USDA Natural Resources Conservation Service

Ecological site R236XY109AK
Subarctic Low Scrub Peat Drainages

Last updated: 2/13/2024
Accessed: 05/11/2025

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).

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 in wide drainageways and open depressions on plains. Site elevation ranges from approximately sea level to 1,000 feet. Slopes are nearly level. Site and soil hydrology, including ponding duration and depth, shape site vegetation. Poorly drained histosols, and year-round water table, and very long, frequent ponding result in obligate wetland species here.

The reference state supports three communities. The reference plant community is characterized as an open , low scrubland (Viereck et al., 1992). It is composed of a mix of facultative to obligate wetland shrubs with sedges, cottongrasses, and forbs throughout. The lowest-lying areas on this site support ponded water throughout the growing season and support emergent vegetation as described by community 1.3. Community 1.2 is an

intermediate wetland community.

Associated sites

R236XY130AK	**Subarctic Scrub Scrub Tundra Loamy Plains and Hills** R236XY130AK describes an ericaceous scrubland on moderately well drained soils on plain and hill slopes. R236XY109AK is a feature on this landscape.
R236XY131AK	**Subarctic Tussock-Scrub Frozen Plains** R236XY131AK describes organic peat mound features with permafrost. These features are on the same plains and hill slopes as this site.
R236XY140AK	**Subarctic Tussock Tundra Wet Loamy Plains** R236XY140AK describes the tussock tundra across plain talfs. The site describe here is a drainage feature on these plains.

Similar sites

R236XY107AK	**Western Alaska Maritime Scrub Gravelly Drainages** Both sites describe wet, concave plain features such as depression and drainages. R236XY107AK is located in wider and steeper lowland drainages. Soils are drier and site ponding is occasional and brief, as compared to the frequent flooding in this site. Site differences are reflected in the vegetation, with more facultative to obligate wetland species present in this site.
R236XY136AK	**Subarctic Low Scrub Loamy Plain Drainages** Both sites describe wet plain features such as depressions and drainages. R236XY136AK describes an open scrubland of primarily facultative wetland species associated with a minimally developed Inceptisol. It differs from the obligate wetland associated with a Histosol in this site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Myrica gale* (2) *Ledum palustre subsp. decumbens*
Herbaceous	(1) *Carex aquatilis* (2) *Eriophorum russeolum*

Physiographic features

This site is in drainageways and open depressions on plains. Elevation ranges from approximately sea level to 1,000 feet. Slopes are nearly level (0 – 2 percent). This site is found at all aspects. Ponding is very long and frequent.

Table 2. Representative physiographic features

Geomorphic position, flats	(1) Dip
Slope shape across	(1) Concave
Slope shape up-down	(1) Linear
Landforms	(1) Plains > Drainageway
Runoff class	Negligible to low
Flooding frequency	None
Ponding duration	Very long (more than 30 days)
Ponding frequency	Frequent
Elevation	20–960 ft
Slope	0–2%
Water table depth	0 in

Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to medium
Flooding frequency	None
Ponding duration	Very long (more than 30 days)
Ponding frequency	Frequent
Elevation	0–2,050 ft
Slope	0–7%
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

