USDA Natural Resources Conservation Service

Ecological site R006XA204OR
South Slopes 20-40 PZ

Last updated: 9/11/2023
Accessed: 05/20/2024

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, MLRA6 encompasses 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-Cretaceous 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

Located at the eastern edge of the Columbia river gorge, this unit is restricted to areas influenced by the modified maritime climate of this unique passageway through the Cascades. This setting allows for the persistence of Oregon White Oak woodlands east of the Cascade crest. These woodlands often include ponderosa pine, and on sites with greater soil moisture, Douglas-fir. Botanical diversity is high, with a mixture of West Cascade and East Cascade plant species commonly co-occurring. Physiographically, this unit is characterized by dissected foothills, valleys and ridges draining Mount Hood in Oregon and Mount Adams in Washington. Geologically, the unit is characterized by late tertiary pyroclastic and volcanoclastic deposits and basalt flows. The climate of this unit is generally warm and dry with a predominately xeric soil moisture regime and mesic soil temperature regime. Historically, the drier extent of these forests have been influenced by a fire regime whereby frequent low and mixed severity fires would have favored the development of open canopied forests. Higher elevations and more westerly locations receiving more moisture within this unit would have been influenced by moderately frequent, low and mixed severity fires favoring a mosaic of forest stages with closed canopy conditions common.

Ecological site concept

This site represents a grassland community at the transition zone between the foothills on the eastside of the Oregon cascades and the Columbia plateau. The reference plant community is dominated by Idaho fescue (Festuca idahoensis) and bluebunch wheatgrass (Pseudoroegneria spicata) with sparsely distributed Oregon white oak (Quercus garryana) and antelope bitterbrush (Purshia tridentata). This site occupies south slopes at the higher

end of the precipitation range (20 to 40 in) for Oregon white oak on the east side of the Oregon Cascades, yet shallow soils preclude the establishment of large numbers of conifers and oaks. Sites with gentle slopes and deep, loamy soils within this precipitation zone generally support forest or woodland stands dominated by ponderosa pine (Pinus ponderosa) or Douglas-fir (Pseudotsuga menziesii) due to the deeper rooting requirements of these conifers. South aspect sites with deeper soils support mixed stands of ponderosa pine and white oak.

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

R006XA304OR	**Loamy 20-40 PZ** Non-aspected site, deeper soils, conifers common

Similar sites

R006XA302OR	**Steep South Slopes 20-40 PZ** deeper soils, white oak more common
R006XA304OR	**Loamy 20-40 PZ** Non-aspected site, deeper soils, conifers common

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Festuca idahoensis* (2) *Pseudoroegneria spicata*

Physiographic features

This site occurs on south, southeasterly, and west facing exposures of hill and mountain side slopes. Slopes range from 5 to 75 percent. Elevations range from 500 to 2,500 feet (150 to 750 meters). This site is not subject to ponding or flooding and no water table is present within 100 inches of the soil surface.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Hillside or mountainside
Flooding frequency	None
Ponding frequency	None
Elevation	152–762 m
Slope	5–75%
Ponding depth	0 cm
Water table depth	254 cm
Aspect	W, SE, S, SW

Climatic features

This site has a xeric soil moisture regime with mean annual precipitation ranging from 20 - 40 inches (500 to 1000 mm), most of which occurs during the months of October through April in the form of rain and snow. The soil temperature regime is mesic with a mean annual air temperature of about 49 degrees F (9.5 degrees C). Temperature extremes range from -15 to 110 degrees F (-26 to 43 degrees C). The frost-free period ranges from about 120 to 180 days. The optimum period for plant growth is March through mid-June. This climate is modified by the influence of the Columbia River Gorge which acts as a conduit for maritime air masses to move past the Cascade mountains. 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)	120-180 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	508-1,016 mm
Frost-free period (average)	150 days
Freeze-free period (average)	
Precipitation total (average)	762 mm

