USDA Natural Resources Conservation Service

Ecological site F236XY165AK
Boreal Woodland Loamy Stream Terraces

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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 footslopes. Major rivers include the Egegik, Mulchatna, Naknek, Nushagak, and Wood River. MLRA 236 is in the zone of discontinuous permafrost. It is primarily in areas with finer textured soils on terraces, rolling uplands and footslopes. This MLRA was glaciated during the early to middle Pleistocene. Moraine and glaciofluvial deposits cover around sixty percent of the MLRA. Alluvium and coastal deposits make up a large portion of the remaining area (Kautz et al., 2012; USDA, 2006).

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

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

Ecological site concept

This boreal ecological site is on flood plain terraces. Site elevation is between 30 and 850 feet above sea level. Slopes are nearly level to gentle (0 – 4 percent). Soil hydrology, low soil acidity, and a fire regime shape the vegetation on this landform. Low soil acidity, often associated with ericaceous communities, limits soil fertility and restricts vegetation. Rare, brief ponding, particularly in concave areas, supports a deep water table that is reflected in greater amounts of hydrophytic plant species. This site is susceptible to fire, which removes the overstory and increases post-fire diversity of fast growing, herbaceous species.

The reference state supports three communities. The reference plant community is characterized as a coniferous woodland (Viereck et al., 1992). It is composed of a white spruce canopy with an open understory of facultative to upland ericaceous shrubs, graminoid, mosses, and lichens. Post-fire communities are comprised of fast growing herbaceous species and extant shrubs. There is an alternate state on this site that is created by clearing and maintaining land.

Associated sites

F236XY111AK	**Boreal Forest Loamy Flood Plains** F236XY111AK describes high level flood plains. These areas actively flood, unlike the nearby terraces described by F236XY165AK.
R236XY144AK	**Subarctic Scrub Peat Terraces** R236XY144AK describes wet depressions on terraces. These are features located on the terraces described by F236XY165AK.

Similar sites

F236XY111AK	**Boreal Forest Loamy Flood Plains** F236XY111AK describes medium and high flood plains. They support a forest community on gravelly alluvial soils. Flood plains are susceptible to flooding and the vegetation reflects this disturbance. The forest is comprised of balsam poplar with resilient shrubs such as willow and alder in the understory. F236XY165AK is differentiated by a lack of flooding disturbance and an coniferous overstory.

Table 1. Dominant plant species

Tree	(1) *Picea glauca*
Shrub	(1) *Ledum palustre subsp. decumbens* (2) *Vaccinium vitis-idaea*
Herbaceous	Not specified

Physiographic features

This site is on linear and concave slopes on gravelly terraces. Elevation ranges from 30 to 850 feet above sea level. Slopes are nearly level to gentle (0 – 4 percent). This site is found at all aspects. Flooding does not occur, and ponding is usually rare, though may be more frequent in low-lying concave areas.

Table 2. Representative physiographic features

Slope shape across	(1) Linear (2) Concave
Slope shape up-down	(1) Linear
Geomorphic position, terraces	(1) Tread
Landforms	(1) Plains > Terrace (2) Valley > Terrace
Runoff class	Negligible to low
Flooding frequency	None
Ponding duration	Brief (2 to 7 days)
Ponding frequency	Rare
Elevation	30–850 ft
Slope	0–4%
Water table depth	Not specified
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to low
Flooding frequency	None
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to occasional

Elevation	0–980 ft
Slope	0–4%
Water table depth	31–60 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

