

# Ecological site XA232X02Y211

## Boreal Loamy Escarpments

Last updated: 5/18/2020  
Accessed: 04/26/2024

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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): 232X–Yukon Flats Lowlands

The Yukon Flats Lowlands MLRA is an expansive basin characterized by numerous levels of flood plains and terraces that are separated by minimal breaks in elevation. This MLRA is in Interior Alaska and is adjacent to the middle reaches of the Yukon River. Numerous tributaries of the Yukon River are within the Yukon Flats Lowlands MLRA. The largest are Beaver Creek, Birch Creek, Black River, Chandalar River, Christian River, Dall River, Hadweenzic River, Hodzana River, Porcupine River, and Sheenjek River. The MLRA has two distinct regions—lowlands and marginal uplands. The lowlands have minimal local relief and are approximately 9,000 square miles in size (Williams 1962). Landforms associated with the lowlands are flood plains and stream terraces. The marginal uplands consist of rolling and dissected plains that are a transitional area between the lowlands and adjacent mountain systems. The marginal uplands are approximately 4,700 square miles in size (Williams 1962).

This MLRA is bounded by the Yukon-Tanana Plateau to the south, Hodzana Highlands to the west, Porcupine Plateau to the east, and southern foothills of the Brooks Range to the north (Williams 1962). These surrounding hills and mountains partially isolate the Yukon Flats Lowlands MLRA from weather systems affecting other MLRAs of Interior Alaska. As a result, temperatures are generally warmer in summer and colder in winter than is characteristic in other areas at comparable latitude. There is a moisture and temperature gradient in which the lowlands region tends to be drier and colder and the surrounding marginal uplands region tends to be moister and warmer (PRISM Climate Group 2006).

The Yukon Flats Lowlands MLRA is mostly undeveloped lands that are sparsely populated and not accessible by a road system. A number of villages, including Beaver, Birch Creek, Chalkyitsik, Circle, Fort Yukon, Stevens Village, and Venetie, are adjacent to the Yukon River or one of its major tributaries. The largest village is Fort Yukon, which according to the 2010 U.S. Census has 583 residents that are dominantly Gwich'in Alaska Natives.

### LRU notes

Alaska has no officially recognized LRU. However, there appear to be two distinct LRU in the Yukon Flats Lowlands MLRA. These LRU are thought to have differing climatic regimes, landforms, and soil types (STATSGO and Jorgensen and Meidinger 2015). The two LRU were previously discussed in the MLRA notes section above and are termed the lowlands LRU and the marginal uplands LRU.

This ecological site is associated with the marginal uplands LRU.

### Classification relationships

Yukon Flats Lowlands MLRA.

### Ecological site concept

This ecological site is associated with erosive escarpments in the marginal uplands region of the Yukon Flats Lowlands MLRA. During field work, these escarpments had limited sampling. Flight and satellite reconnaissance results in readily recognizable escarpments in the marginal uplands region of the Yukon Flats Lowlands MLRA (fig. 3). Escarpments are considered very steep (50 to 100 percent slope), excessively drained, and appear to be erosive. Based on this reconnaissance and limited data collected from the Yukon Flats Lowlands and Interior Alaska Highlands MLRA, escarpments are believed to support multiple plant communities. These steep and dry slopes are likely prone to fire and this disturbance may result in significant slope erosion and multiple plant communities.

Reference state plant communities are believed to be closed deciduous forest and open low scrub (Viereck et al. 1992). Species that are thought to commonly occur in the reference state are quaking aspen (*Populus tremuloides*), prickly rose (*Rosa acicularis*), prairie sagewort (*Artemisia frigida*), common juniper (*Juniperus communis*), kinnikinnick (*Arctostaphylos uva-ursi*), purple reedgrass (*Calamagrostis purpurascens*), slender wheatgrass (*Elymus trachycaulus*), and American pasqueflower (*Pulsatilla pates*), northern bedstraw (*Galium boreal*), Rocky Mountain goldenrod (*Solidago multiradiata*), and three toothed saxifrage (*Saxifraga tricuspidata*).

