USDA Natural Resources
Conservation Service

Ecological site R236XY124AK
Subarctic Tall Scrub Loamy Convex Hillslopes

Last updated: 2/13/2024
Accessed: 05/17/2024

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.

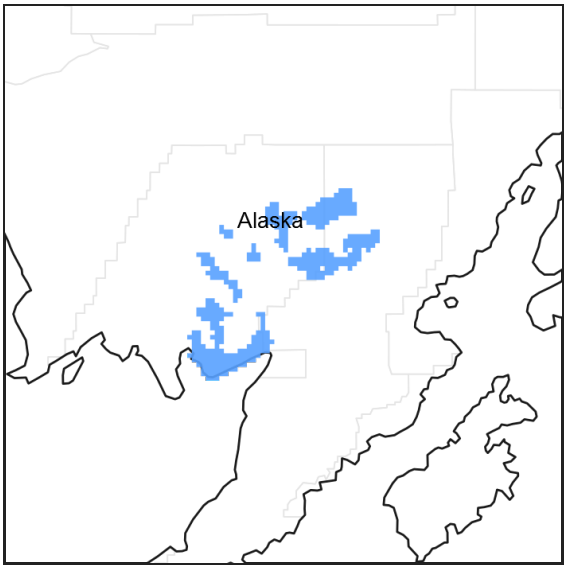


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

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 site is on linear and convex slopes of rolling plains and hill shoulders. Site elevation is between 70 and 1,980 feet above sea level. Slopes range from nearly level to very steep (0 – 42 percent). low soil fertility, soil acidity, and an erosional disturbance regime shape the vegetation in the reference state.

The reference state supports two communities. The reference plant community is characterized as a closed tall scrubland (Viereck et al., 1992). It is composed of an alder canopy with bluejoint and spreading woodfern in the understory. There is an alternate state associated with human disturbance.

Associated sites

F236XY115AK	**Boreal Forest Loamy Moist Slopes** F236XY115AK describes mixed forests on rounded mountain backslopes. These areas are downslope of the alder-bearing hill shoulders described by this site.
F236XY171AK	**Subarctic Woodland Loamy Slopes** F236XY171AK describes forested plains. These areas are downslope of the hill shoulder positions described by this ecological site. Differences in soil characteristics and disturbance regimes are main drivers in shaping the vegetation on these sites.
R236XY132AK	**Subarctic Dwarf Scrub Dry Loamy Slopes** Both sites are found on hill shoulders. R236XY132AK describes low scrub communities that do not support the alder found in this site. Differences is exposure and soil properties, including cryoturbation in R236XY132AK, create separate reference plant communities.
R236XY130AK	**Subarctic Scrub Scrub Tundra Loamy Plains and Hills** R236XY130AK describes low scrub communities on hill toeslopes. These positions are downslope of areas described by R236XY124AK.

Similar sites

R236XY105AK	**Subarctic Scrub Mosaic Gravelly Hillslopes** Both sites support dense alder in the reference plant community. R236XY105AK supports a mosaic of alder and low shrub areas on hill backslopes. Those positions are downslope of the shoulder sites that support R236XY124AK.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Alnus viridis subsp. sinuata*
Herbaceous	(1) *Dryopteris expansa* (2) *Calamagrostis canadensis*

Physiographic features

This site is on linear and convex shoulder slopes of hills and rolling plains. This is also a smaller site along lake margins. Elevation ranges from 70 to 1,980 feet above sea level. Slopes gradients vary from nearly level to very steep (0 – 42 percent, 60 percent max). This site is found at all aspects, though at smaller mapping scales (order 2), they may be restricted from north-facing slopes.

Table 2. Representative physiographic features

Landforms	(1) Plains > Plain (2) Hills > Hill
Runoff class	Medium to high

Flooding frequency	None
Ponding frequency	None
Elevation	30–594 m
Slope	0–42%
Water table depth	Not specified
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Low to high
Flooding frequency	None
Ponding frequency	None
Elevation	0–604 m
Slope	0–60%
Water table depth	38 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

Influencing water features

Due to its landscape position, this site is not influenced by wetland or riparian water features. Precipitation is the main source of water.

Soil features

Soils are primarily Spodosols (Soil Survey Staff, 2013). Spodic horizons and andic soil properties are a result of ash deposition. Soils are very deep and well drained. They support a cryic temperature regime and an udic moisture regime. Parent material is organic material over eolian deposits or loess.

Soil characteristics affecting vegetation include soil acidity and fertility. Low soil pH and low soil fertility are ideal conditions for alder colonization (Uchytil, 1989). Soil hydrology on these well drained soils does not appear to be a major driver of vegetation.

