USDA Natural Resources
Conservation Service

Ecological site R236XY129AK
Subarctic Low Scrub Peat Coastal Plains

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

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 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).

Classification relationships

Alaska Vegetation Classification:
Open low scrubland (II.C.2 - level III) / Sweetgale-graminoid bog (II.C.2.j- level IV)
(Viereck et al., 1992)

Ecological site concept

This ecological site is on coastal plain tidal marshes. Site elevation is at or near sea level. Slopes are nearly level. Site hydrology, as influenced by aquic soil conditions, a very shallow water table, and flooding and ponding shape the vegetation on this landform. Further, brackish water intrusion also affects the species found on this site.

The reference state supports two communities. The reference plant community is characterized as an open low scrubland (Viereck et al., 1992). It is composed of a mix of hydrophytic shrubs species with facultative to obligate wetland graminoids and forbs throughout. The presence of surface water is a strong indicator of this site on the coastal plain complex. Lower lying areas on this site are commonly wetter, and support more herbaceous species and less shrubs than the reference plant community.

Associated sites

R236XY133AK	**Subarctic Graminoid Loamy Tidal Coastal Plains** Both sites are part of the coastal plain complex. R236XY129AK defines the tidal marshes. Brackish water influences the vegetation. The soil in this site supports a thick organic layer comprised of fibric material, which isn't found in R236XY133AK. R236XY133AK is found at slightly higher positions on the coastal plain.
R236XY135AK	**Western Alaska Maritime Scrub Loamy Plains, Coastal** Both sites are on the coastal plain complex. R236XY135AK is associated with Entisols on plain talfs. They lack the organic material associated with soils correlated to R236XY129AK. R236XY135AK supports less hydrophytic species, as the soil is better drained and it does not support a water table throughout the growing season.
R236XY170AK	**Subarctic Graminoid Loamy Coastal Plain Rises** Both sites are part of the coastal plain complex. R236XY170AK describes the driest areas of the complex, where less hydrophytic vegetation is dominant. Flooding is rare, ponding is absent, and there is no water table present throughout most of the year.

Similar sites

R236XY135AK	**Western Alaska Maritime Scrub Loamy Plains, Coastal** Both sites are on the coastal plain complex. Both sites are associated with aquic soils and support a mix of facultative wet to obligate wetland species. This site supports a thick, organic soil which is not found in R236XY135AK. Vegetation is also different as this site is under greater influence from brackish water incursion and salt spray.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Myrica gale* (2) *Betula nana*
Herbaceous	(1) *Comarum palustre* (2) *Carex lyngbyei*

Physiographic features

This site is on frequently flooded tidal marshes on coastal plains. Elevation is at or just above sea level. Slopes are mostly level. This site is found at all aspects. Surface water is often present due to frequent flooding.

Table 2. Representative physiographic features

Geomorphic position, flats	(1) Talf
Landforms	(1) Coastal plain > Coastal plain (2) Coastal plain > Tidal marsh
Runoff class	Negligible
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Frequent
Ponding duration	Not specified
Ponding frequency	None
Elevation	0–9 m
Slope	0%
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 low
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Rare to frequent
Ponding duration	Very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	0–9 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 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)	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