### Associated sites

XA232X02Y217	<p><b>Boreal Woodland Loamy Frozen Plain Wet</b></p> <p>This ecological site occurs where water accumulates on the slopes (i.e. lower third of slopes and swales) of the marginal uplands region of the Yukon Flats Lowlands MLRA. The marginal uplands are characterized by broad and extensive plains. Associated soils have very deep loess deposition, are prone to ponding, and are poorly drained. The reference plant community is characterized as needleleaf woodland (10 to 25 percent cover; Viereck et al. 1992) primarily composed of black spruce (<i>Picea mariana</i>).</p>
XA232X02Y203	<p><b>Boreal Scrub Loamy Frozen Drainages</b></p> <p>This ecological site occurs in drainageways of the marginal uplands region of the Yukon Flats Lowlands MLRA. The marginal uplands are characterized by broad and extensive plains. Associated soils flood occasionally (5 to 50 times in 100 years) for long durations of time (between 7 and 30 days). Soils range from poorly to very poorly drained. The reference plant community is characterized as closed tall scrub (Viereck et al. 1992). Black spruce commonly occurs but cover is generally low.</p>
XA232X02Y227	<p><b>Boreal Forest Loamy Frozen Plains Cold</b></p> <p>This ecological site occurs on colder slope positions (i.e. North facing slopes) in the marginal uplands region of the Yukon Flats Lowlands MLRA. Associated soils have very deep loess deposition and range from poorly to somewhat poorly drained. The reference plant community is characterized as an open needleleaf forest (25 to 60 percent cover; Viereck et al. 1992) primarily composed of black spruce.</p>
XA232X02Y210	<p><b>Boreal Forest Loamy Frozen Plains Warm</b></p> <p>This ecological site occurs on warmer slope positions (i.e. South facing slopes) in the marginal uplands region of the Yukon Flats Lowlands MLRA. Associated soils have very deep loess deposition and are well drained. The reference plant community phase is characterized as an open needleleaf forest (25 to 60 percent cover; Viereck et al. 1992) primarily composed of mature white spruce (<i>Picea glauca</i>).</p>

### Similar sites

R231XY109AK	<p><b>Boreal Scrub Gravelly Slopes Dry</b></p> <p>R231XY109AK occurs on steep, erosive escarpments adjacent to the Yukon River in the Interior Alaska Highlands MLRA (see fig. 1 and 4). Because these two sites occur in different MLRAs and landscape positions, differences in plant community composition likely exist.</p>
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Figure 1. Scrub community sampled on steep and erosive escarpments in Yukon-Charley Rivers National Preserve Soil Survey (site R231XY109AK). The photo shows a mat of kinnikinnick with patches of purple reedgrass.

Table 1. Dominant plant species

Tree	(1) <i>Populus tremuloides</i>
Shrub	(1) <i>Artemisia frigida</i> (2) <i>Juniperus communis</i>
Herbaceous	(1) <i>Calamagrostis purpurascens</i> (2) <i>Elymus trachycaulus</i>

## Legacy ID

F232XY211AK

## Physiographic features

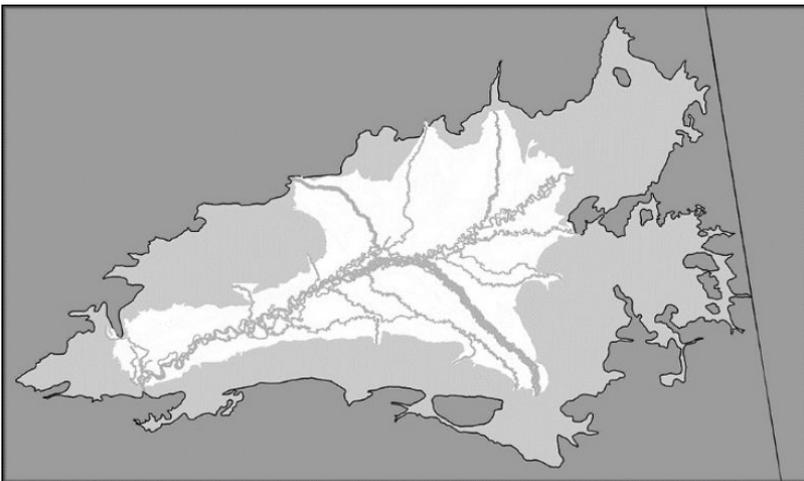


Figure 2. Lowlands (white) and marginal uplands (light gray) regions of the Yukon Flats Lowlands MLRA.



