it becomes warmer and drier which results in a dry season beginning in the late spring and reaching a peak in mid-summer. In the fall and winter, a circulation of air around two pressure centers over the ocean brings a prevailing southwesterly and westerly flow of air into the Pacific Northwest. This air from over the ocean is moist and near the temperature of the water. Condensation occurs as the air moves inland over the cooler land and rises along the windward slopes of the mountains or highlands. This results in a wet season beginning in October, reaching a peak in winter, then gradually decreasing in the spring.

The elevation within the LRU varies from approximately 1,000 feet in the lower river valleys to about 7,200 feet in the higher mountains. The annual precipitation increases from 9 inches in the valleys to over 48 inches in the highest mountains. Winter season snowfall averages about 43 inches. Both rainfall and snowfall increase with elevation. Snow can be expected after the first of November and to remain on the ground from the first of December until March or April.

In January, the average maximum temperature is near 29° F and the minimum temperature is 14° F. Minimum temperatures from -5° to -20°F are recorded almost every winter and temperatures ranging to -25° F have been recorded. In July, the average maximum temperature is 81° and the minimum temperature 47° F. Maximum temperatures reach 100° F on a few afternoons each summer and temperatures as high as 108° F have been recorded. The average date of the last freezing temperatures can be expected by early-June and after early-September in the warmer areas.

(Compiled from WRCC: Climate of Washington and available station data)

Frost-free period (days):

Total range = 85 to 145 days

Central tendency = 95 to 115 days

Mean annual precipitation (cm):

Total range = 265 to 700 mm

(10 to 28 inches)

Central tendency = 410 to 525 mm

(16 to 21 inches)

MAAT (C)

Total range = 3.6 to 10.1

(38 to 50 F)

Central tendency = 5.9 to 7.6

(43 to 46 F)

Climate stations: REPUBLIC, REPUBLIC RS

Table 4. Representative climatic features

Frost-free period (characteristic range)	74 days
Freeze-free period (characteristic range)	125 days
Precipitation total (characteristic range)	17 in
Frost-free period (actual range)	74 days

Freeze-free period (actual range)	125 days
Precipitation total (actual range)	17 in
Frost-free period (average)	74 days
Freeze-free period (average)	125 days
Precipitation total (average)	17 in

