USDA Natural Resources
Conservation Service

Ecological site R043AY516ID
Cool-Frigid Moist-Xeric Loamy Low AWC Mountain Slopes (FECA/FEID/FEVI)

Last updated: 10/15/2020
Accessed: 05/03/2024

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.

LRU notes

Major land resource area (MLRA): 043A-Northern Rocky Mountains
Modal LRU – 043A02 - Western Selkirk Highlands

Others where occurring: 043A01 - Okanogan Plateau

This LRU is composed predominantly of glaciated mountains and foothills. The soils tend to be loamy andisols, and inceptisols, with mixed or distinct ash surfaces. Till, outwash and residuum from granitic or metasedimentary rock are the dominant parent materials. Soil climate is a frigid or cryic temperature regime and xeric or udic moisture regime with average annual precipitation around 660 mm (26 inches).

Classification relationships

This ES fits into the National Vegetation Standard's Central Rocky Mountain Lower Montane, Foothill & Valley 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 WA-NRCS range site: R043AY702WA; MOUNTAIN PARK 24+ PZ)

Ecological site concept

Ecological Site Concept:

This ES is found on well drained mountain sides. A water table is not present. They have cool-frigid temperatures and a plant community dominated by grasses and forbs. They are loamy but have low AWC due to the presence of a depth restriction and/or high rock fragment content.

Table 1. Dominant plant species

Tree	Not specified

Shrub	(1) *Amelanchier alnifolia* (2) *Rosa*
Herbaceous	(1) *Festuca campestris* (2) *Festuca idahoensis*

Physiographic features

Physiographic Features
This ecological site occurs mainly on valley floors in mountains. Parent materials are organic material over mixed alluvium or till.

Landscapes: Mountains
Landforms: mountain valleys, valley floors

Elevation:
Total range = 505 to 1825 m
(1,655 to 5,995 feet)
Central tendency = 970 to 1315 m
(3,185 to 4,310 feet)

Slope (percent):
Total range = 0 to 80 percent
Central tendency = 20 to 45 percent

Water Table Depth:
>200 cm
(>80 inches)

Flooding:
Frequency: none
Duration: none

Ponding:
Frequency: none
Duration: none

Aspect: 5-145-295
Central Tendency: 70-145-200

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope
Elevation	971–1,314 m
Slope	20–45%
Water table depth	0 cm
Aspect	E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Elevation	504–1,827 m
Slope	0–80%
Water table depth	0 cm

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 4,900 feet on low mountains and foothills. The annual precipitation increases from 9 inches in the valleys to over 38 inches in the higher terrain. 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 = 90 to 120 days
Central tendency = 95 to 105 days

Mean annual precipitation (cm):
Total range = 420 to 675 mm
(16 to 30 inches)
Central tendency = 560 to 685 mm
(22 to 27 inches)

MAAT (C)
Total range = 3.5 to 8.8
(38 to 48 F)
Central tendency = 5.5 to 6.8
(42 to 44 F)

Climate stations: Owl Mountain (East)

Influencing water features

Water Table Depth:
>200 cm
(>80 inches)

Flooding:
Frequency: none
Duration: none

Ponding:
Frequency: none
Duration: none

Soil features

Representative Soil Features
This ecological site is associated with the Pepoon series. These soils have developed in volcanic ash over till and/or coarse granitic colluvium. They have bedrock at a depth of about 10 inches.

Parent Materials:
Kind: volcani ash
Origin:
Kind: till, colluvium
Origin: granitic

Surface Texture: (<2mm fraction)
(1) Ashy-Loam

Surface Fragments

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Colluvium–granite (3) Till
Surface texture	(1) Ashy loam
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	25 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	3.3 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Electrical conductivity (0-152.4cm)	0 mmhos/cm
Sodium adsorption ratio (0-152.4cm)	0
Soil reaction (1:1 water) (0-152.4cm)	7.2