**Figure 3. Satellite image of steep eroded escarpments in the marginal upland region of the Yukon Flats Lowlands MLRA.**



**Figure 4. A plant community on a steep escarpment adjacent to the Yukon River in the Interior Alaska Highlands MLRA. This community is thought to be similar to steep escarpments in the Yukon Flats Lowlands MLRA.**

**Table 2. Representative physiographic features**

Geomorphic position, hills	(1) Free face
Hillslope profile	(1) Backslope (2) Shoulder
Landforms	(1) Plains > Escarpment (2) Plains > Hillslope
Flooding frequency	None
Ponding frequency	None
Elevation	300–1,200 ft
Slope	50–100%
Aspect	W, NW, N, NE, E, SE, S, SW

### **Climatic features**

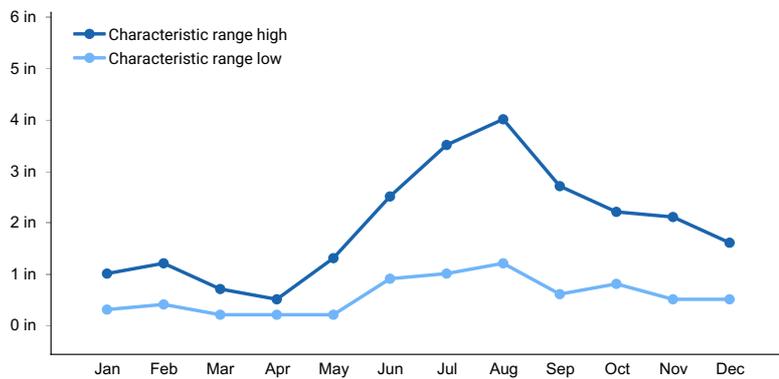
Short, warm summers and long, very cold winters characterize the subarctic continental climate of the area. The surrounding hills and mountains of this MLRA partially isolate it from weather systems affecting other interior lowlands. As a result, temperatures are generally warmer in summer and colder in winter than is characteristic in other areas of comparable latitude. The average annual temperature ranges from about 20 to 25 degrees F (-7 to -4 degrees C). The freeze-free period averages 70 to 120 days. The temperature usually remains above freezing from early June through late August. The average annual precipitation ranges from about 6 inches (150 millimeters) in the central basin to 15 inches (380 millimeters) along the boundary with the surrounding highlands. The maximum precipitation occurs in late summer, mainly as a result of thunderstorms. The average annual snowfall is about 45 to

55 inches (115 to 140 centimeters) (USDA, NRCS 2006).

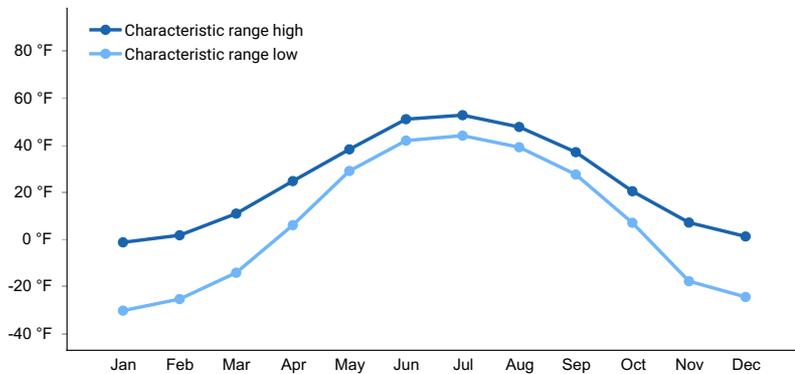
The tabular data in this report is specific to the marginal uplands LRU in the Yukon Flats Lowlands MLRA. All tabular data was calculated from the PRISM dataset (1971-2000).

**Table 3. Representative climatic features**

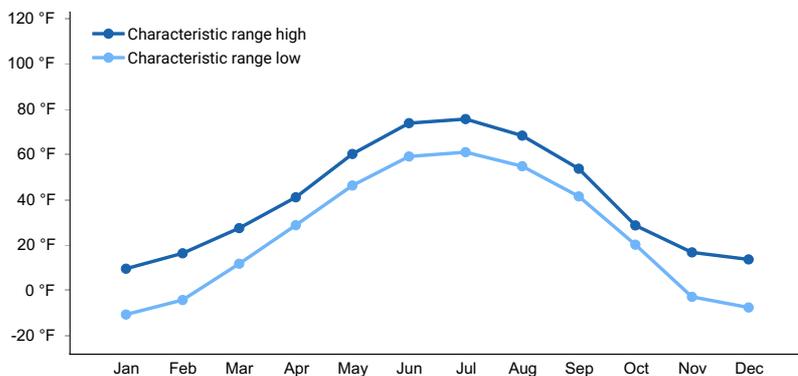
Frost-free period (characteristic range)	45-97 days
Freeze-free period (characteristic range)	70-120 days
Precipitation total (characteristic range)	9-22 in
Frost-free period (average)	75 days
Freeze-free period (average)	
Precipitation total (average)	11 in