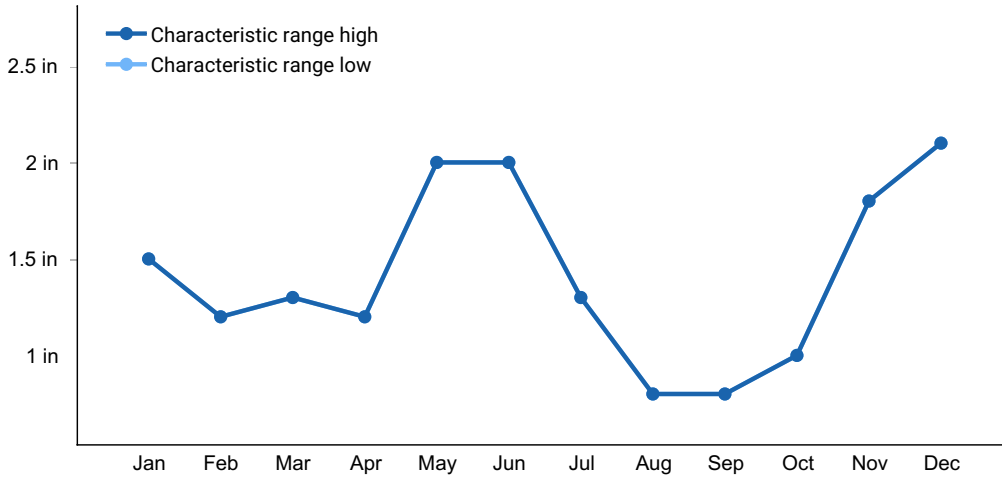


Figure 1. Monthly precipitation range

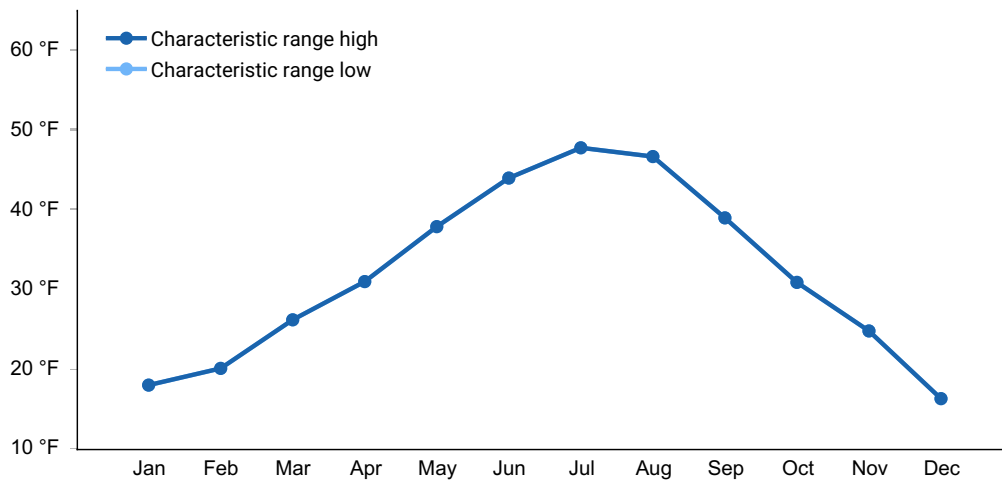


Figure 2. Monthly minimum temperature range

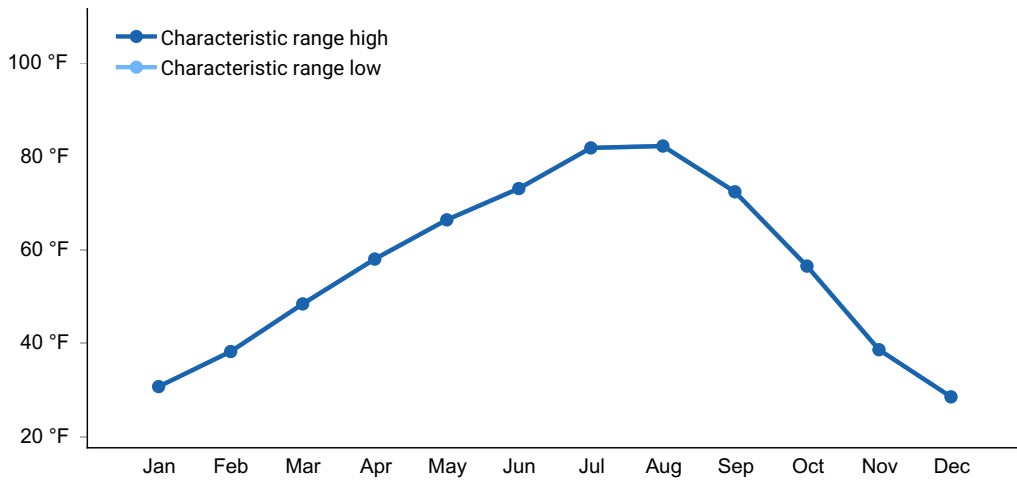


Figure 3. Monthly maximum temperature range

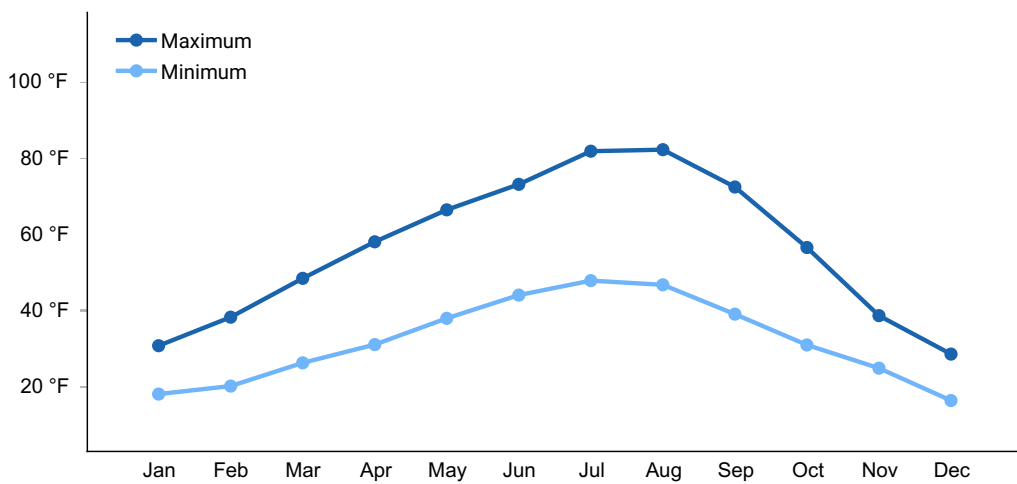


Figure 4. Monthly average minimum and maximum temperature

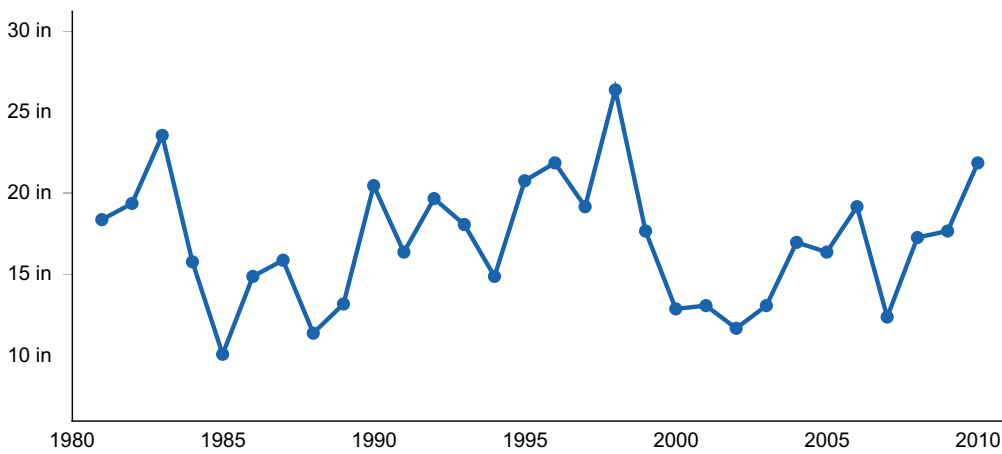


Figure 5. Annual precipitation pattern

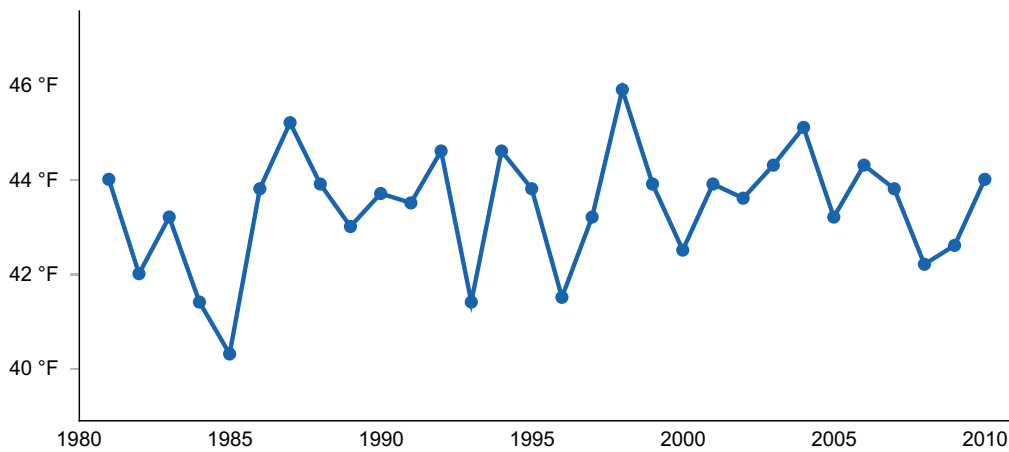


Figure 6. Annual average temperature pattern

Climate stations used

- (1) REPUBLIC [USC00456974], Republic, WA

Influencing water features

Water Table Depth:

>200cm

(>80 in)

Flooding:

Frequency: None

Duration: None

Ponding:

Frequency: None

Duration: None

Soil features

Representative Soil Features

This ecological site is associated with the Borgeau, Cheney, Conconully, Cubhill, Foggydew, Haploxerolls, Hum, Mires, Mires variant, Molcal, Molson, Narcisse, Thuso, Wagberg, and Wenner series. The soils are Alfic Humic Vitrixerands, Calcic Haploxerolls, Cumulic Haploxerolls, Humic Vitrixerands, Vitrandic Argixerolls, Vitrandic Calcixerolls, and Vitrandic Haploxerolls. These soils have developed in a variety of materials. These include till, outwash, glaciolacustrine deposits as well as colluvium and residuum from granite, metamorphic and volcanic rocks. Most sites have a surface influenced by volcanic ash and loess. Volcanic ash layers are mixed at lower elevations and form distinct, thicker layers at higher elevations.

