USDA Natural Resources Conservation Service

Ecological site R006XB102OR
Cold Wet Meadow

Last updated: 9/11/2023
Accessed: 05/19/2024

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): 006X–Cascade Mountains, Eastern Slope

Stretching from northern Washington to southern Oregon, the Cascade Mountains, and spans the entirety of the mountain slopes, foothills, elevated plateaus and valleys on the eastern slopes of the Cascade mountains. This MLRA is a transitional area between the Cascade Mountains to the west and the lower lying Columbia Basalt Plateau to the east. Situated in the rain shadow of the Cascade Crest, this MLRA receives less precipitation than portions of the cascades further west and greater precipitation than the basalt plateaus to the east. Geologically, the majority of the MLRA is dominated by Miocene volcanic rocks while the northern portion is dominated by Pre-Cretaceaus metamorphic rocks and the southern portion is blanketed with a thick mantle of ash and pumice from Mount Mazama. The soils in the MLRA dominantly have a mesic, frigid, or cryic soil temperature regime, a xeric soil moisture regime, and mixed or glassy mineralogy. They generally are moderately deep to very deep, well drained, and loamy or ashy. Biologically, the MLRA is dominated by coniferous forest, large expanses of which are dominated by ponderosa pine, Douglas-fir or lodgepole pine. Areas experiencing cooler and moister conditions include grand fir, white fir, and western larch while the highest elevations include pacific silver fir, subalpine fir and whitebark pine. Economically, timber harvest and recreation are important land uses in these forests. Historically, many of these forests would have experienced relatively frequent, low and mixed severity fire favoring the development of mature forests dominated by ponderosa pine or Douglas-fir. In the southern pumice plateau forests, less frequent, higher severity fire was common and promoted the growth of large expanses of lodgepole pine forests.

LRU notes

This broad group of sites encompasses meadow and riparian sites that occur across the MLRA. These sites range across MLRA 6 and span broad gradients of plant community composition, physiography, geology, and climate. These sites share common influences of adjacent riparian areas or wetlands and moist to wet soils with udic or aquic soil moisture regimes.

Classification relationships

Riparian Zone Associations of the Deschutes, Ochoco, Fremont, and Winema National Forests (Kovalchik 1987)
SW11-13 – Willow/Widefruit sedge

Riparian And Wetland Vegetation of Central and Eastern Oregon (Crowe et al. 2004)
CEGL001185 - Salix boothii-Salix geyeriana/*Carex angustata* (C. eurycarpa)

Ecological site concept

This site represents a wet meadow occurring within the foothills of the eastside of the Oregon Cascades. The reference plant community is dominated by a diversity of riparian willow (Salix spp.) species and an herbaceous layer dominated by various sedge (Carex spp.) species. In comparison to other meadow sites described in the

area, this site is wetter and colder, experiencing moist soils throughout much of the year as well as occasional spring ponding. These conditions favor species with high moisture requirements and those adapted to an anoxic soil environment. Adjacent sites with lower water tables and less frequent ponding may be forested with lodgepole pine (Pinus contorta). The soil moisture regime is Aquic and the soil temperature regime is Cryic.

This is a provisional ecological site and is subject to extensive review and revision before final approval. All data herein should be considered provisional and contingent upon field validation prior to use in conservation planning.

Associated sites

F006XY712OR	**Cryic Xeric Pumice Uplands 18-25 PZ** occupying adjacent forested map units where no water table is present
F006XY718OR	**Cryic Xeric Pumice Basins 18-25 PZ** occupying adjacent forested map units where no water table is present but where cold air pooling occurs
F006XE807OR	**Cryic Aquic Pumice Basins (PICO/SPDO-VAUL)** Occupying locations further from water bodies with lower water tables

Similar sites

F006XY706OR	**Cryic Coniferous Flood Plain** Occupying floodplains and low terraces along streams
R006XB100OR	**Wet Meadow** Elevation below 3,500 feet, frigid soil temperature regime, dominated by tufted hairgrass
F006XE807OR	**Cryic Aquic Pumice Basins (PICO/SPDO-VAUL)** Water table lower, forested with lodgepole

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix*
Herbaceous	(1) *Carex*

Physiographic features

This site occurs on low gradient floodplains above perennial stream and river channels. Slopes range from nearly level to 3 percent. Elevations range from 4,000 to 6,000 feet (1,200 to 1,850 meters). This site is common along the pumice basin river channels of the Deschutes and Little Deschutes rivers but may be found in the vicinity of the Metolius drainage as well. Sites are flooded, with water levels near the surface up to 8 inches above the soil surface in the spring.

