USDA Natural Resources Conservation Service

Ecological site R236XY103AK
Subarctic Graminoid Loamy Mountain Depressions

Last updated: 2/13/2024
Accessed: 05/12/2025

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): 236X–Bristol Bay-Northern Alaska Peninsula Lowlands

The Bristol Bay-Northern Alaska Peninsula Lowland Major Land Resource Area (MLRA 236) is located in Western Alaska. This MLRA covers approximately 19,500 square miles and is defined by an expanse of nearly level to rolling lowlands, uplands and low to moderate hills bordered by long, mountain footslopes. Major rivers include the Egegik, Mulchatna, Naknek, Nushagak, and Wood River. MLRA 236 is in the zone of discontinuous permafrost. It is primarily in areas with finer textured soils on terraces, rolling uplands and footslopes. This MLRA was glaciated during the early to middle Pleistocene. Moraine and glaciofluvial deposits cover around sixty percent of the MLRA. Alluvium and coastal deposits make up a large portion of the remaining area (Kautz et al., 2012; USDA, 2006).

Climate patterns across this MLRA shift as one moves away from the coast. A maritime climate is prominent along the coast, while continental weather, commonly associated with Interior Alaska, is more influential inland. Across the MLRA, summers are general short and warm while winters are long and cold. Mean annual precipitation is 13 to 50 inches, with increased precipitation at higher elevations and areas away from the coast. Mean annual temperatures is between 30 and 36 degrees F (USDA, 2006).

The Bristol Bay-Northern Alaska Peninsula MLRA is principally undeveloped wilderness. Federally managed land includes parts of the Katmai and Aniakchak National Parks, and the Alaska Peninsula, Becharof, Togiak and Alaska Maritime National Wildlife Refuges. The MLRA is sparsely populated. Principal communities include Dillingham, Naknek, and King Salmon. Commercial fishing in Bristol Bay and the Bering Sea comprises a major part of economic activity in the MLRA. Other land uses include subsistence activities (fishing, hunting, and gathering) and sport hunting and fishing (USDA, 2006).

Ecological site concept

This ecological site is in mountain depressions. Site elevation is between 280 and 2,950 feet above sea level. Slopes are gentle (4 – 7 percent). Concave slope shape and highly organic, very poorly drained soils with a year-round water table shape the vegetation on this site.

The reference state supports two communities. The reference plant community is characterized as an open scrubland (Viereck et al., 1992). It is composed of facultative to obligate wetland shrub, forb, and graminoid species. Sphagnum mosses are present and greatly influence the vegetation on this site. Low points in depression centers support an emergent graminoid wetland community.

Associated sites

R236XY106AK	**Subarctic Dwarf Scrub Dry Loamy Slopes** R236XY106AK describes upper hill slopes. These areas feature the depressions described by R236XY103AK.

R236XY151AK	**Subarctic Open Willow Loamy Plain Swales** R236XY151AK describes swales on hills. Swales are distinct microfeatures found on the same hillslopes as the depressions described by R236XY103AK.
R236XY105AK	**Subarctic Scrub Mosaic Gravelly Hillslopes** R236XY105AK describes hill side slopes. These slopes feature the depressions described by R236XY103AK.

Similar sites

R236XY109AK	**Subarctic Low Scrub Peat Drainages** Both sites are in depressions on larger features. R236XY109AK is in plains depressions, which are at lower elevations and undergo longer ponding disturbances. Site and soil hydrology is a major factor differentiating the vegetation on these similar sites.
R236XY127AK	**Subarctic Sedge Peat Plain Depressions** R236XY127AK is in depressions of plains and hills. Differences in soil and site hydrology and characteristics are major factors differentiating the graminoid reference plant community in R236XY127AK and the scrubland described here.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix pulchra* (2) *Vaccinium uliginosum*
Herbaceous	(1) *Carex aquatilis* (2) *Eriophorum russeolum*

Physiographic features

This site is in concave depressions on mountain and hill slopes. Elevation ranges from 280 to 2,950 feet above sea level. Slopes are gentle (4 – 7 percent). This site is found at all aspects. This site experiences occasional, brief ponding during the growing season, but no flooding. A water table is present at the soil surface throughout the year.