Parent Materials:

Kind: volcanic ash, loess, till, outwash, glaciolacustrine

Origin: mixed

Kind: colluvium, residuum

Origin: granite, metamorphics, metasediments, volcanic rock, calcareous shale

Surface Texture: (<2mm fraction)

(1) Ashy-Loam

(2) Ashy-Sandy Loam

(3) Ashy-Silt Loam

Surface Fragments

Table 5. Representative soil features

Parent material	(1) Volcanic ash (2) Loess (3) Till (4) Outwash (5) Lacustrine deposits (6) Colluvium–igneous and metamorphic rock
Surface texture	(1) Ashy loam (2) Ashy sandy loam (3) Ashy silt loam
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	0 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4.7 in
Calcium carbonate equivalent (0-60in)	0%
Electrical conductivity (0-60in)	0 mmhos/cm
Sodium adsorption ratio (0-60in)	0
Soil reaction (1:1 water) (0-60in)	7

Table 6. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Very slow to moderately rapid
Depth to restrictive layer	0 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3.2–8.1 in
Calcium carbonate equivalent (0-60in)	0–30%
Electrical conductivity (0-60in)	0–8 mmhos/cm
Sodium adsorption ratio (0-60in)	0
Soil reaction (1:1 water) (0-60in)	6.1–8.4

Ecological dynamics

State and transition model

1 Reference State The reference community is a stabilized, persistent perennial bunchgrass dominated herbaceous community with mineral soils that withstands nature fire return interval.

1.1 This plant community dominated by cool season bunchgrasses and less shortgrass species with other grass and forb species. Fire Return Interval is 35 years.

1.1a Site experiences fire that top kills vegetation that returns the community to the pioneering herbaceous community. Shrubs on the periphery and the few interior and bunchgrasses resprout from large root masses and interspaces filled in with wind dispersed or stored seed of pioneering herbaceous species.

1.2a Site recovers from fire over time, deeper rooted plants increase and dominate over pioneering herbaceous species.

1.1b Shrub species increase due to lack of fire or increased grazing of palatable grasses.

1.3a Shrub cover decreases with fire or increased browsing by ungulates.

1.1c Improper grazing management causes a decrease in palatable species and an increase in *Poa secunda*.

1.4a Proper grazing management and potentially some seeding of native bunchgrasses return community to the reference community.

1.2 Pioneering herbaceous species establish on mineral soil between resprouting shrubs and bunchgrass and shortgrass species.

1.3 Shrub Encroached Community in which shrub species encroach from periphery to interior and increase in cover.

1.4 Improper Grazing Community in which palatable grass and forb species decrease with an increase in increaser species such as *Poa secunda*.

State 2 – Fire Suppression State

T1a Fire return Intervals significantly longer than the natural 35 year interval growth and a diversity of herbaceous species to populate interspaces.

State 3 Fragmentation of site resulting in patches of non-connected patches of shrubs with altered hydrology, nutrient flow and vegetation propagules and wildlife dispersal altered.

T1b Fragmentation of the intact community and its hydrology and nutrient flows to numerous disconnected patches due to development, extreme grazing practices or ungulate or recreation use.

R2 Improved grazing practices, altered ungulate use, development removal and seeding of bunchgrasses and shortgrass and shrub species and other restoration practices.

State 4 Improper Grazing State: Improper grazing practices have damaged soil physiology through compaction and increased which allows build-up of fine fuels and decadent growth in shrubs and bunchgrasses.

R1 Return of natural fire cycle to the community which allows for shrubs and bunchgrasses to resprout new soil erosion due to trampling and hoof action, change in plant cover and composition by weight to unpalatable, increaser species and possible introduction of weedy and/or noxious plant species through animal transport of seeds.

T1c Improper grazing practices such as continual year round use of area, intense use with large herds, with or without heavy native ungulate use.