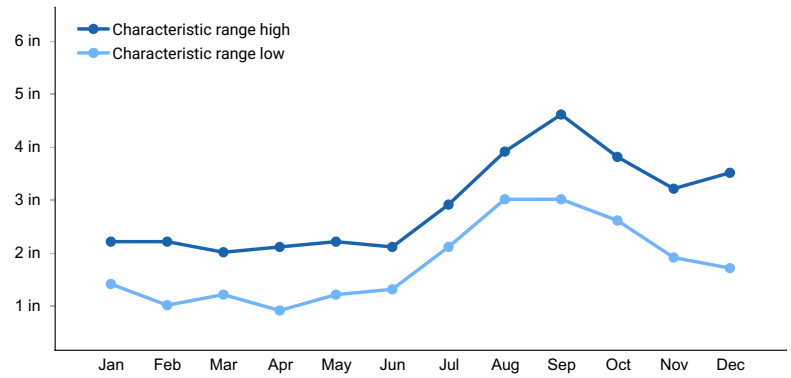


Figure 1. Monthly precipitation range

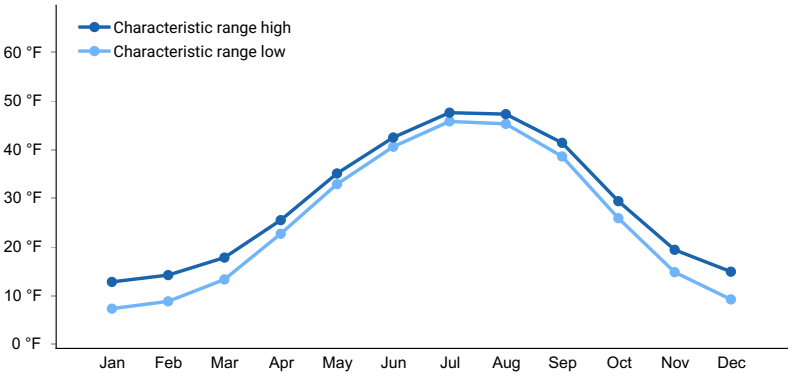


Figure 2. Monthly minimum temperature range

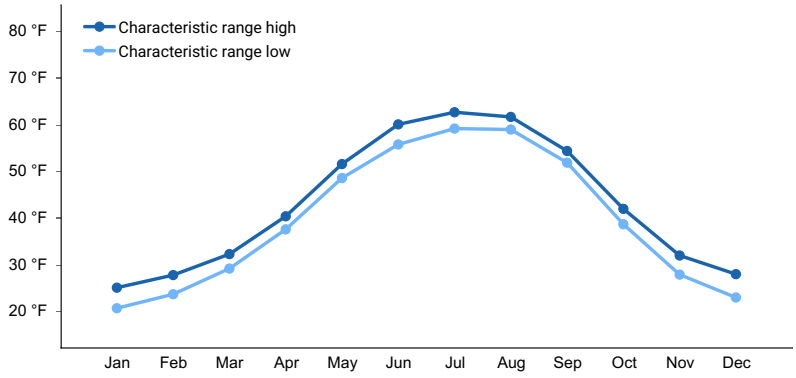


Figure 3. Monthly maximum temperature range

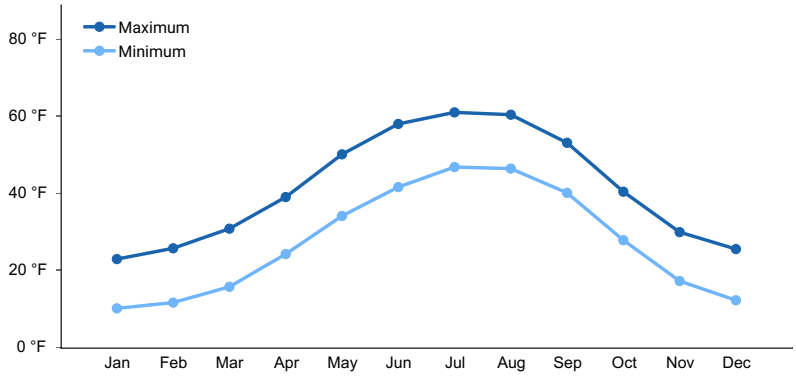


Figure 4. Monthly average minimum and maximum temperature

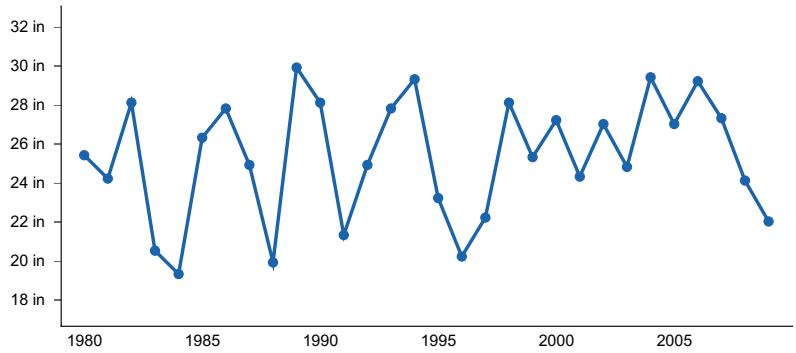


Figure 5. Annual precipitation pattern

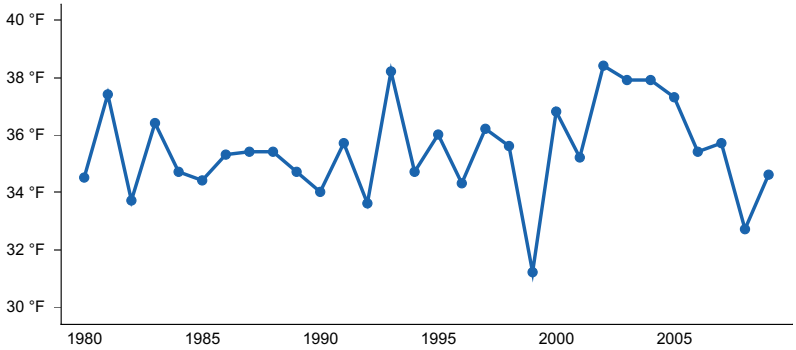


Figure 6. Annual average temperature pattern

Influencing water features

Due to its landscape position, this site is generally not influenced by wetland or riparian water features. Concave areas are typically small and may support a higher degree of facultative wet wetland species. Precipitation is the main source of water.

Soil features

Soils are young and weakly developed Inceptisols (Soil Survey Staff, 2013). Soils are very deep and well drained. They support a cryic temperature regime and an udic moisture regime. Parent material is primarily organic material over gravelly alluvium.

Soils are weakly developed, as indicated by a cambic horizon and an ochric epipedon. This affects the plant community that develops on this site. Soil is extremely to moderately acidic, which is common with ericaceous communities. Soil hydrology does not generally affect vegetation on these soils. Soils are well drained. However, concave areas have a deep water table that is reflected in greater amounts of hydrophytic plant species.

Correlated soil components in MLRA 236: Tunravik, Oxyaquic Humicryepts; D36-Boreal woodland gravelly terraces; D36-Boreal woodland loamy terraces, moist; E36-Boreal forest-gravelly terraces

Table 5. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	60 in
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	1.8–2.3 in
Soil reaction (1:1 water) (0-10in)	3.7–5.8