Table 2. Representative physiographic features

Geomorphic position, hills	(1) Base Slope
Geomorphic position, mountains	(1) Center third of mountainflank
Slope shape across	(1) Concave
Slope shape up-down	(1) Concave
Landforms	(1) Mountains > Depression (2) Hills > Depression
Runoff class	Low to medium
Flooding frequency	None
Ponding duration	Brief (2 to 7 days)
Ponding frequency	Occasional
Elevation	280–2,950 ft
Slope	4–7%
Water table depth	0 in
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Low to medium

Flooding frequency	None
Ponding duration	Brief (2 to 7 days)
Ponding frequency	Occasional
Elevation	280–2,950 ft
Slope	4–7%
Water table depth	0 in

Climatic features

The climate of this site reflects that of the MLRA, which is described as maritime polar (EPA, 2013). Temperatures are moderated by the nearby Bristol Bay and norther Pacific bodies of water. Annual precipitation ranges from 21 – 34 inches with approximately 40 percent occurring during the June-September growing season (PRISM, 2018).

Table 4. Representative climatic features

Frost-free period (characteristic range)	75-100 days
Freeze-free period (characteristic range)	65-90 days
Precipitation total (characteristic range)	21-34 in
Frost-free period (actual range)	75-100 days
Freeze-free period (actual range)	65-90 days
Precipitation total (actual range)	15-41 in
Frost-free period (average)	90 days
Freeze-free period (average)	75 days
Precipitation total (average)	29 in