**Figure 5. Monthly precipitation range**



**Figure 6. Monthly minimum temperature range**



**Figure 7. Monthly maximum temperature range**

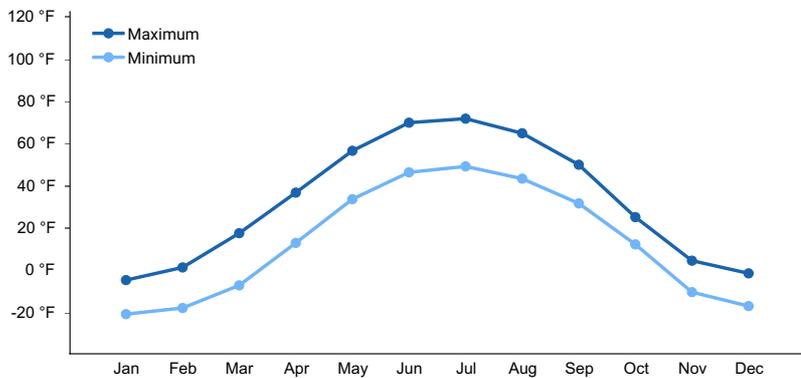


Figure 8. Monthly average minimum and maximum temperature

## Influencing water features

### Soil features

Correlated soil components for the Soil Survey of Yukon-Charley Rivers National Preserve Area Alaska (AK684): Boreal taiga loamy escarpment slopes.

Correlated soil components for the Yukon Flats Areas, Alaska soil survey (AK685): Ustic Calcicrypts.



Figure 9. A soil profile on a steep escarpment adjacent to the Yukon River in the Interior Alaska Highlands MLRA. Typical soil profile associated with Ustic Calcicrypts soil component.

Table 4. Representative soil features

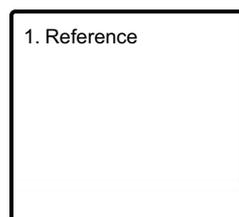
Parent material	(1) Loess (2) Alluvium
Family particle size	(1) Loamy-skeletal (2) Sandy or sandy-skeletal
Drainage class	Excessively drained
Soil depth	80 in

## Ecological dynamics

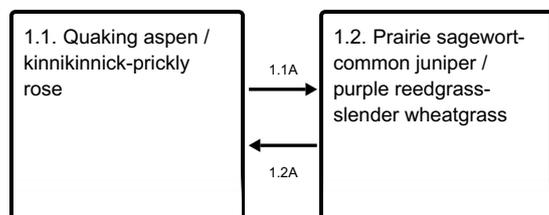
Little is currently known about this ecological site. There are associated plant communities that are thought to be related through fire succession. As we collect more data and gain more knowledge in the MLRA, these two plant communities may eventually be split into two separate ecological sites or two separate states within this ecological site.

## State and transition model

### Ecosystem states



### State 1 submodel, plant communities



## State 1 Reference



**Figure 10. Aerial image of the marginal uplands in the Yukon Flats Lowlands MLRA. This ecological site is associated with steep, dry, and erosive slopes in this MLRA.**

Associated soils are considered excessively drained and plants growing on these escarpments likely experience drought stress. The steep and dry slopes associated with this ecological site are likely prone to fire and this disturbance may result in significant slope erosion. This report provides baseline data for this provisional ecological site concept. More data collection is needed to provide further information about existing plant communities and the disturbance regimes that would result in transitions from one community or state to another. The common and scientific plant names are from the USDA PLANTS database. All communities in this report are characterized using the Alaska Vegetation Classification (Viereck et al. 1992).

## Community 1.1 Quaking aspen / kinnikinnick-prickly rose



**Figure 11. Typical plant community observed on steep erosive slopes in Yukon-Charley Rivers Preserve.**

Plant community 1.1 is believed to be a closed deciduous forest (Viereck et al. 1992) primarily composed of mature quaking aspen. Common understory species are thought to include (*Rosa acicularis*), prairie sagewort (*Artemisia frigida*), common juniper (*Juniperus communis*), kinnikinnick (*Arctostaphylos uva-ursi*), purple reedgrass (*Calamagrostis purpurascens*), slender wheatgrass (*Elymus trachycaulus*), and American pasqueflower (*Pulsatilla patens*), northern bedstraw (*Galium boreale*), Rocky Mountain goldenrod (*Solidago multiradiata*), and three toothed saxifrage (*Saxifraga tricuspidata*).