Subsurface fragment volume <=3" (Depth not specified)	47%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 6. Representative soil features (actual values)

Drainage class	Moderately well drained to well drained
Permeability class	Moderate
Soil depth	60 in
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	1.8–2.8 in
Soil reaction (1:1 water) (0-10in)	3.7–6
Subsurface fragment volume <=3" (Depth not specified)	0–49%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site is on terraces with well drained alluvial soils. Local site factors including soil characteristics and a fire regime support three communities in the reference state. The reference plant community is a white spruce

woodland with ericaceous shrubs, bluejoint, mosses, and lichens in the open understory.

Vegetation on this site reflects the underlying soil. These well drained soils support plants that are primarily identified as facultative to upland species. Soil drainage and the moderately to extremely acidic soil is often associated with the ericaceous community in the understory.

Fire is the major documented disturbance regime. High-intensity and low-intensity fires differentially affect post-disturbance vegetation. The severity of a burn generally refers to the proportion of the surface organic mat and tree canopy consumed during a fire (Chapin et al., 2006). It is difficult to gauge or estimate the typical fire on this site. The site location near flood plains lends protection during wildfires. Fuel load is relatively low in this woodland. However, the organic layer on this site is thin in these weakly developed soils, so even a low-intensity fire could damage root stock and the seedbank. The fire cycle is hypothesized to be between 75 and 100 years on this site, based on tree ages and depth to charcoal in the soil.

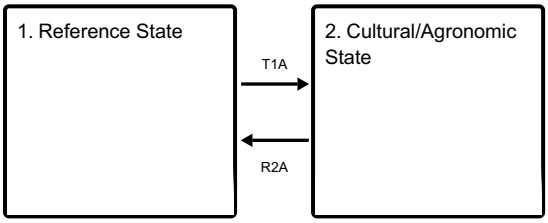
Willows are slightly to moderately browsed by moose. This does not appear to affect the ecological processes of the site.