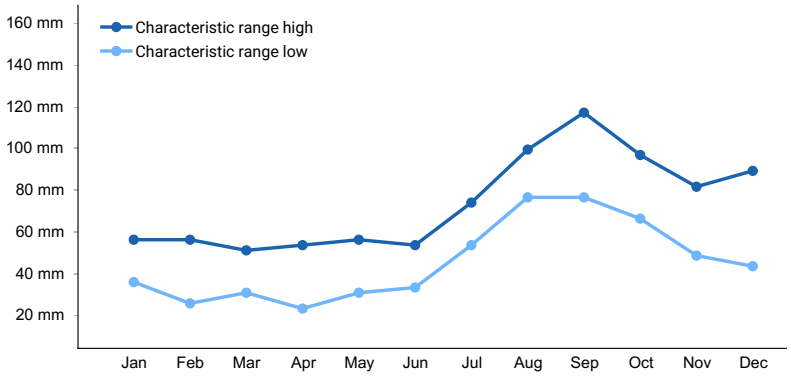


Figure 1. Monthly precipitation range

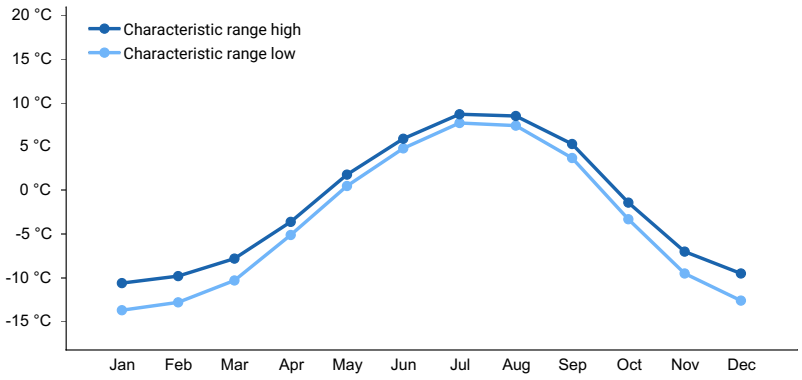


Figure 2. Monthly minimum temperature range

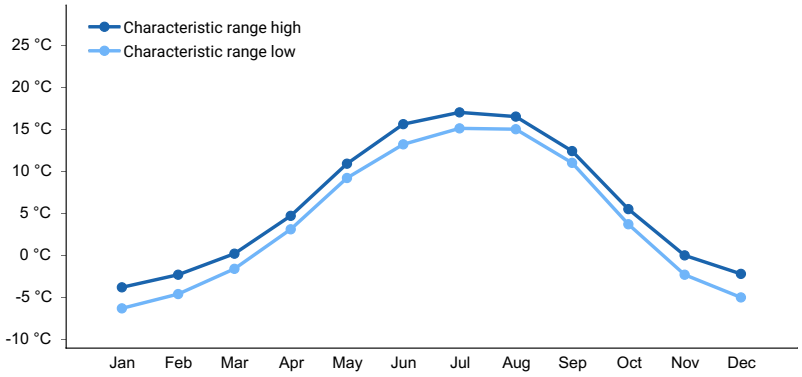


Figure 3. Monthly maximum temperature range

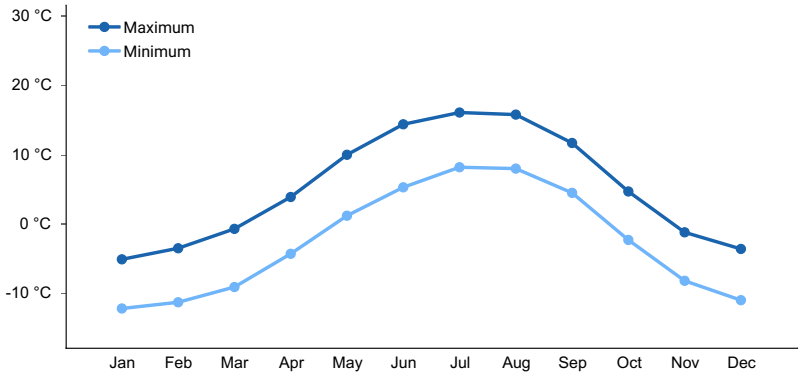


Figure 4. Monthly average minimum and maximum temperature

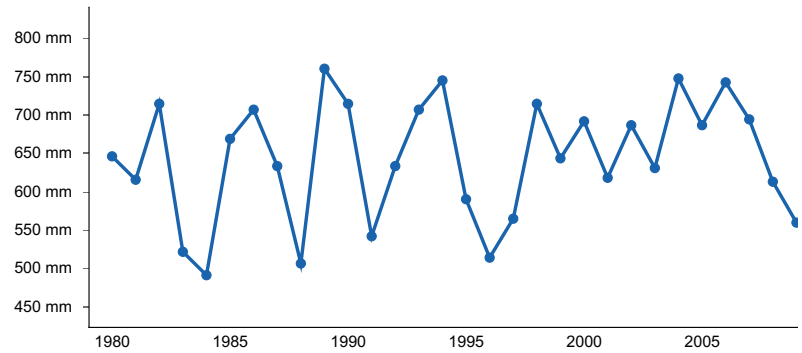


Figure 5. Annual precipitation pattern

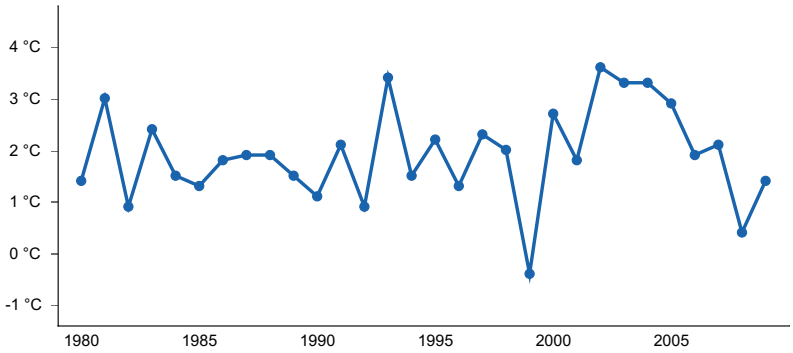


Figure 6. Annual average temperature pattern

Influencing water features

This site is influenced by frequent flooding. The flood source may be riverine or coastal. Water is typically present on or at the soil surface throughout the year. This restricts vegetation to primarily facultative wet to obligate wetland species. Lower lying areas of this site support more herbaceous species and less shrubs.