### **Dominant plant species**

- quaking aspen (*Populus tremuloides*), tree
- prickly rose (*Rosa acicularis*), shrub
- prairie sagewort (*Artemisia frigida*), shrub
- common juniper (*Juniperus communis*), shrub
- kinnikinnick (*Arctostaphylos uva-ursi*), shrub
- purple reedgrass (*Calamagrostis purpurascens*), grass
- slender wheatgrass (*Elymus trachycaulus*), grass
- eastern pasqueflower (*Pulsatilla patens*), other herbaceous
- northern bedstraw (*Galium boreale*), other herbaceous
- Rocky Mountain goldenrod (*Solidago multiradiata*), other herbaceous
- three toothed saxifrage (*Saxifraga tricuspidata*), other herbaceous

### **Community 1.2**

#### **Prairie sagewort-common juniper / purple reedgrass-slender wheatgrass**



**Figure 12. Typical plant community on escarpments along the Yukon River in Yukon-Charley Rivers National Preserve.**



Figure 13. Typical plant community on escarpments along the Yukon River in Yukon-Charley Rivers National Preserve.

Plant community 1.2 is believed to be open low scrub (Viereck et al. 1992). Species that are thought to commonly occur in the reference state are quaking aspen (*Populus tremuloides*), prickly rose (*Rosa acicularis*), prairie sagewort (*Artemisia frigida*), common juniper (*Juniperus communis*), kinnikinnick (*Arctostaphylos uva-ursi*), purple reedgrass (*Calamagrostis purpurascens*), slender wheatgrass (*Elymus trachycaulus*), and American pasqueflower (*Pulsatilla patens*), northern bedstraw (*Galium boreale*), Rocky Mountain goldenrod (*Solidago multiradiata*), and three toothed saxifrage (*Saxifraga tricuspidata*).

#### Dominant plant species

- quaking aspen (*Populus tremuloides*), tree
- prickly rose (*Rosa acicularis*), shrub
- prairie sagewort (*Artemisia frigida*), shrub
- common juniper (*Juniperus communis*), shrub
- kinnikinnick (*Arctostaphylos uva-ursi*), shrub
- purple reedgrass (*Calamagrostis purpurascens*), grass
- slender wheatgrass (*Elymus trachycaulus*), grass
- eastern pasqueflower (*Pulsatilla patens*), other herbaceous
- northern bedstraw (*Galium boreale*), other herbaceous
- Rocky Mountain goldenrod (*Solidago multiradiata*), other herbaceous
- three toothed saxifrage (*Saxifraga tricuspidata*), other herbaceous

#### Pathway 1.1A

#### Community 1.1 to 1.2



Quaking aspen / kinnikinnick-prickly rose



Prairie sagewort-common juniper / purple reedgrass-slender wheatgrass

Fire.

## Pathway 1.2A Community 1.2 to 1.1



Prairie sagewort-common juniper / purple reedgrass-slender wheatgrass



Quaking aspen / kinnikinnick-prickly rose

Time without fire.

## Additional community tables

### Inventory data references

NASIS User Site ID / Modal Datasets

08CS01901 reference state

09NP00303 reference state

09NP01303 reference state

09TC03201 reference state

10TC00203 reference state

10TC00204 reference state

10TC00302 reference state

10TC00401 reference state

10TC00402 reference state

### Other references

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PRISM Climate Group. 2006. Climate data of United States, 1971-2000. Oregon State University, Corvallis.

Schoeneberger, P.J., and D.A. Wysocki. 2012. Geomorphic description system. Version 4.2. U.S. Department of Agriculture, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.

Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and W.D. Broderson, editors. 2012. Field book for describing and sampling soils. Version 3.0. U.S. Department of Agriculture, Natural Resources Conservation Service.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Parry, N. 2013. Soil Survey of Yukon-Charley Rivers National Preserve Areas, Alaska. U.S. Department of Agriculture, Natural Resources Conservation Service.

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

Viereck, L.A., C.T. Dyrness, A.R. Batten, and K.J. Wezlick. 1992. The Alaska vegetation classification. U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station General Technical Report PNW-GTR-286.

Williams, J.R. 1962. Geologic reconnaissance of the Yukon Flats District, Alaska. U.S. Department of the Interior, Geologic Survey Bulletin 1111-H.

## Contributors

Blaine Spellman

## Approval

Michael Margo, 5/18/2020

## 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	05/11/2020
Approved by	Michael Margo
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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