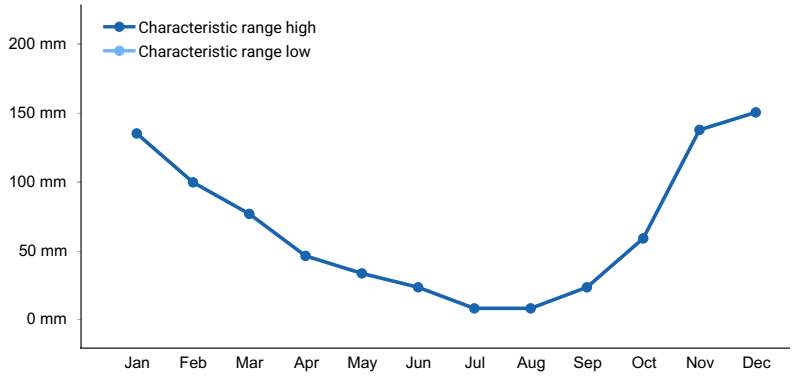


Figure 1. Monthly precipitation range

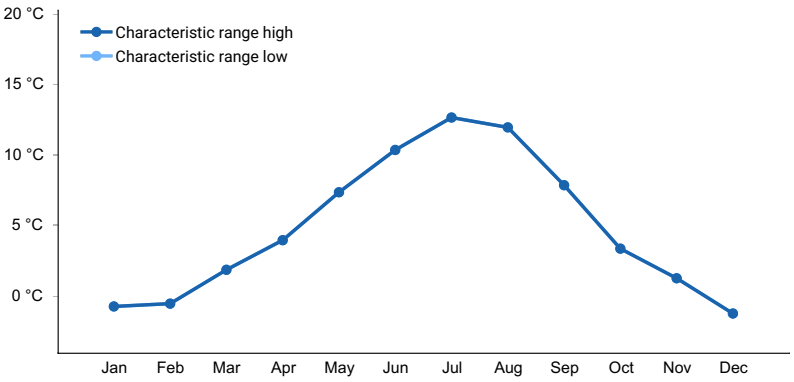


Figure 2. Monthly minimum temperature range

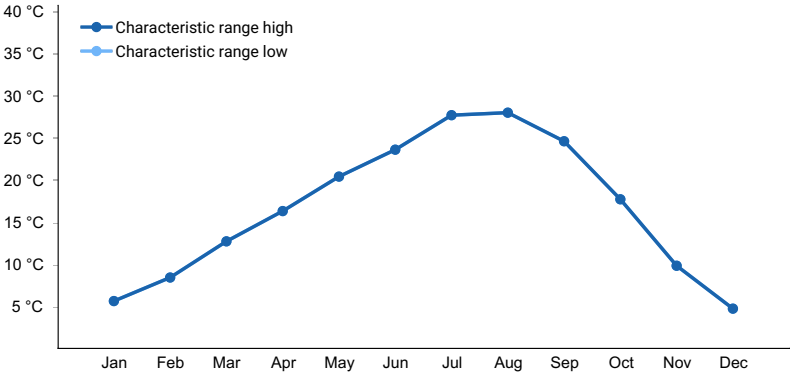


Figure 3. Monthly maximum temperature range

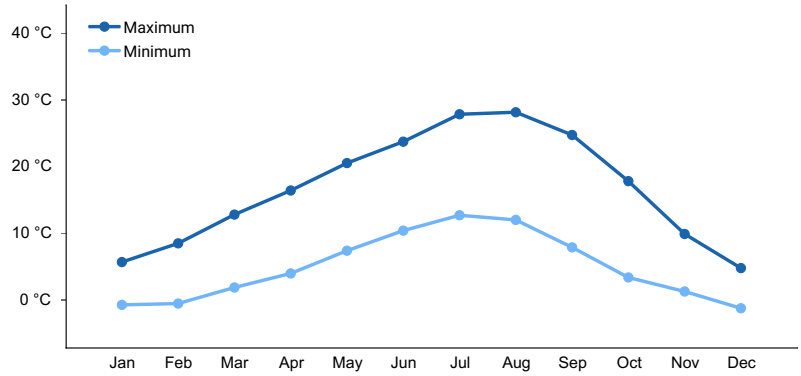


Figure 4. Monthly average minimum and maximum temperature

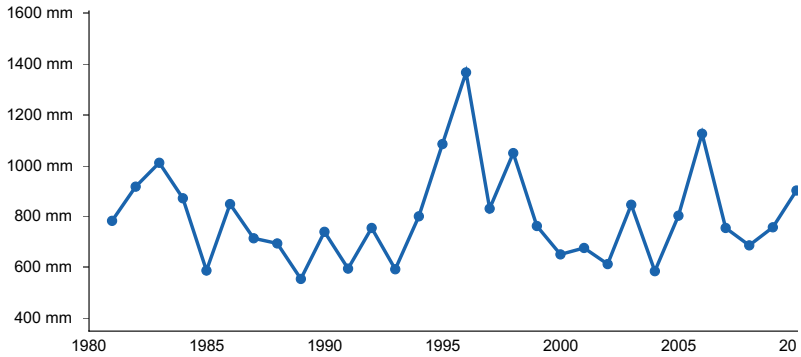


Figure 5. Annual precipitation pattern

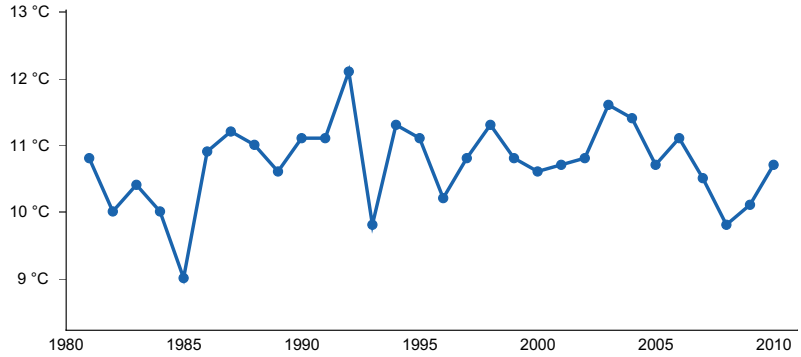


Figure 6. Annual average temperature pattern

Climate stations used

- (1) HOOD RIVER EXP STN [USC00354003], Hood River, OR

Influencing water features

This site is not influenced by water from a wetland or stream.

Wetland description

N/A

Soil features

The soils that typify this site concept are shallow, well drained and cobbly surface and subsurface textures over basalt parent material. Surface textures are often cobbly loams. Subsoil textures are often a very cobbly loam or very cobbly clay loam. Depth to bedrock or an indurated pan is about 12 to 20 inches. Permeability is moderate. The available water holding capacity is about 1 to 2 inches. The potential for erosion is slight to severe.

Table 4. Representative soil features

Parent material	(1) Colluvium–basalt (2) Volcanic ash (3) Loess
Surface texture	(1) Cobbly loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	30–51 cm
Soil depth	30–51 cm
Surface fragment cover <=3"	0–45%
Surface fragment cover >3"	0–45%
Available water capacity (0-50.8cm)	2.54–5.08 cm
Soil reaction (1:1 water) (0-50.8cm)	6.6–7.3
Subsurface fragment volume <=3" (10.2-50.8cm)	0–20%
Subsurface fragment volume >3" (10.2-50.8cm)	30–50%

Ecological dynamics

Reference Plant community:

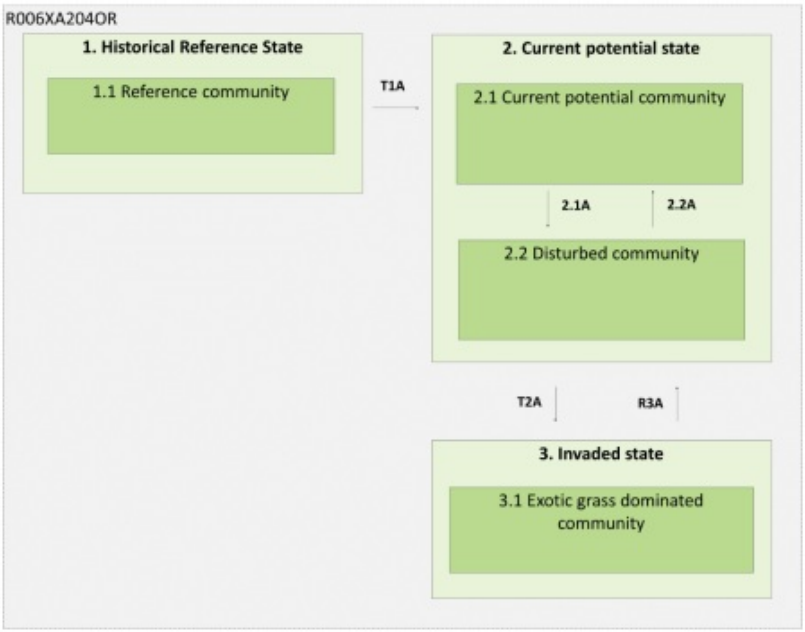
The reference native plant community is dominated by Idaho fescue and bluebunch wheatgrass with sparsely scattered scrub White oak and bitterbrush. This is considered a grassland site yet trees and shrubs may occur in very low cover throughout this ecological site. Vegetative composition is approximately 85 percent grasses, 10 percent forbs and 5 percent shrubs/trees. Variability in plant composition and yield is dependent on soil depth and coarse fragments, rather than precipitation and elevation ranges within the site. Idaho fescue is the predominant grass as a result of available moisture. Bluebunch wheatgrass will be in higher proportion on more coarse surface textures.

Disturbance:

Existing within a matrix dominated by Oregon White oak woodland sites, the fire regime for this grassland site is similarly characterized by frequent, low intensity fires (Landfire 2007). These fires remove aboveground biomass and favor dominance by herbaceous species overtime. If the condition of the site deteriorates as a result of improper grazing management, bluebunch wheatgrass decreases while Sandberg bluegrass (*Poa secunda*) and bulbous bluegrass (*Poa bulbosa*) increase. Idaho fescue is the preferred species during spring and summer. With further deterioration, bunchgrasses decrease, minor forbs and grasses increase and annual grasses invade. Under deteriorated conditions, cheatgrass (*Bromus tectorum*) and a variety of forbs will replace the perennial bunchgrasses. Severe annual grass invasion may alter the fire regime of this site, increasing the frequency of fire and shifting timing to earlier into the summer season (Gucker 2007).

The state and transition model below represents a generalized and simplified version of community change in response to major disturbance types in this ecological site. It does not attempt to model all of the complex interacting effects of grazing, fire and invasive species on ecosystem change and the potential states and transitions emerging from these dynamics. Hotter and dryer conditions due to climate change will likely interact with existing disturbance process to create unpredictable ecosystem dynamics. Conversion of this site to cropland or pastureland is not likely due to shallow soils. Restoration activities for sites within the East Cascades White Oak ecosystem should be informed by the document “Oregon White Oak Restoration Strategy for National Forest System Lands East of the Cascade Range” by Devine et al 2013.

State and transition model



Community Pathways

2.1A	Improper grazing management
2.2A	Extended rest from grazing

Transitions / Restoration Pathways

T1A	Introduction of invasive annual grasses
T2A	Prolonged inappropriate grazing management, catastrophic fire in the presence of exotic annuals
R3A	Treatment of exotic grasses, restoration of perennial grasses

State 1
Historical Reference State

Site characterized by bunchgrasses, with sparsely distributed shrubs and scrub oak. A disturbance regime of regular surface fire will maintain the community in this phase with white oak and bitterbrush able to resprout following low severity fire. The high precipitation that this site receives may increase site resilience to invasion relative to drier, low elevation sites.