Soil features

These organic soils are cold and minimally decomposed Cryofibrists (Soil Survey Staff, 2013). Soils are very deep and very poorly drained. They support a cryic temperature regime and an aquic or peraquic moisture regime. Parent material is organic material over marine deposits.

Soil hydrology is a major driver of plant community composition. This peaty soil has slightly decomposed fibric soil materials in the top 28 inches. These materials generally have a high water content (Soil Survey Staff, 2013). Aquic conditions are present throughout the profile. A water table is present at the soil surface throughout the year, limiting vegetation to facultative wet to obligate wetland species.

Correlated soil components in MLRA 236: Picnicpoint, Sheepisland, E36-Maritime sedge-sphagnum-organic depressions

Table 5. Representative soil features

Parent material	(1) Marine deposits (2) Organic material
Surface texture	(1) Peat
Drainage class	Poorly drained to very poorly drained
Permeability class	Moderate
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	7.62–14.99 cm
Soil reaction (1:1 water) (0-25.4cm)	5.1–6.1
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 6. Representative soil features (actual values)

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 (0-25.4cm)	7.62–14.99 cm
Soil reaction (1:1 water) (0-25.4cm)	5.1–7.2
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site is on frequently flooded tidal marsh coastal plains. Site hydrology, influenced by soil characteristics and flooding and ponding disturbances, shape the plant communities. The reference plant community is an open scrubland of hydrophytic shrubs with facultative wet to obligate wetland graminoids throughout.

Hydrology explains the differences between communities on this landform. The reference plant community is drier than community 1.2. Flooding is frequent but does not scour the vegetation or soil under normal conditions. Slower growing shrubs are supported in these areas. Wetter areas exclude shrubs and are dominated by graminoids.

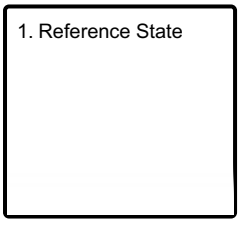
A hydrologic change can shift an area from one community to the other. A raised water table in the reference plant community increases surface ponding and kills shrubs. This is often the result of soil scouring or increased water inflow to an area. A lowered water table often leads to a more stable area where shrubs are supported. This could be due to increased drainage in the marsh or the buildup of organic soil.

There is little evidence of browsing or grazing on this site.

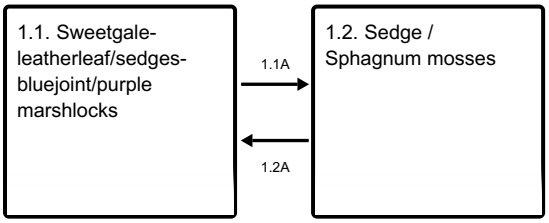
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant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

1.2A - Hydrologic shift causing a drier site and soil

State 1
Reference State

The reference state supports two community phases grouped by the structure and dominance of the vegetation (e.g., shrubs, forbs, and graminoids) and their ecological function and stability. The reference plant community is characterized by an open low scrubland comprised of facultative wet to obligate wetland shrub and graminoid species with Sphagnum moss throughout. The presence of this and related communities are dictated temporally and spatially by site-specific hydrology. All community phases in this report are characterized using the Alaska vegetation classification system (Viereck et al., 1992).

Dominant plant species

- sweetgale (*Myrica gale*), shrub
- leatherleaf (*Chamaedaphne calyculata*), shrub
- sedge (*Carex*), grass
- bluejoint (*Calamagrostis canadensis*), grass

Community 1.1
Sweetgale-leatherleaf/sedges-bluejoint/purple marshlocks

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	Sweetgale	*Myrica gale*	MYGA	100	25
S	Dwarf birch	*Betula nana*	BENA	80	9
S	Alaska bog willow	*Salix fuscescens*	SAFU	80	3
S	Leatherleaf	*Chamaedaphne calyculata*	CHCA2	70	6
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	70	15
G	Lyngbye's sedge	*Carex lyngbyei*	CALY3	50	20
F	Purple marshlocks	*Comarum palustre*	COPA28	80	15
M	Sphagnum moss	*Sphagnum spp.*	SPHAG2#	90	40

Sphagnum mosses are identified to the genus level.