This site supports one alternate state. Areas cleared for agronomic or cultural purposes support a unique vegetative community. These areas are common in and around villages. The disturbed soil supports a unique community of primarily herbaceous plants, which are commonly mowed or otherwise maintained during the growing season.

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

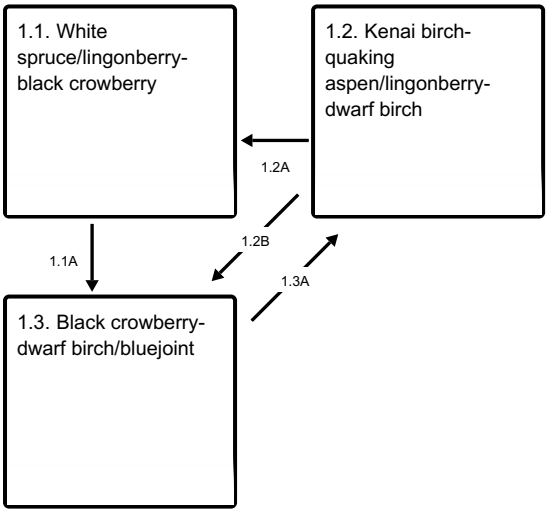
Ecosystem states



T1A - Cultural/agronomic land use.

R2A - Cultural/agronomic land use recovery.

State 1 submodel, plant communities



1.1A - Fire.

1.2A - Time and growth without disruptive fire.

1.2B - Fire.

1.3A - Time and growth without disruptive fire.

State 2 submodel, plant communities

2.1. Bluejoint/common chickweed-fireweed meadow

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 a needleleaf woodland. The presence of each community is dictated temporally by fire. This report provides baseline inventory data on the vegetation. Future data collection is needed to provide further information about existing plant communities and the disturbance regimes that result in transitions from one community to another. Common and scientific names are from the USDA PLANTS database. Community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1
White spruce/lingonberry-black crowberry

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)
T	White spruce	*Picea glauca*	PIGL	161^	15^
S	Lingonberry	*Vaccinium vitis-idaea*	VAVI	100	20
S	Black crowberry	*Empetrum nigrum*	EMNI	100	15
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	89	20
S	Marsh Labrador tea	*Ledum palustre* ssp. *decumbens*	LEPAD	89	20
S	Dwarf birch	*Betula nana*	BENA	83	15
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	72	3
M	Feathermosses#	Includes 3 genera		39, 67, 61	25, 20, 9

* Trees may be present in multiple strata within one plot; therefore, it is possible for species of this plant group to have a constancy value of more than 100 percent.

^ Tall, medium, and stunted individuals are counted as canopy trees. Regenerative individuals are not included.

Feathermosses are represented by three species—Hylocomium splendens, Pleurozium schreberi, and Ptilium crista-castrensis, respectively.

This dataset includes data from 35 sample plots. The sample plots are distributed across the survey area and are independent of one another.

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

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

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

The reference plant community is a white spruce needleleaf woodland (Viereck et al., 1992) that has low and dwarf shrubs, mosses, and lichens in the understory and open areas. Shrubs throughout the understory include lingonberry (*Vaccinium vitis-idaea*), black crowberry (*Empetrum nigrum*), marsh Labrador tea (*Ledum palustre* ssp. decumbens), dwarf birch (*Betula nana*), and bog blueberry (*Vaccinium uliginosum*). Other species may include spirea (*Spiraea stevenii*), resin birch (*Betula glandulosa*), willows (Salix spp.), bluejoint (*Calamagrostis canadensis*), Altai fescue (*Festuca altaica*), fireweed (*Chamerion angustifolium*), horsetails (Equisetum spp.), and fewflower meadow-rue (*Thalictrum sparsiflorum*). Sporadic individual trees, including paper birch (*Betula papyrifera*), Kenai birch (*Betula papyrifera* var. kenaica), balsam poplar (*Populus balsamifera*), and quaking aspen (*Populus tremuloides*), may be present. These trees commonly are remnants from earlier community phases. Mosses, dominantly feathermosses, and lichens, dominantly snow lichens (Stereocaulon spp.), make up a large portion of the ground cover. The ground cover may also include herbaceous litter and woody litter. Some areas are bare soil.