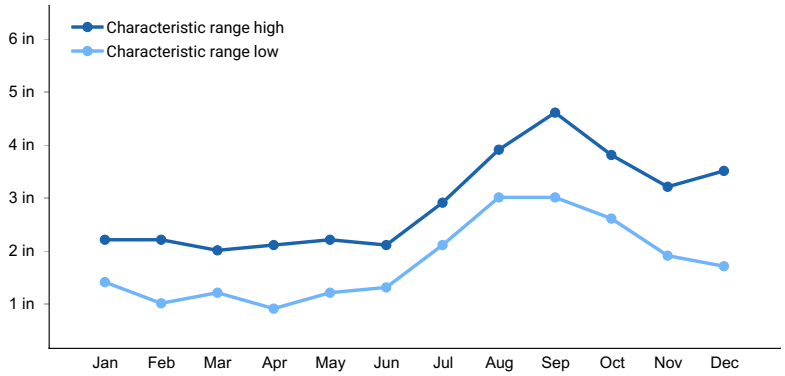


Figure 1. Monthly precipitation range

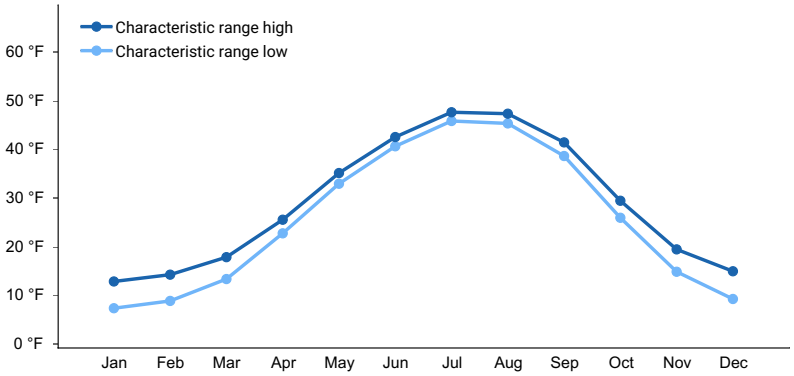


Figure 2. Monthly minimum temperature range

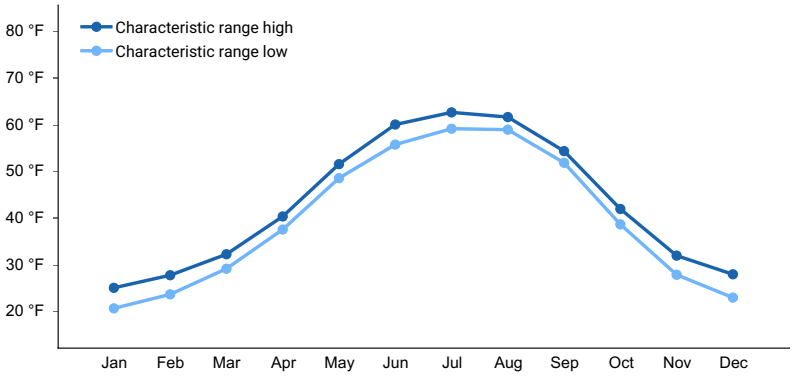


Figure 3. Monthly maximum temperature range

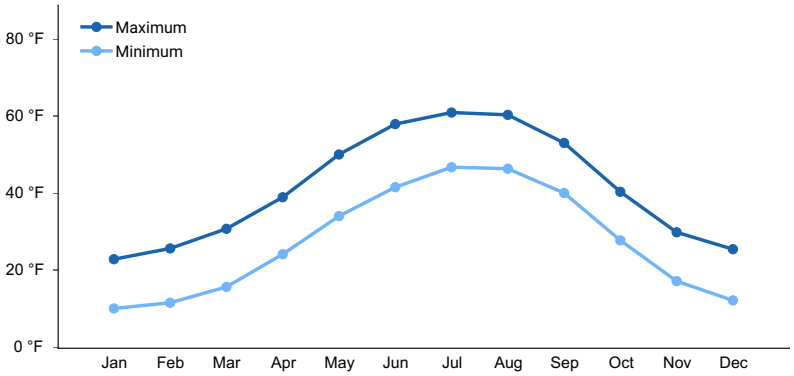


Figure 4. Monthly average minimum and maximum temperature

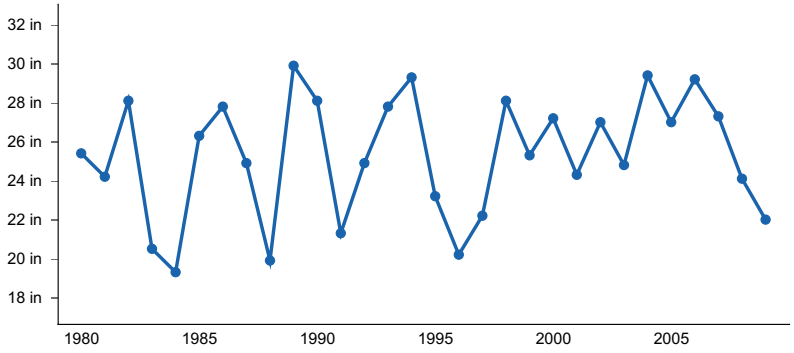


Figure 5. Annual precipitation pattern

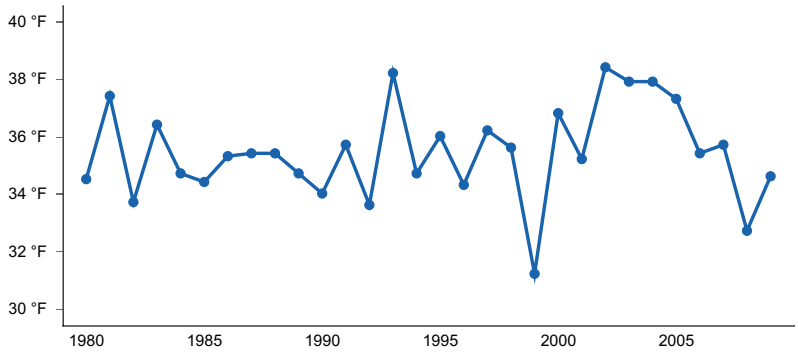


Figure 6. Annual average temperature pattern

Influencing water features

Site and soil hydrology influence vegetation on this site. Slope run-off gathers in these linear depressions. Site ponding is frequent and very long. Sphagnum mosses hold water in place in the upper parts of the soil profile. A water table is present at the soil surface throughout the year.

Soil features

Soils are cold, wet, organic Cryohemists (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 mossy organic material over eolian deposits or alluvium.

Soil characteristics affecting vegetation include temperature and hydrology. Low soil temperature during the growing season can restrict supported plants. Hemist soils are comprised of wet, moderately decomposed organic material (Soil Survey Staff, 2013). Live Sphagnum (Sphagnum spp.) mosses hold onto water at the soil surface. A water table at the soil surface, present year round, greatly restricts the vegetation in this site to facultative wet to obligate wetland species.

Correlated soil components in MLRA 236: Mosquitopoint, Cryohemists, D36-Western maritime scrub organic drainages, D36-Western maritime sedge organic depressions, E36-Maritime sedge/scrub-organic depressions

Table 5. Representative soil features

Parent material	(1) Alluvium (2) Eolian deposits
Surface texture	(1) Peat
Drainage class	Very poorly drained
Permeability class	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)	3.7–5.2
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	Very slow to moderately rapid
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)	3.7–6.1