Dominant plant species

- Idaho fescue (*Festuca idahoensis*), grass
- bluebunch wheatgrass (*Pseudoroegneria spicata*), grass
- Sandberg bluegrass (*Poa secunda*), grass

Community 1.1
Reference Community

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	661	942	1222
Forb	101	146	191
Shrub/Vine	11	17	22
Tree	11	17	22
Total	**784**	**1122**	**1457**

State 2
Current potential state

This state is similar to the Reference State. Ecological function and structure has not changed fundamentally; however the resiliency of the site has been reduced by the presence of invasive plants. Non-native plant species may increase in abundance but will not become dominant or control ecological processes within this state.

Community 2.1
Current potential community

Plant community similar to Reference Community 1.1 yet with the addition of weedy annual forbs and exotic annual grasses.

Community 2.2
Distrurbed community

Annual invasive grasses and other exotic species increasing, native species in decline.

Pathway 2.1A
Community 2.1 to 2.2

Improper grazing management and overutilization beyond acceptable limits of the carrying capacity of the site.

Pathway 2.2A
Community 2.2 to 2.1

Extended rest from grazing allowing native grasses to increase in cover

Context dependence. Excessive grazing leading to a loss of species diversity or reproductive output or altering abiotic conditions by significantly compacting or eroding soil, for example, will not recover by rest alone and will require additional inputs

State 3
Invaded state

Much of the perennial grasses have been lost and replaced by exotic annual grasses. This may result in an increase in fire frequency and size thereby maintaining the site in this state (Archer 2001, Zouhar 2003).

Dominant plant species

- cheatgrass (*Bromus tectorum*), grass
- medusahead (*Taeniatherum caput-medusae*), grass
- bulbous bluegrass (*Poa bulbosa*), grass

Transition T1A
State 1 to 2

An introduction of invasive annual grasses due to factors such as overgrazing, recreational use, or transport via mechanical means will alter the resilience and resistance of the site to disturbance (Archer 2001).

Transition T2A
State 2 to 3

Prolonged inappropriate grazing management leading to a loss of most perennial grasses and a widespread invasion of exotic annual grasses such as cheatgrass. This may also occur following catastrophic fire if exotic annuals were high in cover before disturbance (Archer 2001).

Restoration pathway R3A
State 3 to 2

Reduction of invasive species may be possible yet will be time and labor intensive and require significant inputs. Techniques may include prescribed burning, mechanical treatment, herbicide application and reseeding (Archer 2001).

Context dependence. Steep slopes may restrict some activities.

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**			740–1065	
	Idaho fescue	FEID	*Festuca idahoensis*	392–673	–
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	78–224	–
	Sandberg bluegrass	POSE	*Poa secunda*	39–112	–
	Lemmon's needlegrass	aclel	*Achnatherum lemmonii var. lemmonii*	8–56	–
2	**Other perennial grasses**			11–34	
	prairie Junegrass	KOMA	*Koeleria macrantha*	–	–
	Leiberg's bluegrass	Pole	*Poa leibergii*	–	–
	bulbous bluegrass	pobu	*Poa bulbosa*	–	–
Forb					
3	**Forbs**			67–157	
	largehead clover	trma3	*Trifolium macrocephalum*	17–56	–
	arrowleaf balsamroot	basa3	*Balsamorhiza sagittata*	17–56	–
	arrowleaf buckwheat	erco12	*Eriogonum compositum*	6–22	–
	common yarrow	acmi2	*Achillea millefolium*	6–22	–
4	**Other perennial forbs**			11–56	
	desertparsley	lomat	*Lomatium*	–	–
	lupine	lupin	*Lupinus*	–	–
	purple leptotaenia	loco	*Lomatium columbianum*	–	–
	Scouler's woollyweed	hisc2	*Hieracium scouleri*	–	–
Tree					
5	**Trees**			11–22	
	Oregon white oak	quga4	*Quercus garryana*	11–22	–
Shrub/Vine					
6	**Shrubs**			11–22	
	antelope bitterbrush	putr2	*Purshia tridentata*	11–22	–

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

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Contributors

Andrew Neary - 2020/2021 update of original draft concept

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	05/20/2024
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:

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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:**