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 is open low scrubland (Viereck et al., 1992) comprised of facultative or obligate wetland species. This community contains sweetgale (*Myrica gale*), dwarf birch (*Betula nana*), leatherleaf (*Chamaedaphne calyculata*), and Alaska bog willow (*Salix fuscescens*). Bluejoint (*Calamagrostis canadensis*) and various sedges (Carex spp.) are also present. Common forbs include purple marshlocks (*Comarum palustre*) and horsetails (Equisetum spp.). Mosses, particularly sphagnum mosses (Sphagnum spp.), are common as ground cover. Herbaceous litter and surface water are also common.

Dominant plant species

- sweetgale (*Myrica gale*), shrub
- Alaska bog willow (*Salix fuscescens*), shrub
- leatherleaf (*Chamaedaphne calyculata*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- Lyngbye's sedge (*Carex lyngbyei*), grass
- sedge (*Carex*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Community 1.2
Sedge / Sphagnum mosses

Figure 9. Typical area of community 1.2.

Community Phase 1.3 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	*Carex lyngbyei*	CALY3	100	30
G	Manyflower sedge	*Carex pluriflora*	CAPL6	100	15
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	80	1
G	Tall cottongrass	*Eriophorum angustifolium*	ERAN6	60	1
F	Purple marshlocks	*Comarum palustre*	COPA28	100	10
F	Marsh willowherb	*Epilobium palustre*	EPPA	80	Trace
M	Sphagnum moss	*Sphagnum spp.*	SPHAG2 #	60	35

Sphagnum mosses are identified to the genus level.

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.

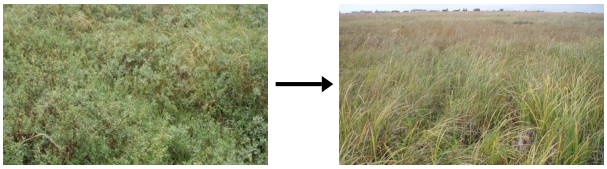
The wetter phase of this site supports a wet graminoid herbaceous meadow containing a mix of hydrophilic graminoids (Viereck et al., 1992). Common sedge species include manyflower sedge, creeping sedge (*Carex chordorrhiza*), Lyngbye's sedge (*Carex lyngbyei*), and water sedge (*Carex aquatilis*). White cottongrass (*Eriophorum scheuchzeri*) can also be present. Lyngbye's sedge is most common in areas that infiltrated by brackish water or salt spray and can make up greater than 75% of vegetative cover in these areas. Hydrophytic forbs are common, as are shrubs in small quantities. Moss cover is high and is comprised dominantly of sphagnum mosses.

Dominant plant species

- creeping sedge (*Carex chordorrhiza*), grass
- mud sedge (*Carex limosa*), grass
- Lyngbye's sedge (*Carex lyngbyei*), grass
- water sedge (*Carex aquatilis*), grass

- purple marshlocks (*Comarum palustre*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

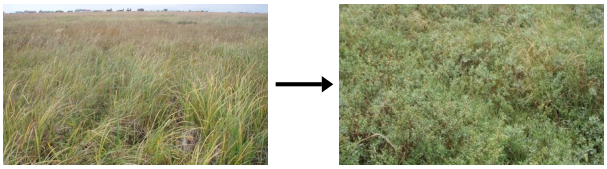
Pathway 1.1A
Community 1.1 to 1.2



Sweetgale-leatherleaf/sedges-bluejoint/purple marshlocks **Sedge / Sphagnum mosses**

This transition occurs due to increased water input on a site that temporarily or permanently raises the relative water table and increases surface ponding frequency and duration. Increased water input can be caused by greater precipitation or a local change in marsh drainage patterns. Soil erosion can also alter the relative water table depth. Continued incursion by brackish or sea water favors a community of dense Lyngbye's sedge (*C. lyngbyei*).

Pathway 1.2A
Community 1.2 to 1.1



Sedge / Sphagnum mosses **Sweetgale-leatherleaf/sedges-bluejoint/purple marshlocks**

This community pathway occurs gradually as the relative water table drops. This is usually the result of organic buildup of fibrist material in the top soil horizon. Site conditions become stable and allow slower growing shrub populations to expand.

Additional community tables

Inventory data references

Modal points for Community 1.1
07AO01301
07AO01306
07AO01503
10SS02201

Modal points for community 1.2
07SS24501
07SS09906
07CS15806
07CS16405

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

Kautz, D.R., P. Taber, and S. Nield, editors. 2012. Land Resource Regions and Major Land Resource Areas of

Alaska. United States Department of Agriculture, Natural Resources Conservation Service (USDA–NRCS).

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.

US Environmental Protection Agency (EPA). Level III Ecoregions of the Conterminous United States. UP ESP Office of Research and Development. Corvallis, OR. http://edg.epa.gov/. Created 16 Apr 2013. Accessed 20 Mar 2023.

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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:**

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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:**