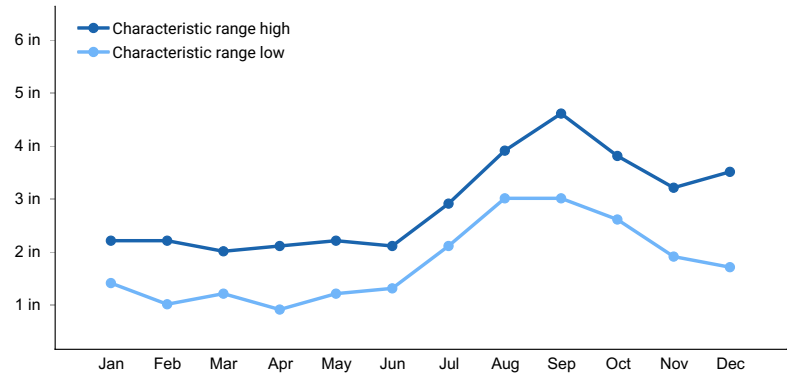


Figure 1. Monthly precipitation range

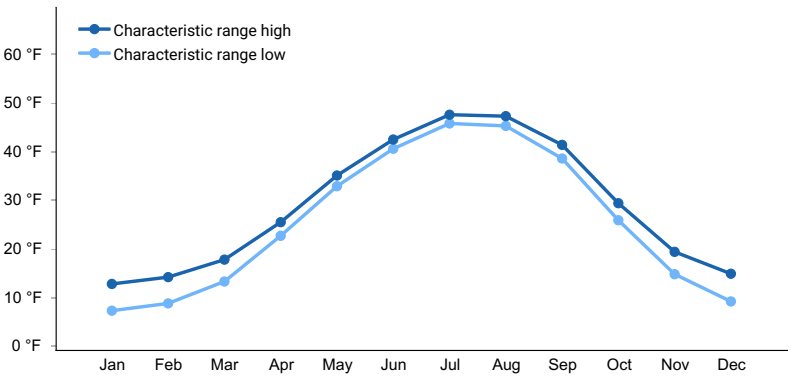


Figure 2. Monthly minimum temperature range

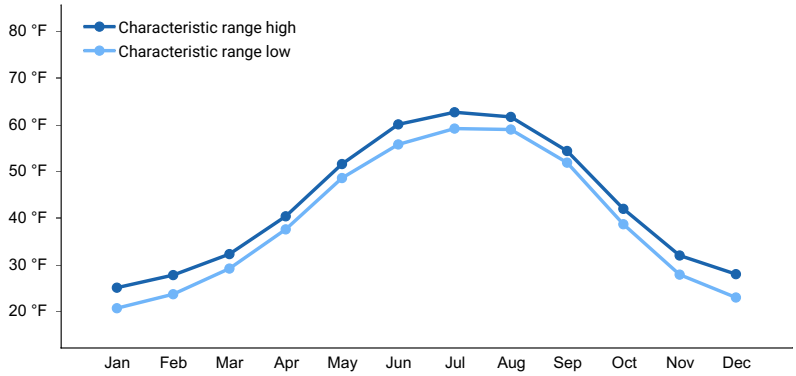


Figure 3. Monthly maximum temperature range

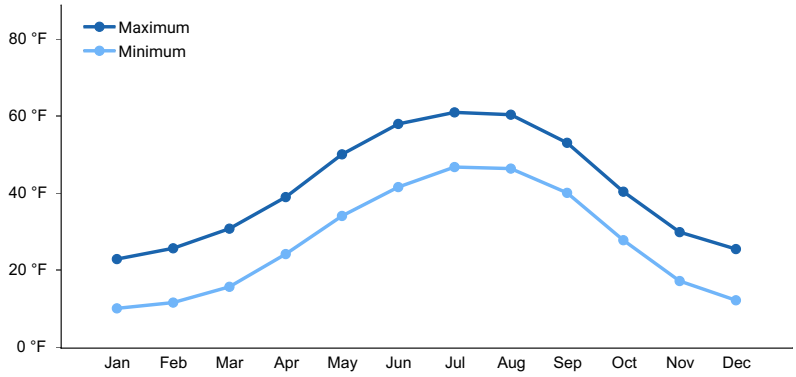


Figure 4. Monthly average minimum and maximum temperature

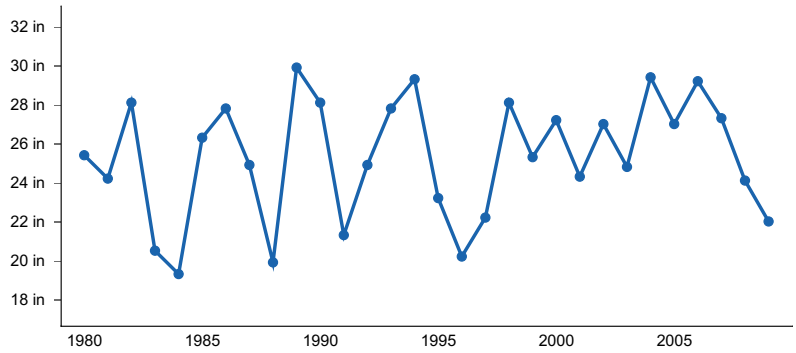


Figure 5. Annual precipitation pattern

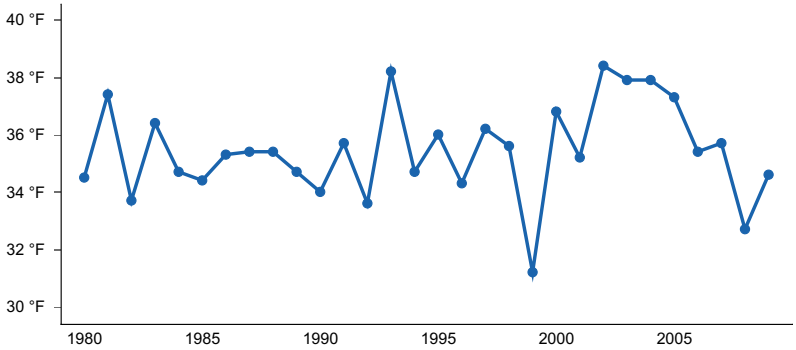


Figure 6. Annual average temperature pattern

Influencing water features

Wet soil conditions in these concave slope features restrict vegetation to facultative to obligate wetland species. The ponded community phase (1.2) can support an emergent wetland community. Precipitation, throughflow, and slope run off are the main sources of water.

Soil features

Soils are wet Histosols with well decomposed organic material (Soil Survey Staff, 2013). Soils are very deep and very poorly drained. They support a cryic temperature regime and an aquic moisture regime. Parent material is organic material over slope alluvium or colluvium.

Soil characteristics affecting vegetation include soil hydrology and organic material. Hemic soil materials (0 – 10 inches) and sapric soil materials (10 – 37 inches) are present in the profile. Hemic materials have an intermediate water content when saturated (Soil Survey Staff, 2013). A water table is present at the soil surface throughout the year, including the growing season. Wet soils influence the vegetation by restricting the vegetation that can grow here during the important early growing season months.