R3 Prescribed grazing practices such as rotational grazing, fencing off of areas, lowered to manageable herd size.

T3a T4a T1d Introduction and dominance of non-native species and invasive species. Sites are invaded by noxious weeds or introduced pasture grasses. Pasture grasses may be planted or a result of invasion from neighboring sites. Improper grazing may be a trigger for invasion however flooding may transport seeds to freshly deposited alluvia animal transport of seeds.

State 5 Invaded State: This includes many non-native species that have come to dominate riparian areas such as cheatgrass (*Poa pratensis*), timothy (*Phleum pratensis*) and some native increaser species may include: Site dominated by pasture grasses (*Poa pratensis* and *Phleum pratense*), weeds and invader species (*Hypericum perforatum*, *Potentilla recta*, *Euphorbia esula*, and knapweeds, especially *Centaurea biebersteinii* (= *Centaurea maculosa*).

Figure 7. Narrative

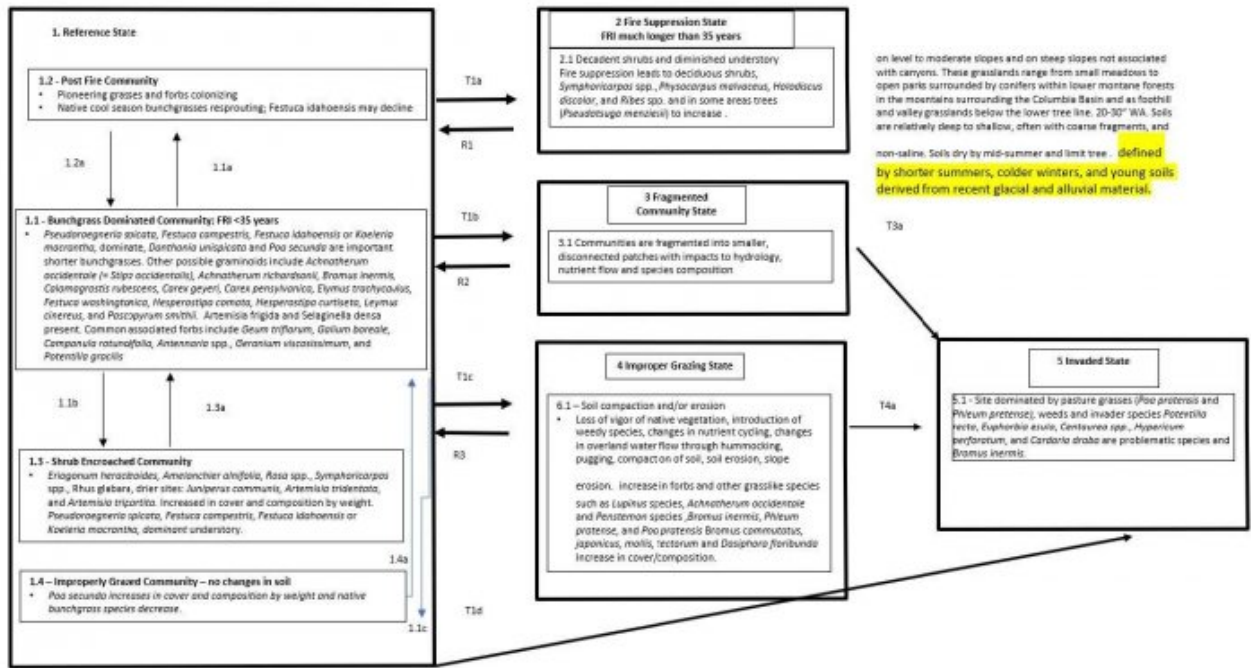


Figure 8. STM

References

. USNVC [United States National Vegetation Classification]. 2019. United States National Vegetation Classification Database, V2.03. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC.. USNVC: <http://usnvc.org/>.

Gerald, R. 2004. NRCS - Washington; Interim Ecological Site Descriptions for Rangeland.

Rocchio, J.F. and R.C. Crawford. 2015. Ecological systems of Washington State. A guide to identification. Washington Department of Natural Resources.. Natural Heritage Report.. Washington Department of Natural Resources, Natural Heritage Program, Olympia, WA. 1–397.

Contributors

Stephanie Shoemaker

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	04/11/2026
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:**