Table 2. Representative physiographic features

Landforms	(1) Basin > Flood plain
Flooding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	None to rare
Elevation	1,219–1,829 m
Slope	0–3%
Ponding depth	0–20 cm
Water table depth	30–61 cm
Aspect	Aspect is not a significant factor

Climatic features

The annual precipitation ranges from 14 to 20 inches (350 to 500 mm), most of which occurs in the form of snow during the months of November through May. Spring rains are common. The soils remain moist throughout the summer in most years and have an Aquic soil moisture regime. The soil temperature regime is cryic with a mean annual air temperature of about 43 degrees Fahrenheit (6°C). Temperature extremes range from 90 to -30 degrees Fahrenheit (32 to -34°C). The frost-free period ranges from 20 to 50 days. The optimum period for plant growth is from April through July. The graphs below are populated from the closest available weather station to representative site locations and are provided to indicate general climate patterns.

Table 3. Representative climatic features

Frost-free period (characteristic range)	20-50 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	356-508 mm
Frost-free period (average)	35 days
Freeze-free period (average)	
Precipitation total (average)	432 mm

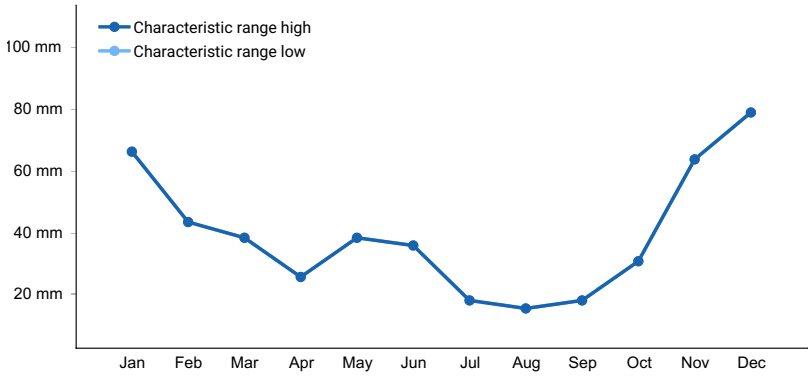


Figure 1. Monthly precipitation range

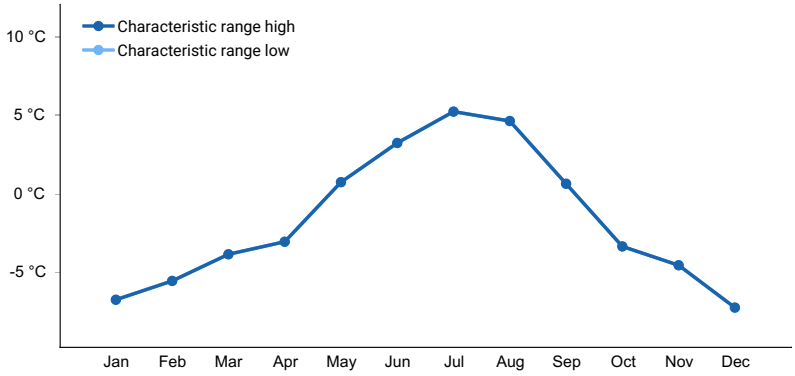


Figure 2. Monthly minimum temperature range

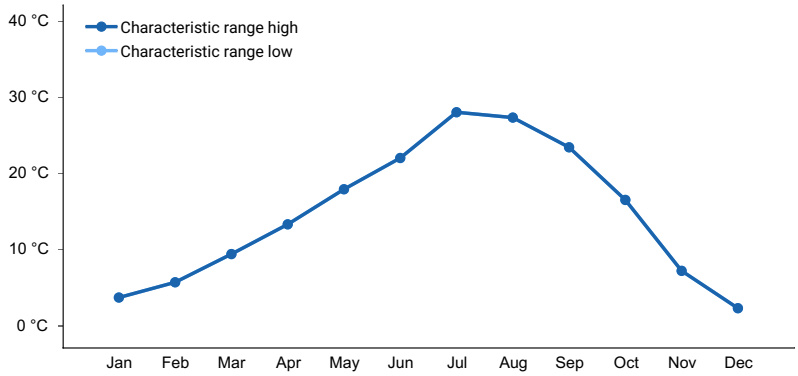


Figure 3. Monthly maximum temperature range

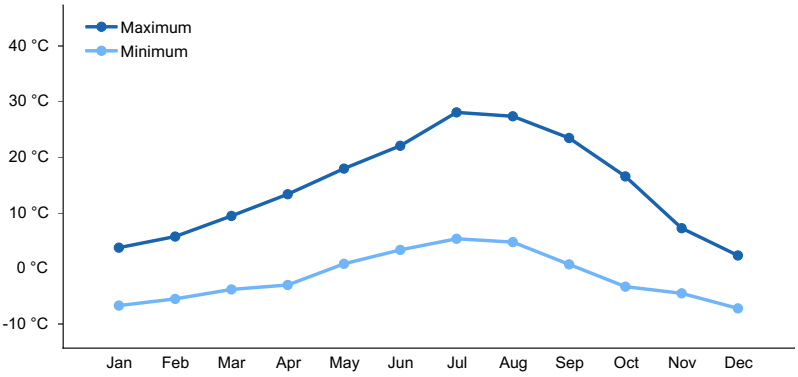


Figure 4. Monthly average minimum and maximum temperature

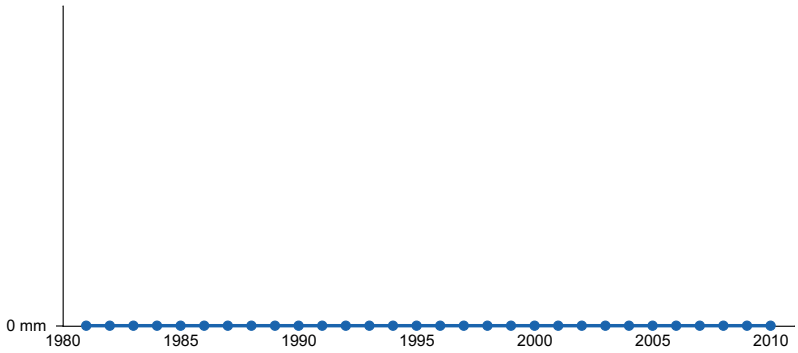


Figure 5. Annual precipitation pattern

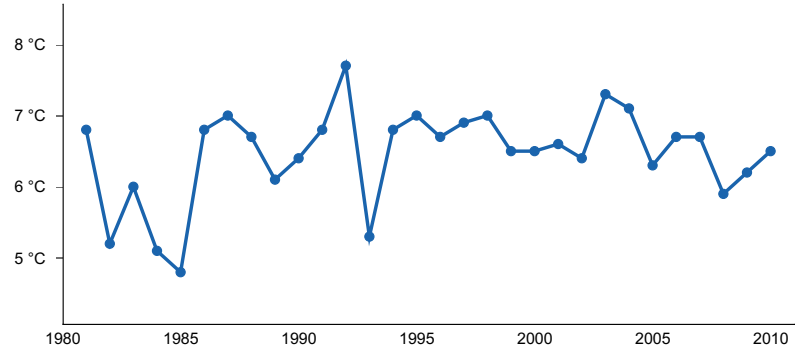


Figure 6. Annual average temperature pattern