Correlated soil components in MLRA 236: D36-Western maritime sedge organic mountains; Cryosaprists

Table 5. Representative soil features

Parent material	(1) Slope alluvium (2) Colluvium
Surface texture	(1) Mucky peat
Drainage class	Very poorly drained
Permeability class	Very slow to moderate
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	3–5.9 in
Soil reaction (1:1 water) (0-10in)	5.8–6.3
Subsurface fragment volume <=3" (Depth not specified)	20%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 6. Representative soil features (actual values)

Drainage class	Very poorly drained to poorly drained
Permeability class	Very slow to moderate
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	3–5.9 in
Soil reaction (1:1 water) (0-10in)	5.6–6.5
Subsurface fragment volume <=3" (Depth not specified)	20%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site describes depressions on mountains. Local site factors including soil characteristics and site hydrology

support two plant communities. The reference plant community is an open low scrubland comprised of facultative to obligate wetland shrubs, forbs, and graminoids.

Spatial and temporal patterns in site hydrology distinguish two plant communities. Thick organic soil horizons develop from Sphagnum mosses. These mosses contain upwards of 90% water by volume. As a result, a water table is present at the soil surface throughout the year. Wet soils influence the vegetation by restricting the vegetation that can grow here throughout the year.

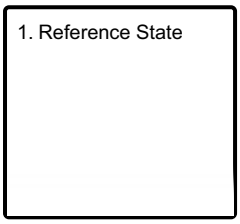
Low areas in a depression are more heavily influenced by hydrological conditions. Low areas can be found throughout a depression, but are most common in the center. Surface ponding may be present, particularly during periods of snow melt and precipitation. Vegetation in these areas forms an emergent graminoid wetland.

Willows are slightly browsed by moose. This does not appear to affect the ecological processes of the site.

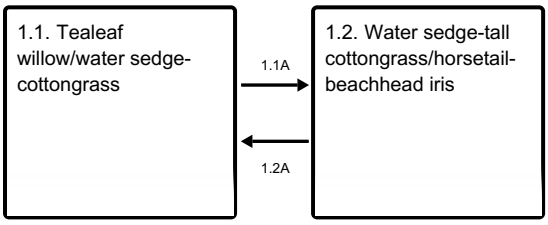
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1A - Raised water table

1.2A - Lowered water table

State 1
Reference State

The reference state supports two community phases, which are distinguished by the developed structure and dominance of the vegetation and by their ecological function and stability. The reference community phase is open low scrubland (Viereck et al., 1992) that consists of hydrophilic shrubs and graminoids. The presence of each community is dictated spatially and temporally by ponding. This report provides baseline inventory data on the vegetation. Future data collection is needed to provide further information about existing plant communities and the disturbance regimes that result in transitions from one community to another. Common and scientific names are from the USDA PLANTS database. Community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1
Tealeaf willow/water sedge-cottongrass

Figure 7. Typical area of community 1.1.

Community Phase 1.1 Canopy Cover Table

Vegetation data is aggregated across modal sample plots for this community phase and is provided as frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species. Canopy cover is represented as a mean with the range in parentheses.

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
S	Tealeaf willow	*Salix pulchra*	SAPU15	100	20
S	Dwarf birch	*Betula nana*	BENA	100	10
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	100	15
G	Water sedge	*Carex aquatilis*	CAAQ	100	50
G	Red cottongrass	*Eriophorum russeolum*	ERRU2	50	35
G	Tall cottongrass	*Eriophorum angustifolium*	ERAN6	50	5
G	Mud sedge	*Carex limosa*	CALI7	50	20
F	Purple marshlocks	*Comarum palustre*	COPA28	50	3
M	Mosses#		2MOSS	100	95

Mosses are not separated by species.

This dataset includes data from 2 sample plots. The sample plots are distributed across the survey area and are independent of one another. Due to the limited data available for this community phase, personal field observations were also used to aid in describing the vegetative community.

Plant functional group classifications—T = trees, S = shrubs, G = graminoids, F = forbs, B = bryophytes, L = lichens

Canopy cover data is rounded, except trace (0.1 percent) cover. Data ranging from 1 to 9 percent cover is rounded to the nearest integer. Data ranging from 10 to 100 percent cover is rounded to the nearest factor of 5.

Figure 8. Frequency and canopy cover of plants in community 1.1.

The reference plant community is open low scrubland (Viereck et al., 1992). This community consists of various facultative or obligate wetland species, including willows (Salix spp.), water sedge (*Carex aquatilis*), mud sedge (*Carex limosa*), red cottongrass (*Eriophorum russeolum*), and tall cottongrass (*Eriophorum angustifolium*). Other species commonly include dwarf birch (*Betula nana*), bog blueberry (*Vaccinium uliginosum*), and purple marshlocks (*Comarum palustre*), which is an obligate forb. The ground cover consists dominantly of mosses, herbaceous litter, and water.

