USDA Natural Resources Conservation Service

Ecological site XA232X01Y212
Boreal Sedge Peat Terrace Depressions

Last updated: 5/18/2020
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): 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 lowlands LRU.

Classification relationships

Yukon Flats Lowlands MLRA.

Ecological site concept

This ecological site is associated with drainageways on stream terraces in the Yukon Flats Lowlands MLRA. Associated drainageways have a water table ponded over the soil surface for the entire growing season and are considered very poorly drained. The soils associated with the reference plant community phase lack permafrost at depth.

The reference plant community is characterized as subarctic lowland sedge wet meadow (Viereck et al. 1992) and is composed primarily of water sedge (*Carex aquatilis*). Other commonly observed species include a mixture of willows (Salix spp.), bluejoint (Calamagrostis canadensis), Northwest Territory sedge (*Carex utriculata*), marsh cinquefoil (Comarum palustre), and water horsetail (Equisetum fluviatile).

Associated sites

XA232X01Y218	**Boreal Woodland Loamy Frozen Terraces** This ecological site is associated with wet soils on the tread of stream terraces in Yukon Flats Lowlands MLRA. Soils generally have permafrost at moderate depth (20 to 40 inches) and pond occasionally for long durations of time. The reference plant community is characterized as a needleleaf woodland (10 to 25 percent cover; Viereck et al. 1992) composed of black spruce (Picea mariana) and white spruce (Picea glauca).
XA232X01Y219	**Boreal Forest Loamy Terraces Moist** This ecological site is associated with somewhat poorly to moderately well drained soils on the treads of stream terraces in the Yukon Flats Lowlands MLRA. Flooding frequency ranges from rare to none. The reference plant community is characterized as an open needleleaf forest (25 to 60 percent cover) primarily composed of mature white spruce (Picea glauca).
XA232X01Y221	**Boreal Forest Loamy Terraces** This ecological site is associated with moderately well to well drained soils on the tread of stream terraces in the Yukon Flats Lowlands MLRA. Flooding frequency ranges from rare to none. The reference plant community is characterized as an open needleleaf forest (25 to 60 percent cover) primarily composed of mature white spruce (Picea glauca).
XA232X01Y250	**Boreal Woodland Gravelly Terraces Dry** This ecological site is associated with somewhat excessively drained soils on the tread of gravelly stream terraces in Yukon Flats Lowlands MLRA. Gravelly horizons occur at very shallow depth (0 to 10 inches). The reference plant community is characterized as a needleleaf woodland (10 to 25 percent cover; Viereck et al. 1992) composed primarily of mature white spruce (Picea glauca).
XA232X01Y262	**Boreal Woodland Gravelly Terraces** This ecological site is associated with wet soils on the tread of gravelly stream terraces in the lowlands region of the Yukon Flats Lowlands MLRA. Gravelly horizons range from very shallow to shallow depths (0 to 20 inches) and soils lack permafrost at depth. The pH of soil horizons commonly range from neutral to moderately alkaline, which leads to diverse species assemblages. The reference plant community phase is characterized as a needleleaf woodland (10 to 25 percent cover; Viereck et al. 1992) composed primarily of black spruce (Picea mariana) and white spruce (Picea glauca).
XA232X01Y222	**Boreal Graminoid Loamy Terrace Depressions** This ecological site is associated with closed depressions of stream terraces that support a reference state with multiple graminoid-dominant community phases. These depressions are considered closed because they are not associated with a flood regime and have limited, if any, groundwater flow or recharge. The presumed hydrological inputs for this ecological site are primarily thaw of the annual active soil layer and/or permafrost, snowmelt runoff, and precipitation. This hydrologic regime results in the development of sodic soil properties.
XA232X01Y223	**Boreal Scrub Loamy Frozen Terrace Depressions** This shrubby ecological site occurs in the transitional area between the forested tread of a stream terrace and the graminoid-dominant communities associated with closed, terrace depressions (ecological site R232XY222AK). This site typically occurs between the outer third and lip of these closed depressions. The reference plant community for ecological site is characterized as an open tall scrubland (Viereck et al. 1992) and those shrubs are primarily an assortment of willow (Salix spp.).
XA232X01Y229	**Boreal Scrub Loamy Terrace Swales** This ecological site is associated with swales on stream terraces in lowlands region of the Yukon Flats Lowlands MLRA. Associated soils are considered very poorly drained. The reference plant community is characterized as open tall scrub (Viereck et al. 1992) and the dominant shrubs are willow (Salix spp.) and shrub birch (Betula glandulosa).

