

# Ecological site R236XY133AK

## Subarctic Graminoid Loamy Tidal Coastal Plains

Last updated: 2/13/2024  
Accessed: 05/16/2024

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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): 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 foothills. 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 foothills. 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).

### Classification relationships

Alaska Vegetation Classification:

Mesic graminoid herbaceous (III.A.2 - level III) / Bluejoint-herb community (III.A.2.b - level IV)

(Viereck et al., 1992)

### Ecological site concept

This ecological site is on linear tidal flats of the coastal plain shore complex. Site elevation is between sea level to 30 feet. Slopes are nearly level. Site and soil hydrology are the major influencers of vegetation on this site. Soils are poorly drained and a water table is present throughout the growing season. Flooding from tidal events and storms introduce salt and brackish water to this site, significantly influencing the vegetation here.

The reference state supports two communities. The reference plant community is characterized as mesic graminoid herbaceous meadow (Viereck et al., 1992). It is composed of one or more grass species with mixed forbs throughout. Microtopographic lows and areas closest to the sea are generally wetter than the reference state, and supports primarily obligate wetland species tolerant to higher salt concentrations.

## Associated sites

|             |   |
|-------------|---|
| R236XY129AK | <p><b>Subarctic Low Scrub Peat Coastal Plains</b></p> <p>Both sites are part of the coastal plain shore complex. R236XY129AK describes scrub marshes associated with organic Histosols. Those scrub marshes typically have water at the surface. R236XY133AK supports primarily herbaceous species on minimally developed silt loam Entisols.</p> |
|-------------|---|

## Similar sites

|             |  |
|-------------|--|
| R236XY135AK | <p><b>Western Alaska Maritime Scrub Loamy Plains, Coastal</b></p> <p>Both sites are part of the coastal plain and support large populations of herbaceous species. R236XY135AK is better drained and only has a water table at the beginning of the growing season. It supports willows, which are not present in R236XY133AK.</p> |
|-------------|--|

**Table 1. Dominant plant species**

|            |   |
|------------|---|
| Tree       | Not specified   |
| Shrub      | Not specified   |
| Herbaceous | (1) <i>Calamagrostis canadensis</i><br>(2) <i>Leymus mollis</i> |

## Physiographic features

This site is on linear tidal flats of the coastal plain shore complex. Elevation ranges from sea level to 30 feet. Slopes are nearly level (0 – 1 percent). Flooding is very frequent and coincides with tidal inundation. Ponding is occasional and brief and is more common in low-lying areas of this site. This site is found at all aspects.

**Table 2. Representative physiographic features**

|                    |  |
|--------------------|--|
| Landforms          | (1) Coastal plain > Tidal flat<br>(2) Shore complex > Tidal flat |
| Runoff class       | Negligible to low  |
| Flooding frequency | Very frequent  |
| Ponding duration   | Brief (2 to 7 days)  |
| Ponding frequency  | Occasional   |
| Elevation          | 0–9 m  |
| Slope              | 0–1%   |
| Water table depth  | 0 cm   |
| Aspect             | W, NW, N, NE, E, SE, S, SW                                       |

**Table 3. Representative physiographic features (actual ranges)**

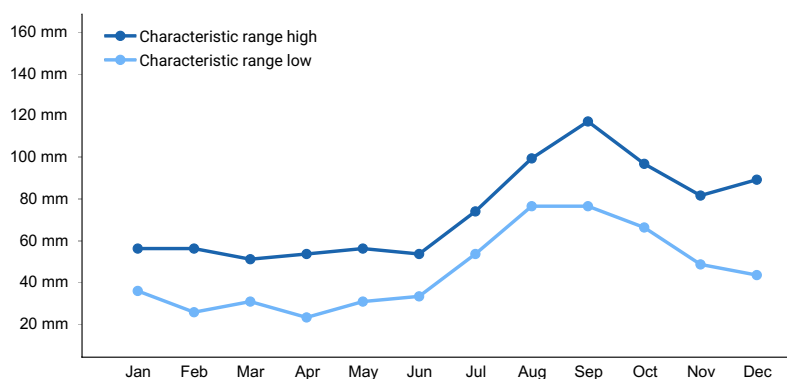
|                    |                           |
|--------------------|---------------------------|
| Runoff class       | Negligible to medium      |
| Flooding frequency | Frequent to very frequent |
| Ponding duration   | Brief (2 to 7 days)       |
| Ponding frequency  | Occasional                |
| Elevation          | 0–85 m                    |
| Slope              | 0–3%                      |
| Water table depth  | 0 cm                      |