Correlated soil components in MLRA 236: Rolph; Clarkspoint; D36-Western maritime scrub loamy eolian slopes;

E36-Maritime scrub-ashy till slopes; E36-Maritime scrub-gravelly till slopes; E36-Maritime scrub-meadow-silty till slopes

Table 5. Representative soil features

Parent material	(1) Eolian deposits (2) Loess
Surface texture	(1) Highly organic silt (2) Highly organic silt loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	6.1–7.11 cm
Soil reaction (1:1 water) (0-25.4cm)	3.4–5.9
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	Somewhat poorly drained to well drained
Permeability class	Slow to moderate
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	6.1–7.87 cm
Soil reaction (1:1 water) (0-25.4cm)	3.4–5.9
Subsurface fragment volume <=3" (Depth not specified)	0–1%
Subsurface fragment volume >3" (Depth not specified)	0–3%

Ecological dynamics

This site is on upland linear to convex slopes of rolling plains and hill shoulders. It is also found along lake margins at a small scale. The reference plant community is a closed alder scrubland with an understory of low species richness.

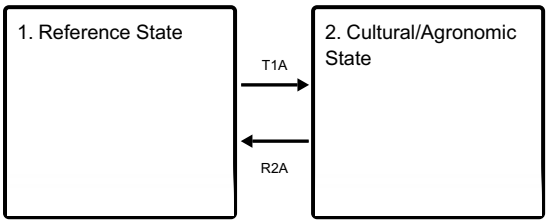
Local site factors, including soil characteristics and erosion support two communities in the reference state. Soils are acidic Spodosols with low fertility (Soil Survey Staff, 2013). Alder seeds are excellent colonizers of bare soil after erosion events. Low soil pH and poor soil fertility are ideal conditions for alder colonization. Alder are nitrogen-fixing and are not restricted by a lack of this nutrient in disturbed areas (Uchytil, 1989). It is currently unknown what role the presence of andic soil properties plays on vegetation on this site. Slight browsing by moose on willow may occur on this site, but it does not appear to affect the ecological processes significantly enough to alter the communities.

This site has an alternate state develops after human activity, typically in and around towns and villages. In places where the shrub overstory is removed, trees such as balsam poplar (*Populus balsamifera*) may propagate. Under management, the lack of competition for space and light may allow regenerative trees to form a woodland community that has an understory of willow and bluejoint grass.

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

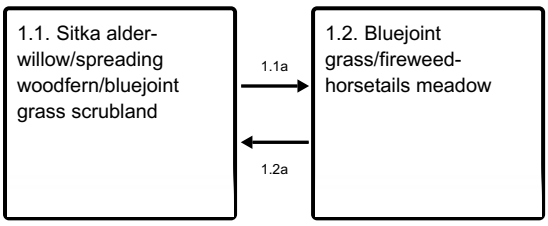
Ecosystem states



T1A - Anthropogenic land use.

R2A - Restoration practice

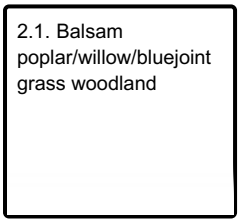
State 1 submodel, plant communities



1.1a - Erosion.

1.2a - Erosion recovery.

State 2 submodel, plant communities



State 1
Reference State

The reference state supports two community phases, which are grouped by the structure and dominance of the vegetation (e.g., trees, shrubs, graminoids, and forbs) and by their ecological function and stability. The reference community phase is characterized by tall, dense scrubland that has graminoids and forbs throughout. The presence of these communities is temporally dictated by erosion. An alternate state is a result of the anthropogenic removal of shrubs.

Community 1.1
Sitka alder-willow/spreading woodfern/bluejoint grass scrubland

Figure 8. Typical area of community 1.1.

Community Phase Canopy Cover

(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
S	Sitka alder	*Alnus viridis* ssp. *sinuata*	ALVIS	92	75
S	Tealeaf alder	*Salix pulchra*	SAPU15	27	20
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	96	20
F	Spreading woodfern	*Dryopteris expansa*	DREX2	92	40
F	Woodland horsetail	*Equisetum sylvaticum*	EQSY	62	2
F	Claspleaf twistedstalk	*Streptopus amplexifolius*	STAM2	62	1
F	Fireweed	*Chamerion angustifolium*	CHAN9	50	2

Figure 9. Constancy and canopy cover of plants in community 1.1.

The reference community phase is characterized by tall, dense scrubland that has graminoids and forbs throughout. Typically, this community consists of dense Sitka alder (*Alnus viridis* ssp. sinuata) and an understory of bluejoint grass (*Calamagrostis canadensis*), spreading woodfern (*Dryopteris expansa*), and woodland horsetail (*Equisetum sylvaticum*). Other extant species include tealeaf willow (*Salix pulchra*), claspleaf twistedstalk (*Streptopus amplexifolius*), fireweed (*Chamerion angustifolium*), field horsetail (*Equisetum arvense*), arctic starflower (*Trientalis europaea*), and spirea (*Spiraea stevenii*). Mosses are a relatively small component of the ground cover (about 4 percent total mean cover). Other ground cover commonly includes herbaceous litter (about 90 percent cover) and woody litter (about 3 percent).

Community 1.2
Bluejoint grass/fireweed-horsetails meadow

Figure 10. Typical area of community 1.2.