Similar sites

XA232X01Y209	**Boreal Tussock Loamy Frozen Terraces** XA232X01Y209 is characterized as open low mixed shrub-sedge tussock bog (Viereck et al. 1992). Tussocks (formed by Carex bigelowii and Eriophorum vaginatum) are common and abundant.
XA232X01Y222	**Boreal Graminoid Loamy Terrace Depressions** XA232X01Y222 has a plant community that ponds for extensive periods of time dominated by a mixture of sedges. However, this ecological site is associated with closed terrace depressions. Marsh cinquefoil, water horsetail, and water hemlock (Cicuta spp.) are not commonly observed.
XA232X01Y205	**Boreal Grass Loamy Flood Plain Depressions** XA232X01Y205 has a plant community that ponds for extensive periods of time dominated by a mixture of sedges. However, this ecological site is associated with closed flood plain depressions.

Figure 1. Plant communities associated with swales (XA232X01Y229) commonly occur on the edge of drainageways in the Yukon Flats Lowlands MLRA.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Carex aquatilis* (2) *Carex utriculata*

Legacy ID

R232XY212AK

Physiographic features

Drainageways and swales (XA232X01Y229) are both depressional features common on stream terraces in the Yukon Flats Lowlands MLRA. Unlike drainageways, swales lack clearly defined channels. While both landforms are depressional features, swales and drainageways have different plant communities. Drainageways are sedge dominant, while swales are shrub birch (*Betula glandulosa*) and willow dominant. In the Yukon Flats Lowlands, swales appear to commonly funnel overland and subsurface water into drainageways. In addition, swale plant communities often occur on the edge of drainageway plant communities.

This ecological site has three associated soil components that occur in different regions of the Yukon Flats Lowlands MLRA. Soils associated with rivers that are currently or have previously been glacially fed have different characteristics than those associated with nonglacial rivers in this MLRA. For instance, glacial rivers that flow out of the southern foothills of the Brooks Range (e.g., Sheenjek River) have created large gravelly stream terraces north of the Yukon River. The soils on these terraces tend to have a sandy and gravelly substratum (Typic Cryaquents, gravelly substratum soils). Nonglacial rivers that flow out of the Yukon-Tanana Plateau (e.g., Beaver Creek) have

formed numerous terrace levels south of the Yukon River. The soils on these terrace levels have a loamy substratum (Typic Cryohemists and Typic Cryaquents, loamy soils).

During initial work on the soil survey, each soil type originally had a correspondingly unique ecological site. After more fieldwork and data analysis, it was determined that these wide-ranging soils each appear to support plant communities that have similar kinds and amounts of vegetation in the reference state. As a result, the soil components were all correlated into one ecological site.