## Climatic features

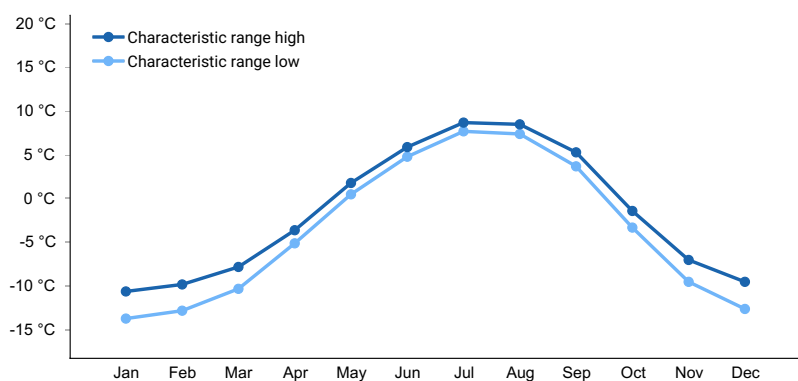
The climate of this site reflects that of the MLRA, which is described as maritime polar (EPA, 2013). Temperatures are moderated by the nearby Bristol Bay and northern Pacific bodies of water. Annual precipitation ranges from 21 – 34 inches with approximately 40 percent occurring during the June-September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

**Table 4. Representative climatic features**

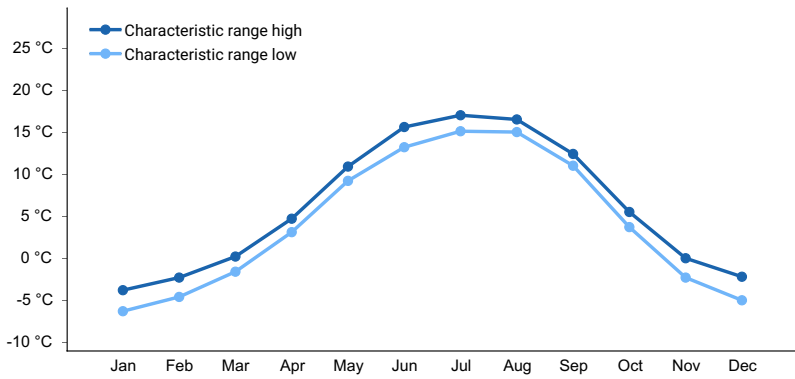
|  |              |
|--|--------------|
| Frost-free period (characteristic range)   | 75-100 days  |
| Freeze-free period (characteristic range)  | 65-90 days   |
| Precipitation total (characteristic range) | 533-864 mm   |
| Frost-free period (actual range)           | 75-100 days  |
| Freeze-free period (actual range)          | 65-90 days   |
| Precipitation total (actual range)         | 381-1,041 mm |
| Frost-free period (average)                | 90 days      |
| Freeze-free period (average)               | 75 days      |
| Precipitation total (average)              | 737 mm       |