Climate stations used

- (1) SUNRIVER [USC00358246], Bend, OR

Influencing water features

This site is adjacent to perennial stream or river channels. Flow alteration for irrigation and removal of beaver has likely altered the hydrology of this site. This site receives runoff from snow melt during the spring and early summer.

Wetland description

Wetland delineation and description is pending further data collection.

Soil features

The soils of this site are typically deep to very deep and somewhat poorly drained. Typically, the surface texture is a silt, fine sandy loam, or loam that is high in organic matter and about 2 to 14 inches thick. The subsoil is often coarse sandy loam from a depth of 14 to 18 inches. Depth to bedrock or an indurated pan is usually greater than 60 inches. Permeability is moderate. The potential for erosion is slight.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt (2) Fine sandy loam (3) Loam
Family particle size	(1) Ashy (2) Coarse-loamy
Drainage class	Somewhat poorly drained
Permeability class	Moderate
Depth to restrictive layer	152–203 cm
Soil depth	152–203 cm
Surface fragment cover <=3"	0–45%
Surface fragment cover >3"	0–45%
Available water capacity (0-101.6cm)	12.7–16.76 cm
Soil reaction (1:1 water) (0-101.6cm)	5.6–7.3
Subsurface fragment volume <=3" (10.2-152.4cm)	0–30%
Subsurface fragment volume >3" (10.2-152.4cm)	0–20%

Ecological dynamics

Reference Plant community:

The Reference Native Plant Community is dominated by willows and sedges. Vegetative composition is approximately 60 percent grasses and grass-like plants, 10 percent forbs and 30 percent shrubs and trees. Production decreases in former meander channels where gravels dominate the soil profile. Production may also decrease under more dense willow canopy cover.