Dominant plant species

- white spruce (*Picea glauca*), tree
- lingonberry (*Vaccinium vitis-idaea*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- dwarf birch (*Betula nana*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous
- knights plume moss (*Ptilium crista-castrensis*), other herbaceous

Community 1.2
Kenai birch-quaking aspen/lingonberry-dwarf birch

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)
T	White spruce	*Picea glauca*	PIGL	159*	10^
T	Kenai birch	*Betula papyrifera* var. *kenaica*	BEPAK	59	15^
T	Quaking aspen	*Populus tremuloides*	POTR5	47	10^
S	Lingonberry	*Vaccinium vitis-idaea*	VAVI	100	10
S	Black crowberry	*Empetrum nigrum*	EMNI	88	15
S	Dwarf birch	*Betula nana*	BENA	88	15
S	Marsh Labrador tea	*Ledum palustre* ssp. *decumbens*	LEPAD	82	25
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	82	6

* Trees may be present in multiple strata within one plot; therefore, it is possible for species of this plant group to have a constancy value of more than 100 percent.

^ Tall, medium, and stunted individuals are counted as canopy trees. Regenerative individuals are not included.

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

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

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

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

The late fire community phase is a mixed woodland that has a dense understory of low and dwarf shrubs. This community consists of mixed deciduous Kenai birch and quaking aspen and coniferous white spruce. Understory shrubs include lingonberry, black crowberry, dwarf birch, bog blueberry, and marsh Labrador tea. Other species may include paper birch, willow (Salix spp.), bluejoint, Altai fescue, fireweed, and horsetails. Various mosses are common. Lichen may be present, but the total cover depends on the period since the last fire. Other ground cover typically includes herbaceous litter and woody litter. Some areas are bare soil.

Dominant plant species

- white spruce (*Picea glauca*), tree
- Kenai birch (*Betula papyrifera var. kenaica*), tree
- quaking aspen (*Populus tremuloides*), tree
- lingonberry (*Vaccinium vitis-idaea*), shrub
- black crowberry (*Empetrum nigrum*), shrub

- dwarf birch (*Betula nana*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- bluejoint (*Calamagrostis canadensis*), grass

Community 1.3
Black crowberry-dwarf birch/bluejoint

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	Black crowberry	*Empetrum nigrum*	EMNI	100	65
S	Dwarf birch	*Betula nana*	BENA	100	60
S	Marsh Labrador tea	*Ledum palustre ssp. decumbens*	LEPAD	100	40
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	100	15
S	Lingonberry	*Vaccinium vitis-idaea*	VAVI	100	15
S	Beauverd spirea	*Spiraea stevenii*	SPST3	100	15
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	15

This dataset includes data from 1 sample plot. 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 12. Frequency and canopy cover of plants in community 1.3.

The early fire community phase is closed low scrubland (Viereck et al., 1992) that includes low and dwarf shrubs. This community consists dominantly of black crowberry, dwarf birch, and marsh Labrador tea. Other common plants include spirea, bog blueberry, lingonberry, and bluejoint. Live trees that survived a fire and stunted and regenerative trees may be present. The ground cover is dominantly moss; lichens are rare. Other ground cover includes herbaceous and woody litter.

Dominant plant species

- black crowberry (*Empetrum nigrum*), shrub
- dwarf birch (*Betula nana*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- beauverd spirea (*Spiraea stevenii*), shrub
- bluejoint (*Calamagrostis canadensis*), grass

Pathway 1.1A
Community 1.1 to 1.3

White spruce/lingonberry-black crowberry

Black crowberry-dwarf birch/bluejoint

Fire. A low-intensity fire removes trees and taller shrubs, but pockets of low vegetation remain. The reduced competition for light and space may allow pioneer graminoids and forbs to colonize and pockets of low and dwarf shrubs to propagate. Based on the age of the trees, fires occur once every 60 to 100 years.