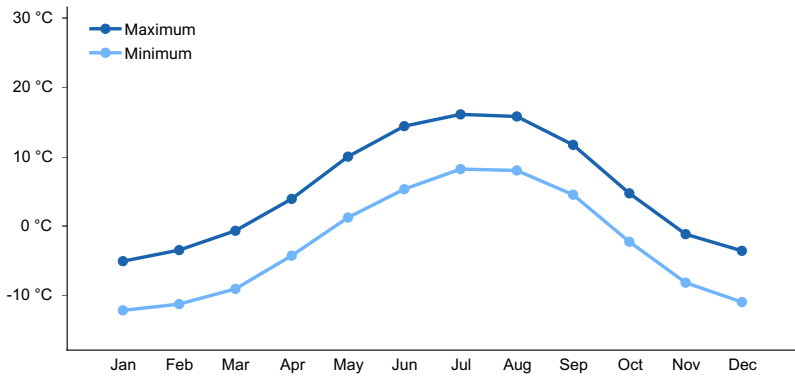
**Figure 1. Monthly precipitation range**



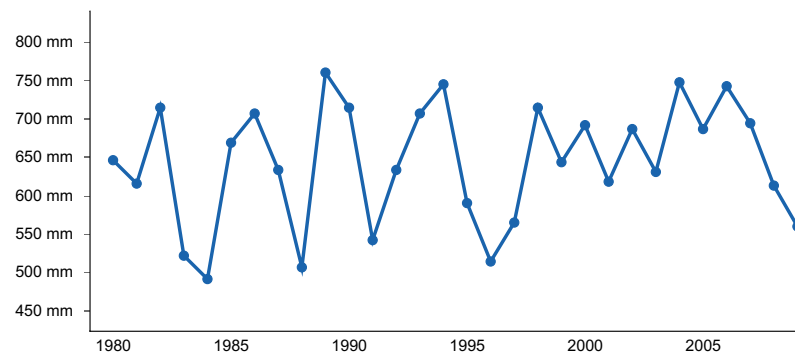
**Figure 2. Monthly minimum temperature range**



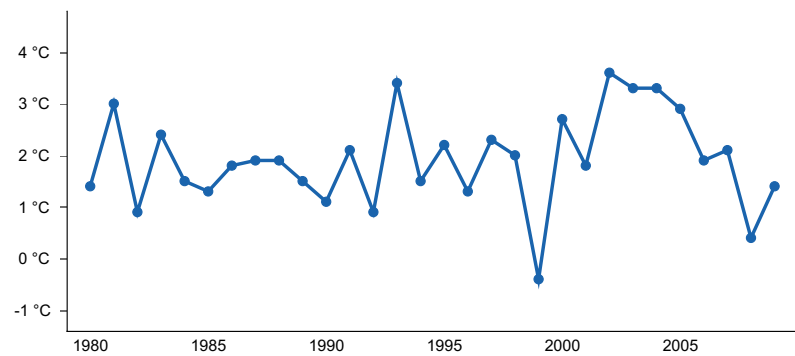
**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

## Influencing water features

This site is flooded and ponded. Very frequent flooding restricts vegetation to facultative to obligate wetland species that are tolerant of saltwater and salt spray. Freshwater is delivered to this system from upstream areas that dissect the coastal plain. Saltwater inundation is common, especially at lower elevations nearest the coast.

## Soil features

Soils are minimally developed Entisols (Soil Survey Staff, 2013). They are very deep and very poorly drained. They support a cryic temperature regime and a peraquic moisture regime. Parent material is composed of marine deposits.

Hydrology is the main soil characteristic affecting vegetation. A water table is present at the soil surface throughout the growing season. Aquic conditions are present between 5 and 72 inches. These soil conditions restrict vegetation to facultative to obligate wetland species.

Correlated soil components in MLRA 236:

Mudie

D36-Western maritime grass silty coastal plains

E36-Maritime wet meadow-silty low coastal plains

**Table 5. Representative soil features**

|  |                     |
|--|---------------------|
| Parent material  | (1) Marine deposits |
| Surface texture  | (1) Silt loam       |
| Drainage class   | Very poorly drained |
| Permeability class                                       | Moderate            |
| Soil depth   | 152 cm              |
| Surface fragment cover <=3"                              | 0%                  |
| Surface fragment cover >3"                               | 0%                  |
| Available water capacity<br>(0-25.4cm)                   | 2.29–4.06 cm        |
| Soil reaction (1:1 water)<br>(0-25.4cm)                  | 6–7.3               |
| Subsurface fragment volume <=3"<br>(Depth not specified) | 0%                  |
| Subsurface fragment volume >3"<br>(Depth not specified)  | 0%                  |