Dominant plant species

- tealeaf willow (*Salix pulchra*), shrub
- dwarf birch (*Betula nana*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- water sedge (*Carex aquatilis*), grass
- red cottongrass (*Eriophorum russeolum*), grass

- tall cottongrass (*Eriophorum angustifolium*), grass
- mud sedge (*Carex limosa*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous
- Moss (*Moss*), other herbaceous

Community 1.2
Water sedge-tall cottongrass/horsetail-beachhead iris

Figure 9. Typical area of community 1.2.

Community Phase 1.2 Canopy Cover Table

Vegetation data is aggregated across modal sample plots for this community phase and is provided as frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species. Canopy cover is represented as a mean with the range in parentheses.

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	100	8
S	Cloudberry	*Rubus chamaemorus*	RUCH	75	3
S	Bog rosemary	*Andromeda polifolia*	ANPO	50	3
G	Water sedge	*Carex aquatilis*	CAAQ	50	15
G	Tall cottongrass	*Eriophorum angustifolium*	ERAN6	75	8
G	Round sedge	*Carex rotundata*	CARO7	25	40
F	Beachhead iris	*Iris setosa*	IRSE	50	10
F	Water horsetail	*Equisetum fluviatile*	EQFL	25	25
F	Buckbean	*Menyanthes trifoliate*	METR3	25	1
M	Sphagnum mosses	*Sphagnum spp.*	SPHAG2	100	45

This dataset includes data from 15 sample plots. The sample plots are distributed across the survey area and are independent of one another.

Plant functional group classifications—T = trees, S = shrubs, G = graminoids, F = forbs, B = bryophytes, L = lichens

Canopy cover data is rounded, except trace (0.1 percent) cover. Data ranging from 1 to 9 percent cover is rounded to the nearest integer. Data ranging from 10 to 100 percent cover is rounded to the nearest factor of 5.

Figure 10. Frequency and canopy cover of plants in community 1.2.

The early ponding phase is a wet graminoid herbaceous meadow (Viereck et al., 1992) that consists of hydrophilic forbs and graminoids and patchy shrubs. This community supports beachhead iris (*Iris setosa*), water horsetail (*Equisetum fluviatile*), buckbean (Menyanthes trifoliate), water sedge, tall cottongrass (*Eriophorum angustifolium*), and round sedge (*Carex rotundata*). Other species include Canadian burnet (*Sanguisorba canadensis*), bog blueberry, cloudberry (*Rubus chamaemorus*), and bog rosemary (*Andromeda polifolia*). Many of these species are wetland obligates. Sphagnum mosses (Sphagnum spp.) may be abundant, and they make up most of the total moss

cover. The ground cover also includes herbaceous litter, woody litter, and water.

Dominant plant species

- bog blueberry (*Vaccinium uliginosum*), shrub
- cloudberry (*Rubus chamaemorus*), shrub
- bog rosemary (*Andromeda polifolia*), shrub
- water sedge (*Carex aquatilis*), grass
- tall cottongrass (*Eriophorum angustifolium*), grass
- round sedge (*Carex rotundata*), grass
- beachhead iris (*Iris setosa*), other herbaceous
- water horsetail (*Equisetum fluviatile*), other herbaceous
- buckbean (*Menyanthes trifoliata*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Pathway 1.1A
Community 1.1 to 1.2

Tealeaf willow/water sedge-cottongrass

Water sedge-tall cottongrass/horsetail-beachhead iris

Areas with a raised water table often experience surface ponding throughout the growing season. A raised water table may be the result of increased overflow and/or throughflow due to an increase in precipitation or run-off from upslope areas.

Pathway 1.2A
Community 1.2 to 1.1

Water sedge-tall cottongrass/horsetail-beachhead iris

Tealeaf willow/water sedge-cottongrass

A lowered water table allows slower growing and less hydrophytic shrubs to expand. This could be the result of decreased in flow from upslope positions or from a buildup in organic matter in the site.

Additional community tables

Inventory data references

Modal points for Community 1.1
09BL10103
09BL10104

Modal points for Community 1.2
08SS08303
08LL05805
10TD09202

References

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Approval

Kirt Walstad, 2/13/2024

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	05/12/2025
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:**