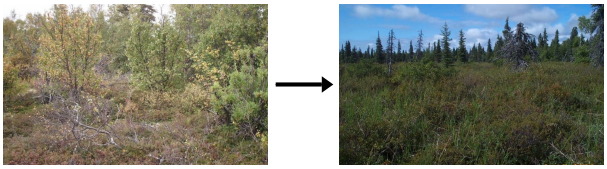
Pathway 1.2A
Community 1.2 to 1.1

Kenai birch-quaking aspen/lingonberry-dwarf birch

White spruce/lingonberry-black crowberry

Natural succession: Time and growth without disruptive fire. As burned areas recover, white spruce reproduces and regenerates. Competition for light and space may lead to a decrease in the population of deciduous trees, such as shade-intolerant quaking aspen (Lavertu et al., 1994; Howard, 1996). The large shrub community continues to diversify. The period needed for this transition currently is unknown. It likely depends on factors such as the rate of seed production of white spruce and the annual growth rate of trees and shrubs.

Pathway 1.2B
Community 1.2 to 1.3



Kenai birch-quaking aspen/lingonberry-dwarf birch

Black crowberry-dwarf birch/bluejoint

Fire. A low-intensity, fast-burning fire may remove trees and taller shrubs but allow pockets of low vegetation to remain. The reduced competition for light and space may allow pioneer graminoids and forbs to colonize and pockets of low and dwarf shrubs to propagate. The frequency of fire in the late fire community phase currently is unknown.

Pathway 1.3A
Community 1.3 to 1.2

Black crowberry-dwarf birch/bluejoint

Kenai birch-quaking aspen/lingonberry-dwarf birch

Natural succession: Normal time and growth without disruptive fire. As burned areas recover, tree species colonize. Shrubs and graminoids continue to diversify as new niches are created, but the total cover may decrease. The period needed for this transition currently is unknown. It likely depends on factors such as the growth rate of trees, distance to a seed source, and reproduction and growth rates of colonizing and extant shrubs.

State 2
Cultural/Agronomic State

This alternate state is a result of land clearing near and in villages and towns. Trees and shrub are cleared by machinery. Areas surrounding buildings and those that have been cleared for lawns or agricultural uses, such as apiaries, are included. This disturbance generally transitions the vegetation to community phase 2.1. Commonly, these areas are mowed to keep graminoids and forbs at a maximum height. Replanting may revert this state to the reference state, but field data of this hypothesized transition are not available.

Community 2.1
Bluejoint/common chickweed-fireweed meadow

Figure 13. Typical area of community 2.1.

Community Phase 2.1 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	*Calamagrostis canadensis*	CACA4	100	80
G	Rough bentgrass	*Agrostis scabra*	AGSC5	100	15
F	Common chickweed	*Stellaria media*	STME2	100	45
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	7

This dataset includes data from 1 sample plot. 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 14. Frequency and canopy cover of plants in community 2.1.

This community is a mesic graminoid herbaceous meadow (Viereck et al., 1992). It consists of graminoids and forbs, including bluejoint, rough bentgrass (*Agrostis scabra*), common chickweed (*Stellaria media*), and fireweed. The presence or absence of trees and shrub depends on the preference of the landowner. The ground cover varies, but it typically includes abundant herbaceous litter from mowing.

Dominant plant species

- bluejoint (*Calamagrostis canadensis*), grass
- rough bentgrass (*Agrostis scabra*), grass
- common chickweed (*Stellaria media*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous

Transition T1A
State 1 to 2

Clearcutting in villages and towns causes this transition. This disturbance is drastic, which suggests no threshold allows the plant community to remain in the reference state. Continued mowing of this grassland community, as described by community phase 2.1, keeps this plant community stable.

Restoration pathway R2A
State 2 to 1

It is hypothesized that alternate state 2 will return to the reference state if mowing and other anthropogenic disturbances are ceased. Standing shrubs and trees in nearby areas and an existing seed bank support recolonization. A full transition back to the reference state may require planting of native species. The period needed for this transition depends on factors such as the extent of the original clearing, previous and current land uses, cessation of anthropogenic disturbance, and period without natural fire.

Additional community tables

Inventory data references

Modal points for Community 1.1
08SS09703
08SS09704
08LL07201
10TD09604
10SS10403

Modal points for community 1.2
08LL07202
09SS02501

Modal points for community 1.3
09SS10103
08AO06602

Modal points for community 2.1
08LL06302

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Approval

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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	04/29/2024
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):**

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:**