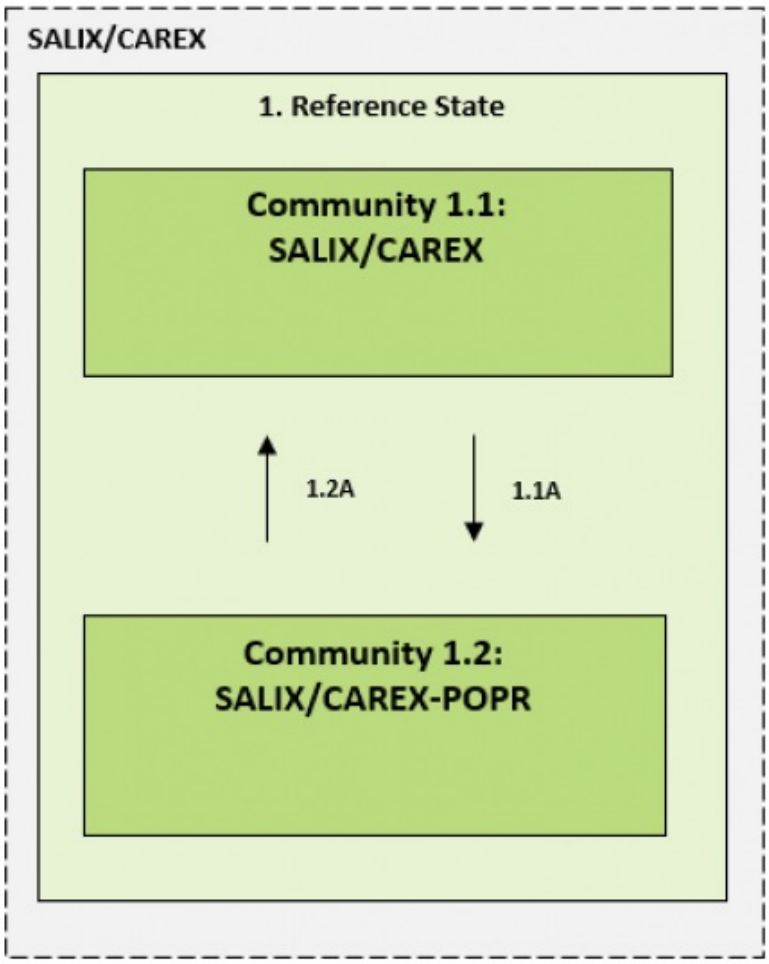
Disturbance:

This site is not well suited to livestock grazing due to the persistence of surface water for most of the year. However, if overgrazing occurs, Kentucky bluegrass (*Poa pratensis*) and unpalatable forbs such silverweed (Potentilla spp.) may become codominant with sedges. Willow will decrease in vigor as indicated by uneven distribution, hedging, and decreasing cover. Fire is unlikely in this wet community except for a short window during late summer or fall. Following wildfire, organic rich soils may be damaged and willows will resprout from root crowns

(Kovalchik 1987). Historic use of this site by beaver would likely have dramatically influenced hydrology, productivity and plant community distribution. Removal of beaver from this site will likely cause significant alterations to these attributes and ecological processes. Flow alteration of adjacent waterways due to irrigation withdraws has likely influenced seasonality and height of water tables, flooding and ponding dynamics.

This state and transition model below represents a generalized and simplified version of plant community change in response to major disturbance types in this ecological site. It is largely based on expert knowledge of range scientists who developed the site originally and successional dynamics described in the aforementioned plant associations. Given that this site is associated with surface water sources which are expected to be impacted by climate change, future climate conditions are likely to lead to altered ecological dynamics. As this site is updated in future iterations, descriptions will include more thorough treatments of disturbance and ecological change.