Community Phase Canopy Cover

(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	90
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	10
F	Spreading woodfern	*Dryopteris expansa*	DREX2	100	2
F	Horsetails	*Equisetum spp.*	EQUIS	67, 67#	4, 3#

Horsetails are represented by two species—field horsetail (*Equisetum arvense*) and woodland horsetail (*E. sylvaticum*), respectively.

Figure 11. Constancy and canopy cover of plant in community 1.2.

This early erosional community phase is characterized by a meadow consisting of bluejoint grass with forbs such as fireweed (*Chamerion angustifolium*), spreading woodfern (*Dryopteris expansa*), and horsetails (Equisetum spp.) scattered throughout. Other species present in small amounts are arctic starflower (*Trientalis europaea*) and purple marshlocks (*Comarum palustre*). The ground cover is dominantly herbaceous litter (about 95 percent total mean cover). Note: The vegetation and soils for this community were sampled at three locations. Due to the limited data available, personal field observations were used to aid in describing the plant community.

Pathway 1.1a
Community 1.1 to 1.2

Sitka alder-willow/spreading woodfern/bluejoint grass scrubland

Bluejoint grass/fireweed-horsetails meadow

Erosion by landslides. The steep, leading edge of the slopes may be susceptible to landslides. As tidal or river action erodes the lower part of the slope, landslides potentially can remove all of the vegetation, providing for fast-growing pioneer graminoids and forbs to colonize. This transition is temporally determined by the rate of erosion at the base of the escarpments.

Pathway 1.2a
Community 1.2 to 1.1

Bluejoint grass/fireweed-horsetails meadow

Sitka alder-willow/spreading woodfern/bluejoint grass scrubland

Natural succession: Normal time and growth without disruptive erosion. Over time, shrubs such as willows and nitrogen-fixing alder may colonize and an understory of shade-tolerant forbs and graminoids may develop. The period required for this transition is unknown. It partially depends on the rates of colonization, growth, and reproduction of the plants.

State 2
Cultural/Agronomic State

This alternate state results from cultural or agronomic activity, typically in towns and villages. The dense community

of shrubs is cleared, which may allow balsam poplar (*Populus balsamifera*) to propagate. Eventually, a woodland community that has many understory species extant in the reference state may develop. Continued anthropogenic activity typically prevents the woodland community from returning to the reference state. If erosion of embankments removes all of the vegetation, however, the early erosional community phase (community 1.2) likely will establish. Hypothetically, if the woodland is clearcut and managed to prevent tree propagation, a transition toward community 1.1 may occur. No evidence of either of these restorative pathways was documented in situ.

Community 2.1
Balsam poplar/willow/bluejoint grass woodland

Figure 12. Typical area of community 2.1.

Community Phase Canopy Cover

(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
T	Balsam poplar	*Populus balsamifera*	POBA2	100	85^
S	Greyleaf willow	*Salix glauca*	SAGL	100	15
S	Highbush cranberry	*Viburnum edule*	VIED	100	5
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	70
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	2
F	Seacoast angelica	*Angelica lucida*	ANLU	100	2

^ Though normally excluded, regenerative individuals were included to numerically show the presence of this species in the community.

Figure 13. Constancy and canopy cover of plants in community 2.1.

This is the only recorded community phase for the alternate state. It is characterized by deciduous woodland that has an understory of bluejoint grass (*Calamagrostis canadensis*), willow, and some forbs. Typically, this community consists of an overstory of balsam poplar (*Populus balsamifera*) and an understory of greyleaf willow (*Salix glauca*), bluejoint grass, highbush cranberry (*Viburnum edule*), and fireweed (*Chamerion angustifolium*). Other common understory species include seacoast angelica (*Angelica lucida*), northern bedstraw (*Galium boreale*), spirea (*Spiraea stevenii*), and horsetails (Equisetum spp.). The ground cover typically is dominantly herbaceous litter (more than 90 percent total mean cover). Mosses and woody litter may be present. Note: The vegetation and soils for this community were sampled at one location. Due to the limited data available, personal field observations were used to aid in describing the plant community.

Transition T1A
State 1 to 2

Cultural or agronomic activity may shift the community to an alternate state. Medium and tall shrubs are removed from the reference community phase, and balsam poplar trees colonize or are planted. Under continued management of alder, a new woodland understory may become established. It is similar to that of community phase 1.1, but it has fewer shrubs and forbs and more graminoids.

Restoration pathway R2A
State 2 to 1

The agronomic state may return to the reference state under managed plantings. It is unknown if this process will occur naturally, though the plants of the reference state are quick-growing disturbance-loving species. Further information is required to fully describe this transformation.

Additional community tables

Inventory data references

Modal points for Community 1.1
07CS01003
07DM00903
07MM21905
07MM01602
07CS17006
09AO03503
10SS02602

Modal points for community 1.2
07SS09601
07CS15604
10SS00203

Modal points for community 2.1
07CS16905

References

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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	05/17/2024
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):**

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:**