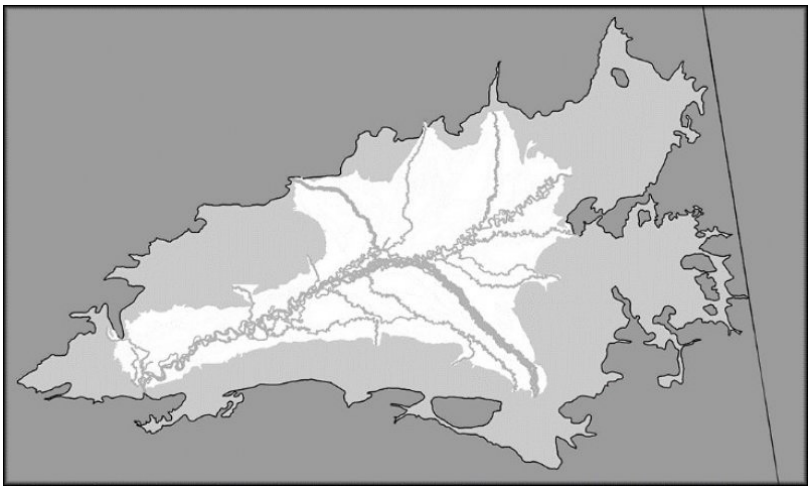

Figure 2. Lowlands region (white) and marginal uplands region (light gray) of the Yukon Flats Lowlands MLRA.

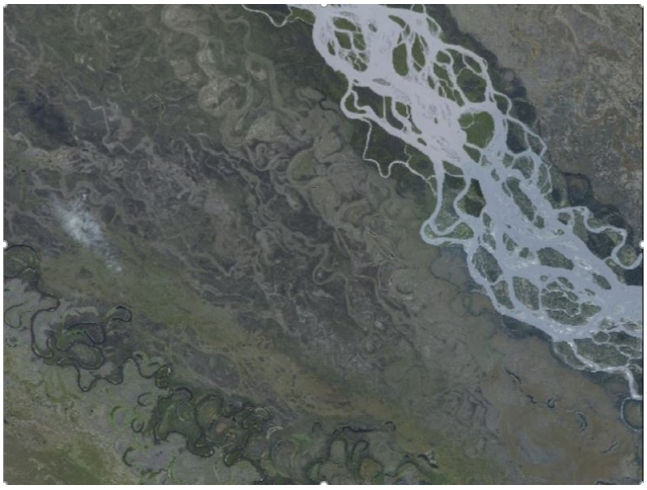

Figure 3. Aerial image showing a complex of drainageways and swales adjacent to Birch Creek and the Yukon River in the Yukon Flats Lowlands MLRA.

Table 2. Representative physiographic features

Geomorphic position, terraces	(1) Tread
Landforms	(1) Alluvial plain > Drainageway
Flooding frequency	Rare
Ponding duration	Very long (more than 30 days)
Ponding frequency	Frequent
Elevation	300–1,000 ft
Slope	0–1%
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).

All of the tabular data below was calculated from the PRISM dataset (1971-2000) and is specific to the Lowlands LRU in the Yukon Flats Lowlands MLRA.

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)	8-13 in
Frost-free period (average)	75 days
Freeze-free period (average)	
Precipitation total (average)	10 in