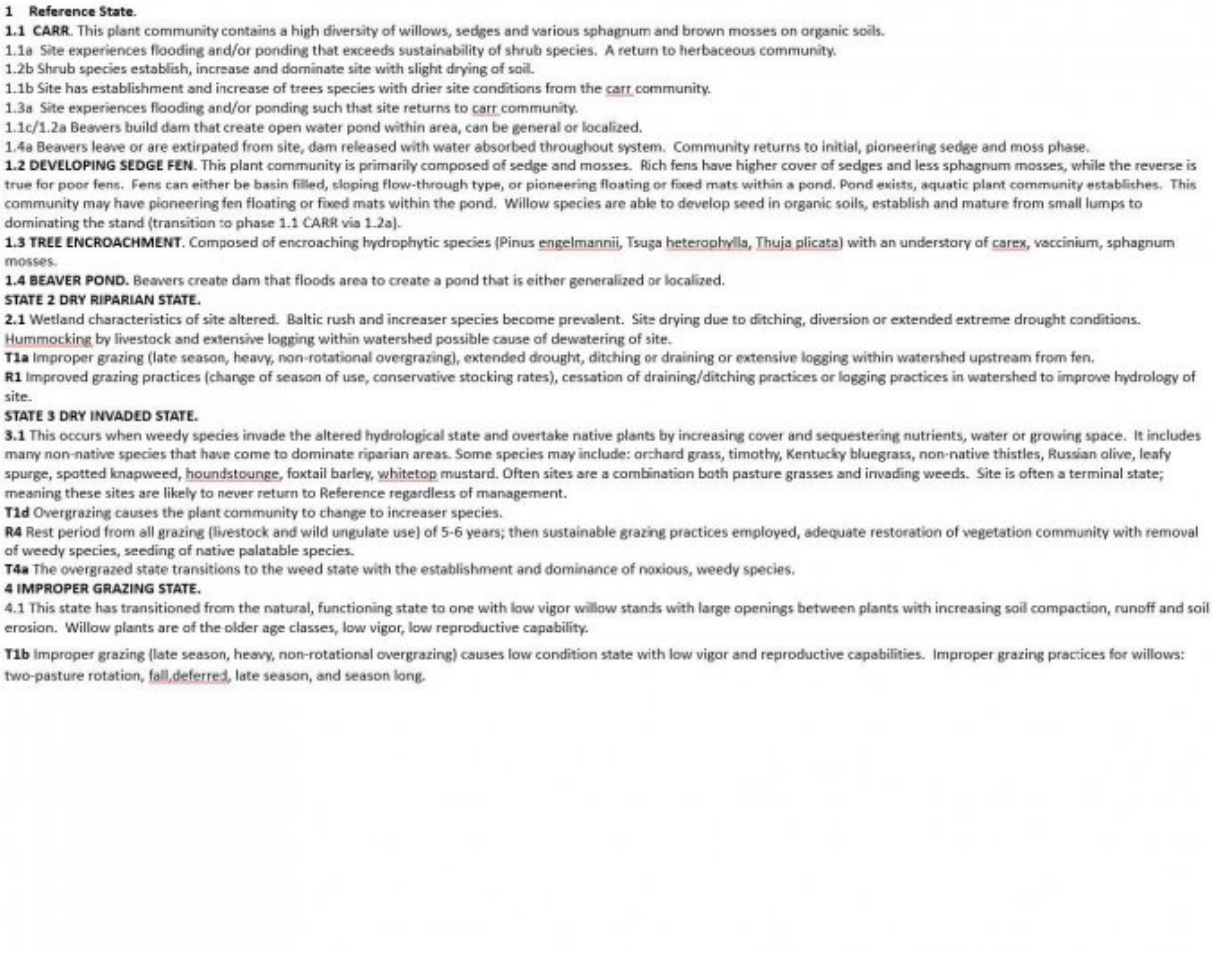
Table 5. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	20–38 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	2.54–3.3 cm
Calcium carbonate equivalent (0-152.4cm)	0%

Electrical conductivity (0-152.4cm)	0 mmhos/cm
Sodium adsorption ratio (0-152.4cm)	0
Soil reaction (1:1 water) (0-152.4cm)	6.6–7.8