**Table 6. Representative soil features (actual values)**

|  |                     |
|--|---------------------|
| Drainage class   | Very poorly drained |
| Permeability class                                       | Slow to moderate    |
| Soil depth   | 152 cm              |
| Surface fragment cover <=3"                              | 0%                  |
| Surface fragment cover >3"                               | 0%                  |
| Available water capacity<br>(0-25.4cm)                   | 2.29–9.14 cm        |
| Soil reaction (1:1 water)<br>(0-25.4cm)                  | 6–7.3               |
| Subsurface fragment volume <=3"<br>(Depth not specified) | 0%                  |
| Subsurface fragment volume >3"<br>(Depth not specified)  | 0%                  |

## Ecological dynamics

This site is on linear tidal flats of the coastal shore complex. Local site factors, including microtopographic elevation,

soil characteristics, and area hydrologic dynamics create two vegetative communities. The reference plant community is a mesic graminoid herbaceous mixed meadow. Vegetation is restricted to salt-tolerant species and both communities are comprised of facultative to obligate wetland species.

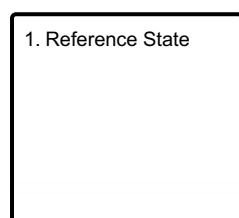
Spatial and temporal patterns in site hydrology support two communities. Microtopographic lows and areas closest to the sea are identified as wetter areas on this site and are more likely to pond, supporting community 1.2. Flooding and ponding events and relative water table depths are susceptible to changes in tidal flooding and drainage patterns, storm scouring, and soil development.

This site is not susceptible to fire disturbance. Grazing is noted on grasses and sedges in both communities and does not appear to affect the ecological processes of this site.

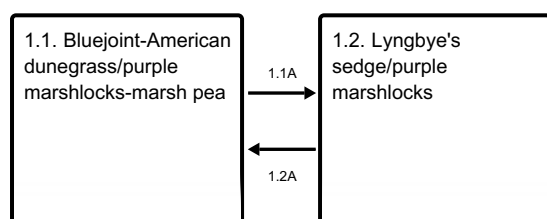
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant 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, decreased drainage

1.2A - Lowered water table, increased drainage

## 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 grassland. The presence of each community is dictated temporally by a disturbance regime of frequent flooding. This report provides baseline inventory data for the vegetation in the ecological site. 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 Bluejoint-American dunegrass/purple marshlocks-marsh pea



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) |
|-------------|--------------------|---------------------------------|-----------------|---------------------|-----------------------------|
| G           | Bluejoint grass    | <i>Calamagrostis canadensis</i> | CACA4           | 80                  | 40                          |
| G           | Lyngbye's sedge    | <i>Carex lyngbyei</i>           | CALY3           | 60                  | 3                           |
| G           | American dunegrass | <i>Leymus mollis</i>            | LEMO8           | 40                  | 40                          |
| F           | Purple marshlocks  | <i>Comarum palustre</i>         | COPA28          | 80                  | 5                           |
| F           | Marsh pea          | <i>Lathyrus palustris</i>       | LAPA4           | 80                  | 2                           |
| F           | Marsh willowherb   | <i>Epilobium palustre</i>       | EPPA            | 60                  | Trace                       |

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

The reference plant community phase is mesic graminoid herbaceous (Vioreck et al., 1992). This community consists of bluejoint (*Calamagrostis canadensis*), American dunegrass (*Leymus mollis*), purple marshlocks (*Comarum palustre*), and marsh pea (*Lathyrus palustris*). Other species extant in this community include Lyngbye's sedge (*Carex lyngbyei*), wideleaf polargrass (*Arctagrostis latifolia*), and marsh willowherb (*Epilobium palustre*). A low concentration of mosses typically is present. The ground cover includes herbaceous litter and water. Some areas are bare soil.