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site is in wide drainageways and open depressions on plains. Slope concavity and site hydrology influence site vegetation. Soils are very poorly drained and support an aquic or peraquic moisture regime. This site contains three communities. The reference plant community is an open, low scrubland of facultative to obligate wetland species. Hydrophytic forbs and graminoids are present throughout. Low-lying areas support ponded water throughout the growing season and support emergent vegetation as described by community 1.3. Community 1.2 is an intermediate wetland community.

Community transitions result from a change in local hydrology. Increased ponding depth and duration favors emergent and obligate species. An opposite hydrologic shift favors slower growing hydrophytic shrubs. Community shifts are likely slow. Precipitation changes can change site water input levels, affecting ponding depth and duration. Relative water table depth can also slowly change due to the buildup or decline of organic mosses in the upper soil levels.

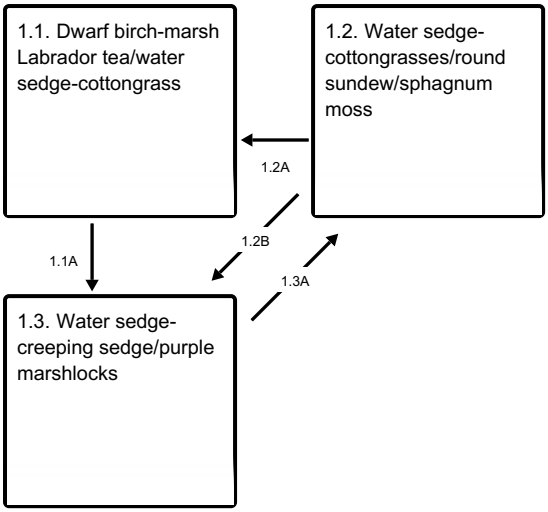
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant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

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities



1.1A - Increased ponding depth

1.2A - Lowered water table or decreased ponding depth

1.2B - Raised water table or increased ponding depth

1.3A - Lowered water table or decreased ponding depth

State 1
Reference State

The reference state supports three 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. The presence of each community is dictated temporally by ponding. This report provides baseline inventory data for the vegetation in this 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
Dwarf birch-marsh Labrador tea/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	Bog rosemary	*Andromeda polifolia*	ANPO	74	2
S	Dwarf birch	*Betula nana*	BENA	94	9
S	Marsh Labrador tea	*Ledum palustre* ssp. *decumbens*	LEPAD	74	7
S	Sweetgale	*Myrica gale*	MYGA	42	25
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	71	7
G	Water sedge	*Carex aquatilis*	CAAQ	68	20
G	Red cottongrass	*Eriophorum russeolum*	ERRU2	48	20
M	Sphagnum moss	*Sphagnum spp.*	SPHAG2#	77	55