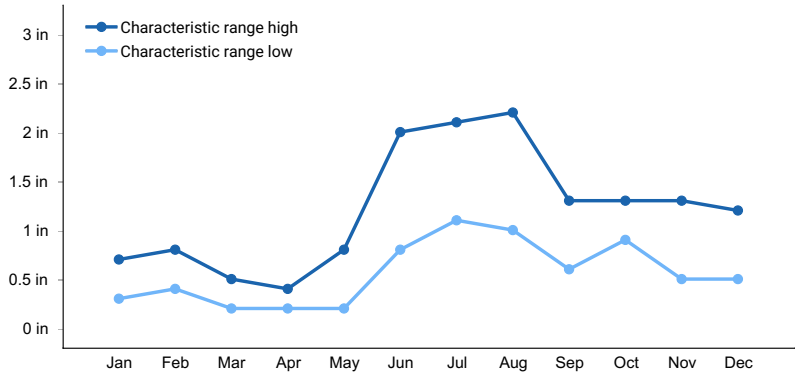

Figure 4. Monthly precipitation range

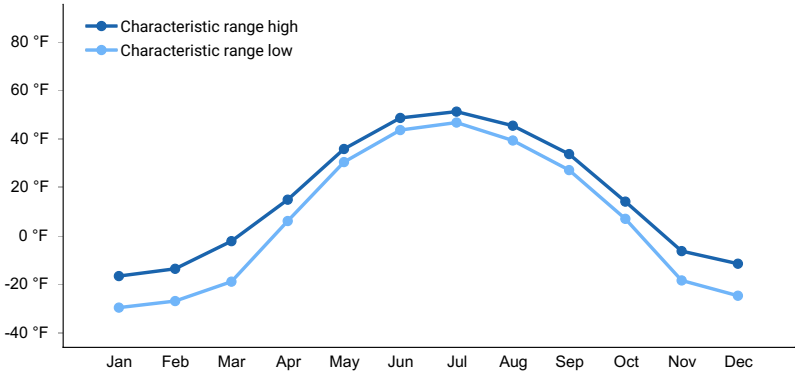

Figure 5. Monthly minimum temperature range

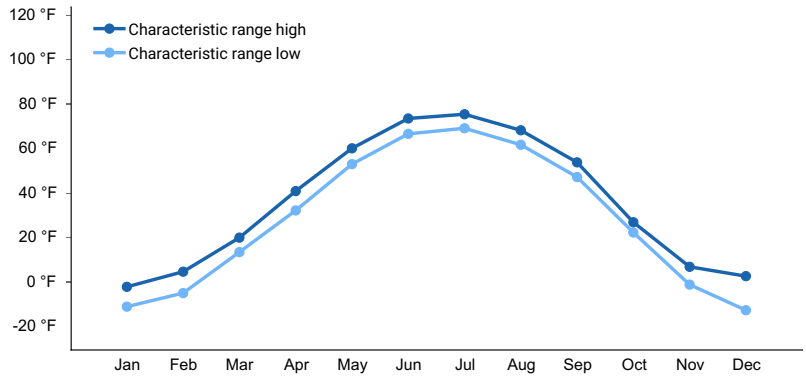

Figure 6. Monthly maximum temperature range

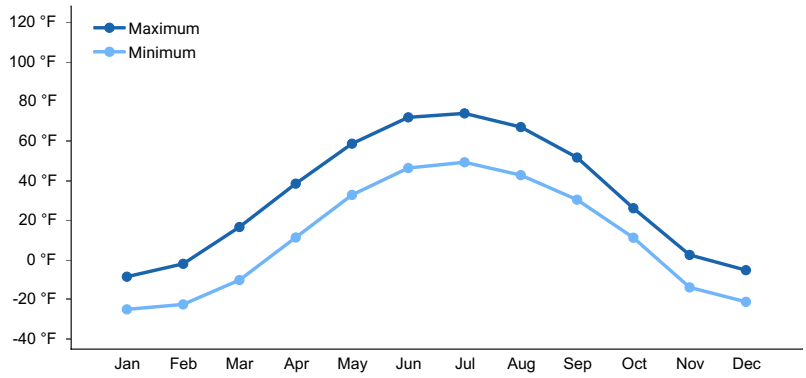

Figure 7. Monthly average minimum and maximum temperature

Influencing water features

Ponding of water over the soil surface occurs continuously throughout the growing season for very long durations of time. Ponding duration and the typical depth to the water table was determined through field observations.

Due to the depth and persistence of this water table, wetland indicator plants are commonly observed in the reference state.

Soil features

Correlated soil components for the Yukon Flats Areas, Alaska soil survey (AK685): Typic Cryaquents, gravelly substratum; Typic Cryaquents, loamy; Typic Cryohemists.

Figure 8. Typical soil profile associated with Typic Haplowassists soil component.

Table 4. Representative soil features

Parent material	(1) Organic material (2) Alluvium
Family particle size	(1) Coarse-loamy (2) Loamy-skeletal
Drainage class	Very poorly drained
Soil depth	80 in

Ecological dynamics

Flooding

This ecological site is associated with drainageways of certain stream terraces that are thought to rarely flood. Historical flood markers in Fort Yukon and aerial observations conducted by U.S. Fish and Wildlife Service staff (personal communication) have shown that flooding occurs on terraces that support this ecological site.