State and transition model



Community Pathways

1.1A	Overutilization by ungulates
1.2A	Rest from grazing

State 1
Historical Reference State

This is the Reference Plant Community given an unaltered disturbance regime. It is highly likely that the Reference State, even in the best condition and highest potential, will almost always include at least some component of exotic species regardless of management inputs, this may also be referred to as the “current potential state”. In this document, the term “reference state” is used synonymously with “current potential state” for the sake of simplicity.

Dominant plant species

- willow (*Salix*), shrub
- sedge (*Carex*), grass

Community 1.1
Reference Community SALIX/CAREX

This represents the Reference Plant Community for this site. It is dominated willow species and sedges.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	751	902	1132
Shrub/Vine	303	359	448
Forb	67	84	101
Tree	–	–	–
Total	**1121**	**1345**	**1681**

Community 1.2
SALIX/CAREX-POPR

If heavy herbivory is sustained, whether by native ungulates or livestock, Kentucky bluegrass and unpalatable forbs such as silverweed may become codominant with sedges. Willow will decrease in vigor as indicated by uneven distribution, hedging, and decreasing cover. Sufficient rest will allow wide-fruit sedge (*Carex angustata*) and willows to recover (Kovalchik 1987). Further research may identify a threshold for this disturbance that will push this site into an alternative state.

Pathway 1.1A
Community 1.1 to 1.2

Overutilization by ungulates

Pathway 1.2A
Community 1.2 to 1.1

Rest from grazing

Context dependence. Excessive grazing leading to a loss of plant species diversity, abundance or reproductive output; altered abiotic conditions such as significantly compacted or eroded soil, or streambank alteration for example, will not recover by rest alone and will require additional inputs

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Grass and grasslike plants**			527–1143	
	widefruit sedge	CAAN15	*Carex angustata*	404–673	–
	Northwest Territory sedge	CAUT	*Carex utriculata*	67–202	–
	analogue sedge	CASI2	*Carex simulata*	28–135	–
	Alaska rush	JUARA	*Juncus arcticus ssp. alaskanus*	28–135	–
2	**Other perennial grasses**			28–67	
	bluejoint	CACA4	*Calamagrostis canadensis*	–	–
	Kentucky bluegrass	POPR	*Poa pratensis*	–	–
	woolly sedge	CAPE42	*Carex pellita*	–	–
Forb					
3	**Other perennial forbs**			28–135	
	cinquefoil	POTEN	*Potentilla*	–	–
	Columbia Gorge rockcress	ARFU	*Arabis furcata*	–	–
	castilla	CASTI	*Castilla*	–	–
	threepetal bedstraw	GATR2	*Galium trifidum*	–	–
	Norton's St. Johnswort	HYSCN	*Hypericum scouleri ssp. nortoniae*	–	–
	spotted geranium	GEMA	*Geranium maculatum*	–	–
	Jacob's-ladder	POLEM	*Polemonium*	–	–
	rose spirea	SPDO	*Spiraea douglasii*	–	–
	cinquefoil	POTEN	*Potentilla*	–	–
Shrub/Vine					
4	**Shrubs**			202–499	
	Geyer willow	SAGE2	*Salix geyeriana*	67–202	–
	Booth's willow	SABO2	*Salix boothii*	67–135	–
	Lemmon's willow	SALE	*Salix lemmonii*	28–67	–
	resin birch	BEGL	*Betula glandulosa*	28–67	–
	bog blueberry	VAUL	*Vaccinium uliginosum*	11–28	–

Inventory data references

Information presented here has been derived from NRCS data. Field observations from range trained personnel were also used. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

References

Ryan, K.C., K.M. Lee, M.G. Rollins, Z. Zhu, J. Smith, and D. Johnson. 2006. Landfire: National vegetation and fuel mapping for fire management planning. Forest Ecology and Management 234:S220.

Other references

Crowe, E.A., B.L. Kovalchik, and M.J. Kerr. 2004. Riparian and Wetland Vegetation of Central and Eastern Oregon. Oregon State University, Portland, OR. 473 pp.

Kovalchik, B.L. 1987. Riparian zone associations: Deschutes, Ochoco, Fremont, and Winema National Forests.

Contributors

Andrew Neary - 2020/2021 PES update of draft site

Approval

Kirt Walstad, 9/11/2023

Acknowledgments

Development of this site as a range site was based on field data collection completed in 1989. It was revised and updated with information regarding ecological dynamics in 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	05/19/2024
Approved by	Kirt Walstad
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:**