Sphagnum mosses are identified at 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 patchy, dense shrubs surrounded by hydrophilic graminoids. This community consists of facultative or obligate shrubs and graminoids, including bog rosemary (*Andromeda polifolia*), sweetgale (*Myrica gale*), marsh Labrador tea (*Ledum palustre* ssp. decumbens), dwarf birch (*Betula nana*), water sedge (*Carex aquatilis*), and red cottongrass (*Eriophorum russeolum*). The various obligate species throughout the community, including roundleaf sundew (*Drosera rotundifolia*), creeping sedge (*Carex chordorrhiza*), manyflower sedge (Carex polifolia), and small cranberry (*Vaccinium oxycoccos*), indicate the ubiquitous presence of surface and subsurface water (NWI code PSS1; Cowardin et al., 1979). Mosses, primarily sphagnum mosses (Sphagnum spp.), commonly form a mat on the surface. Other ground cover includes lichens, water, and herbaceous litter.

Dominant plant species

- bog rosemary (*Andromeda polifolia*), shrub
- dwarf birch (*Betula nana*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- sweetgale (*Myrica gale*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- water sedge (*Carex aquatilis*), grass
- red cottongrass (*Eriophorum russeolum*), grass
- sphagnum (*Sphagnum*), other herbaceous

Community 1.2
Water sedge-cottongrasses/round sundew/sphagnum moss

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	White cottongrass	*Eriophorum scheuchzeri*	ERSC2	42	10
G	Red cottongrass	*Eriophorum russeolum*	ERRU2	45	7
G	Water sedge	*Carex aquatilis*	CAAQ	86	10
G	Creeping sedge	*Carex chordorrhiza*	CACH5	19	15
G	Round sedge	*Carex rotundata*	CARO7	41	8
F	Round sundew	*Drosera rotundifolia*	DRRO	59	1
F	Purple marshlocks	*Comarum palustre*	COPA28	36	5
M	Sphagnum moss	*Sphagnum spp.*	SPHAG2#	95	80

Sphagnum mosses are identified at 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 late ponding phase is a wet graminoid herbaceous meadow (Viereck et al., 2991). This community is comprised of myriad facultative or obligate graminoids, including white cottongrass (*Eriophorum scheuchzeri*), red cottongrass, water sedge, creeping sedge (*C. chordorrhiza*), and round sedge (*C. rotundata*). Shrubs such as dwarf birch (*Betula nana*), bog rosemary (*Andromeda polifolia*), and bog blueberry may be present, but the abundance and coverage commonly are low. Obligate forbs such as purple marshlocks (*Comarum palustre*) and roundleaf sundew are prevalent. Several wetland indicator species are present, including tufted bulrush (*Trichophorum cespitosum*), small cranberry, smallflower lousewort (*Pedicularis parviflora*), and buckbean (Menyanthes trifoliate). Mosses, particularly sphagnum mosses, are prevalent on the surface. Other ground cover commonly includes herbaceous litter and water. Some areas are bare soil.

Dominant plant species

- white cottongrass (*Eriophorum scheuchzeri*), grass
- red cottongrass (*Eriophorum russeolum*), grass

- water sedge (*Carex aquatilis*), grass
- creeping sedge (*Carex chordorrhiza*), grass
- round sedge (*Carex rotundata*), grass
- roundleaf sundew (*Drosera rotundifolia*), other herbaceous
- purple marshlocks (*Comarum palustre*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Community 1.3
Water sedge-creeping sedge/purple marshlocks

Figure 11. Typical area of community 1.3.

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)
S	Small cranberry	*Vaccinium oxycoccos*	VAOX	64	Trace
G	Water sedge	*Carex aquatilis*	CAAQ	82	6
G	Creeping sedge	*Carex chordorrhiza*	CACH5	46	10
G	Red cottongrass	*Eriophorum russeolum*	ERRU2	73	8
F	Purple marshlocks	*Comarum palustre*	COPA28	55	10
F	Mackenzie's water hemlock	*Cicuta virosa*	CIVI5	27	Trace
M	Sphagnum moss	*Sphagnum spp.*	SPHAG2 #	64	90

Sphagnum mosses are identified at 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 12. Frequency and canopy cover of plants in community 1.3.