While conducting fieldwork, little if any evidence of flood-related disturbance was observed. Thus, no flood-related plant communities were developed for this ecological site. A flood event in areas associated with this ecological site likely has limited energy, depositing alluvium on the soil surface but causing minimal alterations to overall composition of the plant community.

Other Observations

The majority of sample locations had no documented animal use (grazing or browsing). On occasion, sedges were reported to be grazed by waterfowl and willow browsed by moose. In both instances, animal use appeared limited.

No alternative states for this ecological site were documented.

State and transition model

Ecosystem states

1. Reference

State 1 submodel, plant communities

1.1. Sedge / marsh cinquefoil-water horsetail

State 1
Reference

Figure 9. Aerial image of a stream terrace in the Yukon Flats Lowlands MLRA. This ecological site is associated with drainageways on stream terraces.

The reference state has one associated plant community. Plant communities in the reference state appear to be largely controlled by the influences of ponding. This report provides baseline vegetation inventory data for the ecological site. 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 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
Sedge / marsh cinquefoil-water horsetail

Figure 10. Typical plant community associated with community 1.1.

Community Phase 1.1 Canopy Cover Table

Vegetation data is aggregated from all sample plots for this community phase. The data 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	willow	*Salix spp.*	SALIX	80	4 (0-30)
G	sedge	*Carex spp.*	CAREX	100	70 (40-90)
G	bluejoint	*Calamagrostis canadensis*	CACA4	40	3 (0-30)
G	cottongrass	*Eriophorum spp.*	ERIOP	30	1 (0-7)
G	Northwest Territory sedge	*Carex utriculata*	CAUT	25	8 (0-60)
F	marsh cinquefoil	*Comarum palustre*	COPA28	75	2 (0-10)
F	water horsetail	*Equisetum fluviatile*	EQFL	55	8 (0-50)
F	water hemlock	*Cicuta spp.*	CICUT	30	0.1 (0-5)

This dataset includes data from 20 sample plots. The plots are distributed across the survey area and are independent of one another.

Values for tall, medium, regenerative, and stunted tree strata are used to calculate mean canopy cover and range values. Regenerative trees are not considered part of the overstory canopy.

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 11. Canopy cover table for community 1.1.

Reference plant community 1.1 is characterized as subarctic lowland sedge wet meadow. Commonly observed species include willow (primarily *Salix pulchra*), sedge (primarily *Carex aquatilis* and *Carex utriculata*), bluejoint, marsh cinquefoil, and water horsetail. The soil surface is primarily covered with herbaceous litter, which is often covered with water. In certain sample locations, moss is abundant. The vegetative strata that characterize this plant community are medium graminoids (between 4 and 24 inches in height) and tall graminoids (greater than 24 inches in height).

Dominant plant species

- tealeaf willow (*Salix pulchra*), shrub
- willow (*Salix*), shrub
- water sedge (*Carex aquatilis*), grass
- Northwest Territory sedge (*Carex utriculata*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- cottongrass (*Eriophorum*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous
- water horsetail (*Equisetum fluviatile*), other herbaceous
- water hemlock (*Cicuta*), other herbaceous

Additional community tables

Inventory data references

NASIS User Site ID / Modal Datasets
10BB03703 plant community 1.1
10BB01601 plant community 1.1
10BB01801 plant community 1.1
10BB03802 plant community 1.1
11SN02801 plant community 1.1
11TD08704 plant community 1.1

11BB05404 plant community 1.1
12NR02204 plant community 1.1
12NR00901 plant community 1.1
12NR01203 plant community 1.1
12NR01702 plant community 1.1
12TR00801 plant community 1.1
11BB05904 plant community 1.1
11BB06004 plant community 1.1
11BB06401 plant community 1.1
2015AK290637 plant community 1.1
2015AK290639 plant community 1.1
2015AK290457 plant community 1.1
2015AK290411 plant community 1.1
2015AK290995 plant community 1.1

Other references

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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 T. 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:**

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:**