### Dominant plant species

- bluejoint (*Calamagrostis canadensis*), grass
- Lyngbye's sedge (*Carex lyngbyei*), grass
- American dunegrass (*Leymus mollis*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous
- marsh pea (*Lathyrus palustris*), other herbaceous
- marsh willowherb (*Epilobium palustre*), other herbaceous

## Community 1.2

### Lyngbye's sedge/purple marshlocks



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) |
|-------------|------------------------|-------------------------|-----------------|---------------------|-----------------------------|
| G           | Lyngbye's sedge        | <i>Carex lyngbyei</i>   | CALY3           | 100                 | 80                          |
| G           | Largeflower spargrass  | <i>Poa eminens</i>      | POEM            | 100                 | Trace                       |
| G           | Lesser saltmarsh sedge | <i>Carex glareosa</i>   | CAGL4           | 50                  | Trace                       |
| F           | Purple marshlocks      | <i>Comarum palustre</i> | COPA28          | 50                  | 10                          |

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

The early community phase is a wet graminoid herbaceous meadow (Vioreck et al., 1992). This community consists of dense Lyngbye's sedge and purple marshlocks. Other species may include bluejoint, largeflower spargrass (*Poa eminens*), lesser saltmarsh sedge (*Carex glareosa*), and fourleaf mare's-tail (*Hippuris tetraphylla*). Mosses and lichens are not in this saline plant community. The ground cover commonly includes herbaceous litter and surface water. Some areas are bare soil.

### Dominant plant species

- Lyngbye's sedge (*Carex lyngbyei*), grass
- largeflower spargrass (*Poa eminens*), grass
- lesser saltmarsh sedge (*Carex glareosa*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous

### Pathway 1.1A

#### Community 1.1 to 1.2



Bluejoint-American dune grass/purple marshlocks-marsh pea



Lyngbye's sedge/purple marshlocks

A rise in the relative water table or increased ponding duration can cause a community shift towards more obligate wetland species. An increase in the water table can result from increased upstream precipitation in an area. It could also be the result of soil scouring and removal during winter storm surges. Increased ponding may be the result of a shift in tidal flat microtopography, where shifting drainages cut off an existing outlet and cause an area to pond.



Lower areas are naturally more likely to pond and support community 1.2.

## Pathway 1.2A Community 1.2 to 1.1



Lyngbye's sedge/purple marshlocks



Bluejoint-American dunegrass/purple marshlocks-marsh pea

A decrease to the relative water table or decreased ponding duration can cause a community shift towards more facultative wetland species. The water table may decrease as a result of decreased upstream precipitation. It can also result from the build-up and development of the soil profile. Area microtopography may also change as the drainage patterns of the tidal flats shift over time, eventually draining ponded areas.

## Additional community tables

### Inventory data references

Modal points for Community 1.1

07CS01203

07AO01303

07MM01506

Modal points for community 1.2

07CS01201

07CS16001

## References

Viereck, L.A., C. T. Dyrness, A. R. Batten, and K. J. Wenzlick. 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..

## Other references

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PRISM Climate Group. (PRISM) Oregon State University. <https://prism.oregonstate.edu>. Date created October 2018. Accessed 3 Mar 2023.

Scenarios Network for Alaska and Arctic Planning (SNAP). Historical Monthly Temperature – 1km, 1901-2009. <http://ckan.snap.uaf.edu/dataset/>. Accessed 20 Mar 2023.

Scenarios Network for Alaska and Arctic Planning (SNAP). Historical monthly and derived precipitation products downscaled from CRU TS data via the delta methods – 2km, 1901-2009. <http://ckan.snap.uaf.edu/dataset/>. Accessed 20 Mar 2023.

Soil Survey Staff. 2013. Simplified Guide to Soil Taxonomy. USDA-Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

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 Agriculture Handbook 296.

## Contributors

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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  | 05/16/2024        |
| Approved by                                 | Kirt Walstad      |
| 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:**

- 
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:**

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**17. Perennial plant reproductive capability:**

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