Ecological dynamics

State and transition model



1 **Reference State.**
1.1 CARR. This plant community contains a high diversity of willows, sedges and various sphagnum and brown mosses on organic soils.
1.1a Site experiences flooding and/or ponding that exceeds sustainability of shrub species. A return to herbaceous community.
1.2b Shrub species establish, increase and dominate site with slight drying of soil.
1.1b Site has establishment and increase of trees species with drier site conditions from the carr community.
1.3a Site experiences flooding and/or ponding such that site returns to carr community.
1.1c/1.2a Beavers build dam that create open water pond within area, can be general or localized.
1.4a Beavers leave or are extirpated from site, dam released with water absorbed throughout system. Community returns to initial, pioneering sedge and moss phase.
1.2 DEVELOPING SEDGE FEN. This plant community is primarily composed of sedge and mosses. Rich fens have higher cover of sedges and less sphagnum mosses, while the reverse is true for poor fens. Fens can either be basin filled, sloping flow-through type, or pioneering floating or fixed mats within a pond. Pond exists, aquatic plant community establishes. This community may have pioneering fen floating or fixed mats within the pond. Willow species are able to develop seed in organic soils, establish and mature from small lumps to dominating the stand (transition to phase 1.1 CARR via 1.2a).
1.3 TREE ENCROACHMENT. Composed of encroaching hydrophytic species (Pinus engelmannii, Tsuga heterophylla, Thuja plicata) with an understory of carex, vaccinium, sphagnum mosses.
1.4 BEAVER POND. Beavers create dam that floods area to create a pond that is either generalized or localized.
STATE 2 DRY RIPARIAN STATE.
2.1 Wetland characteristics of site altered. Baltic rush and increaser species become prevalent. Site drying due to ditching, diversion or extended extreme drought conditions. Hummocking by livestock and extensive logging within watershed possible cause of dewatering of site.
T1a Improper grazing (late season, heavy, non-rotational overgrazing), extended drought, ditching or draining or extensive logging within watershed upstream from fen.
R1 Improved grazing practices (change of season of use, conservative stocking rates), cessation of draining/ditching practices or logging practices in watershed to improve hydrology of site.
STATE 3 DRY INVADED STATE.
3.1 This occurs when weedy species invade the altered hydrological state and overtake native plants by increasing cover and sequestering nutrients, water or growing space. It includes many non-native species that have come to dominate riparian areas. Some species may include: orchard grass, timothy, Kentucky bluegrass, non-native thistles, Russian olive, leafy spurge, spotted knapweed, houndstounge, foxtail barley, whitetop mustard. Often sites are a combination both pasture grasses and invading weeds. Site is often a terminal state; meaning these sites are likely to never return to Reference regardless of management.
T1d Overgrazing causes the plant community to change to increaser species.
R4 Rest period from all grazing (livestock and wild ungulate use) of 5-6 years; then sustainable grazing practices employed, adequate restoration of vegetation community with removal of weedy species, seeding of native palatable species.
T4a The overgrazed state transitions to the weed state with the establishment and dominance of noxious, weedy species.
4 IMPROPER GRAZING STATE.
4.1 This state has transitioned from the natural, functioning state to one with low vigor willow stands with large openings between plants with increasing soil compaction, runoff and soil erosion. Willow plants are of the older age classes, low vigor, low reproductive capability.
T1b Improper grazing (late season, heavy, non-rotational overgrazing) causes low condition state with low vigor and reproductive capabilities. Improper grazing practices for willows: two-pasture rotation, fall,deferred, late season, and season long.

Figure 1. Narrative

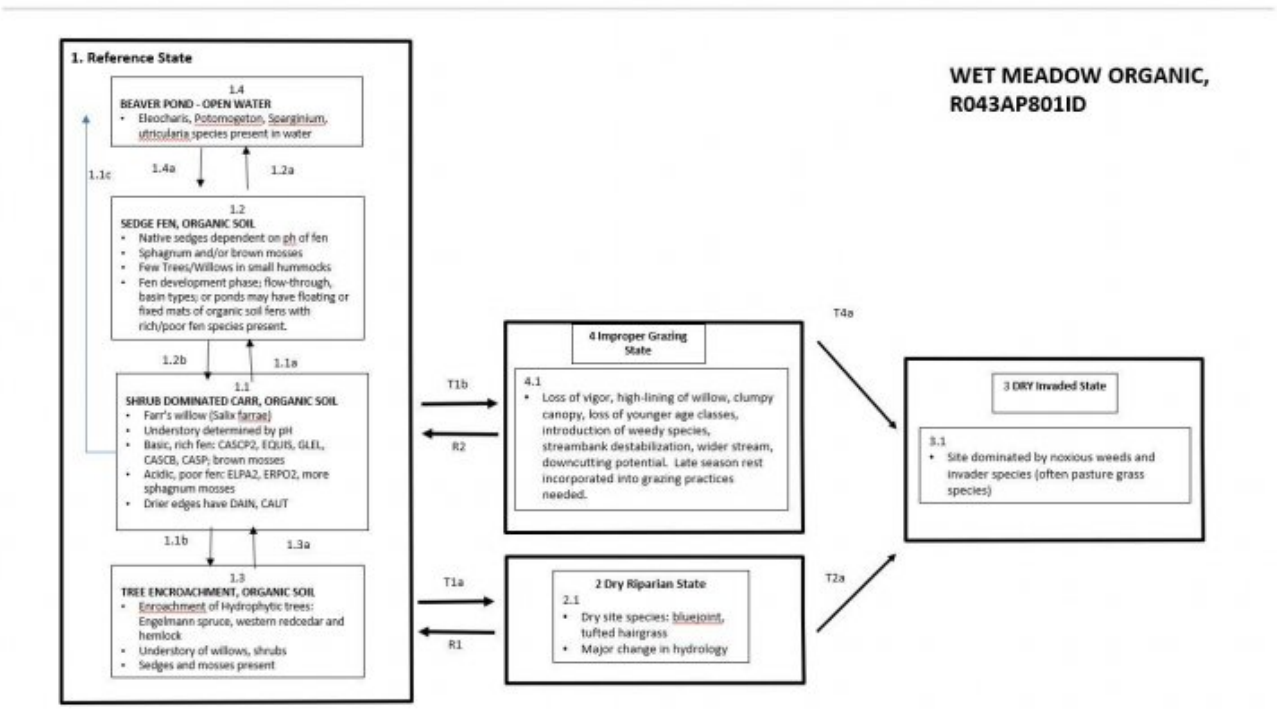


Figure 2. STM

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

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Approval

Curtis Talbot, 10/15/2020

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	05/03/2024
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:**