Community 1.3 is characterized as a wet forb herbaceous meadow (Viereck et al., 1992). It is comprised of a mix of emergent and obligate wetland forb and graminoid species. This community is recognizable by the presence of surface ponded water throughout the growing season. The vegetative strata that characterize this community are medium forbs (4 to 24 inches) and medium graminoids (4 to 24 inches). Ground cover is a mix of mosses,

herbaceous litter, and water.

Dominant plant species

- small cranberry (*Vaccinium oxycoccos*), shrub
- water sedge (*Carex aquatilis*), grass
- creeping sedge (*Carex chordorrhiza*), grass
- red cottongrass (*Eriophorum russeolum*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous
- Mackenzie's water hemlock (*Cicuta virosa*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

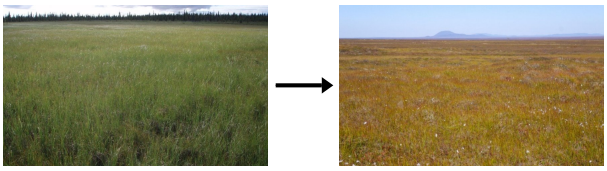
Pathway 1.1A
Community 1.1 to 1.3

Dwarf birch-marsh Labrador tea/water sedge-cottongrass

Water sedge-creeping sedge/purple marshlocks

Increased surface ponding depth throughout the growing season restricts the community to obligate, emergent plant species. This transition may result from increased precipitation or a decrease in the relative microelevation within the lowest part of the drainage.

Pathway 1.2A
Community 1.2 to 1.1

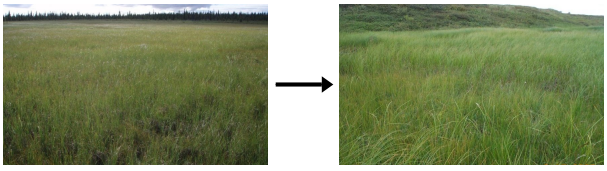


Water sedge-cottongrasses/round sundew/sphagnum moss

Dwarf birch-marsh Labrador tea/water sedge-cottongrass

A lower water table and shorter ponding periods allow less hydrophytic and slower-growing species to colonize an area. This community pathway occurs gradually over time as the relative water table drops, either due to a decrease in water input (less precipitation) or a buildup of soil within the drainage.

Pathway 1.2B
Community 1.2 to 1.3

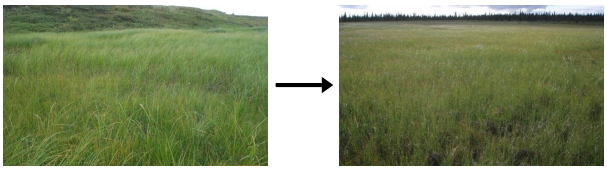


Water sedge-cottongrasses/round sundew/sphagnum moss

Water sedge-creeping sedge/purple marshlocks

Increased surface ponding depth throughout the growing season restricts the community to obligate, emergent plant species. This transition may result from increased precipitation or a decrease in the relative microelevation within the lowest part of the drainage.

Pathway 1.3A
Community 1.3 to 1.2



Water sedge-creeping sedge/purple marshlocks

Water sedge-cottongrasses/round sundew/sphagnum moss

An absence of surface water throughout the growing season allows less hydrophytic species to colonize. Emergent plants make up a smaller percentage of plant cover and a more diverse community of obligate to facultative wetland species develops. This community pathway occurs gradually as the relative water table drops, either due to a decrease in water input (less precipitation) or a buildup of soil within the drainage.

Additional community tables

Inventory data references

Modal points for Community 1.1
08SS07105
08SS07409
08AO05805
08SS11105
10SS08906

Modal points for community 1.2
07CS00101
07CS01903
07CS01906
07SS00602
07SS01903
07SS04806
07AO02201
09AO10804

Modal points for community 1.3
07SS24303
07MM01308

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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	05/11/2025
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):**

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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):**

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:**

17. **Perennial plant reproductive capability:**