USDA Natural Resources Conservation Service

Ecological site R236XY153AK
Boreal Willow Silty Low Flood Plains

Last updated: 2/13/2024
Accessed: 05/12/2025

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.

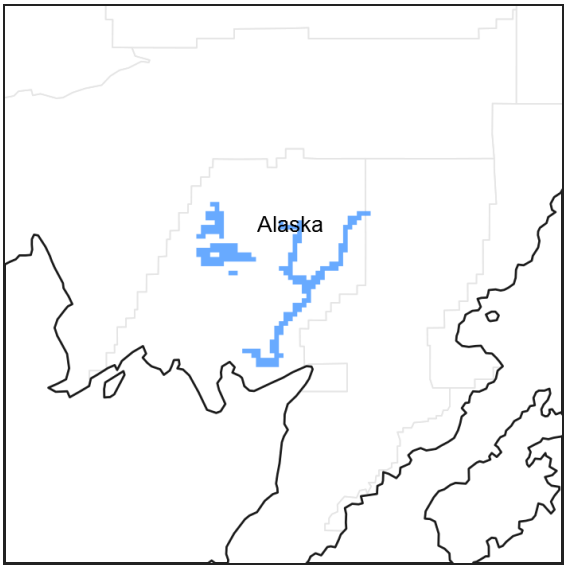


Figure 1. Mapped extent

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 lowland flood plain talfs. Site elevation ranges from 20 to 810 feet above sea level. Slopes are nearly level (0 – 3 percent). Soil and site hydrology and the effects of flooding and ponding shape the vegetation on this landform. Soils have little to no development. This site floods frequently and supports a water table at the start of the growing season, significantly restricting the vegetation supported here.

The reference state supports three communities. The reference plant community is characterized as a closed tall scrubland (Viereck et al., 1992). It is composed of one or more willow species with an understory of hydrophytic graminoids and forbs. The other communities of this site can co-occur with the reference plant community. These communities are associated with wetter areas where vegetation is further restricted to facultative wet to obligate herbaceous species. The most heavily ponded areas typically only support emergent, herbaceous wetland species.

Associated sites

F236XY111AK	**Boreal Forest Loamy Flood Plains** F236XY111AK describes rarely flooded high flood plains that support a forest in the reference plant community. They are located higher on the flood plain than the flood plain described here. Differences in elevation, flooding disturbance, and soil characteristics result in different supported vegetation.
R236XY121AK	**Boreal Tall Scrub Loamy Flood Plains** Both sites are on flood plains and can be found in the same riverine system. R236XY121AK describes low flood plains that are well drained and occasionally flooded. Differences in soil characteristics and flooding disturbance results in different vegetation in the reference states.

Similar sites

R236XY121AK	**Boreal Tall Scrub Loamy Flood Plains** Both sites are on flood plains. R236XY121AK describes low flood plains that are well drained and occasionally flooded. This site frequently floods and supports a water table at the start of the growing season, significantly restricting the vegetation supported here.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix alaxensis* (2) *Salix pulchra*
Herbaceous	(1) *Calamagrostis canadensis* (2) *Comarum palustre*

Physiographic features

This site is on flood plain talfs. Elevation ranges from 20 to 810 feet above sea level. Slopes are nearly level (0 – 3 percent). Flooding is frequent and brief. There is a water table between 9 and 45 inches throughout the growing season. The reference plant community does not pond. Ponding is restricted to lower-lying areas, where it is a brief (community 1.2) to long (community 1.3), occasional event. This site is found at all aspects.

Table 2. Representative physiographic features

Geomorphic position, flats	(1) Talf
Landforms	(1) Valley > Flood plain (2) Alluvial plain > Flood plain
Runoff class	Negligible to low

Flooding duration	Brief (2 to 7 days)
Flooding frequency	Frequent
Ponding duration	Not specified
Ponding frequency	None
Elevation	20–810 ft
Slope	0–3%
Water table depth	9–45 in
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	Frequent
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to occasional
Elevation	0–1,680 ft
Slope	0–3%
Water table depth	0–60 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

Influencing water features

This site is influenced by riparian water features. Precipitation and seasonal snow melt on the site and run off from nearby slopes are the main sources of water.

Soil features

Soils are Entisols with little to no development (Soil Survey Staff, 2013). They are very deep and moderately well drained. They support a cryic temperature regime. Parent material is comprised of alluvium.

Soil characteristics affecting vegetation include soil hydrology and development. Soil development is limited due to the frequent flooding of this site, causing deposition and erosion occur to quickly for soil horizons to develop (Soil Survey Staff, 2013). The condition of the soil at a particular site is reflected in the type, variety and amount of plant species found there. A water table is present at the beginning of the growing season. This restricts the vegetation that can grow here during the important early growing season months.

Correlated soil components in MLRA 236: Nunachuak; D36-Boreal scrub gravelly flood plains, low; D36-Boreal scrub loamy flood plains, wet; E36-Maritime scrub-gravelly low flood plains; E36-Maritime scrub-loamy low flood plains

Table 5. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Very fine sandy loam
Drainage class	Moderately well drained
Permeability class	Moderate to moderately rapid
Soil depth	60 in
Surface fragment cover <=3"	7%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	1.2–1.8 in
Soil reaction (1:1 water) (0-10in)	5.7–6.1
Subsurface fragment volume <=3" (Depth not specified)	7–56%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 6. Representative soil features (actual values)

Drainage class	Very poorly drained to moderately well drained
Permeability class	Slow to moderately rapid
Soil depth	60 in
Surface fragment cover <=3"	0–7%
Surface fragment cover >3"	0–5%
Available water capacity (0-10in)	0.5–3.8 in
Soil reaction (1:1 water) (0-10in)	4.6–7.6
Subsurface fragment volume <=3" (Depth not specified)	0–56%
Subsurface fragment volume >3" (Depth not specified)	0–20%

Ecological dynamics

This site is on lowland flood plain talfs. Local site factors, including microtopographic elevation, soil characteristics, and flooding and ponding effects support three vegetative communities. The reference plant community is a closed willow scrubland

Spatial and temporal patterns in soil and site hydrology create three flood plain communities. A shallow water table is present at the beginning of the growing season, restricting plants to facultative to obligate wetland species on

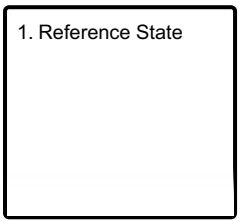
these flood plains. Frequent flooding deposits sediment which are reflected in the minimally developed soil horizons. In these wet, normal conditions, a scrubland of hydrophytic willows will develop. In wetter areas, vegetation is further restricted to facultative wet to obligate herbaceous species. These wetter areas coincide with areas supporting a shallow water table further through the growing season and with lower areas of the flood plain that occasionally pond.

Changes in hydrology can shift one community to the other. Increased flooding frequency may restrict slower growing shrubs from sustaining a community. Increased hydrological effects, such as a raised water table due to increased system precipitation, can also shift vegetation away from a shrubland and towards a grassland or meadow.

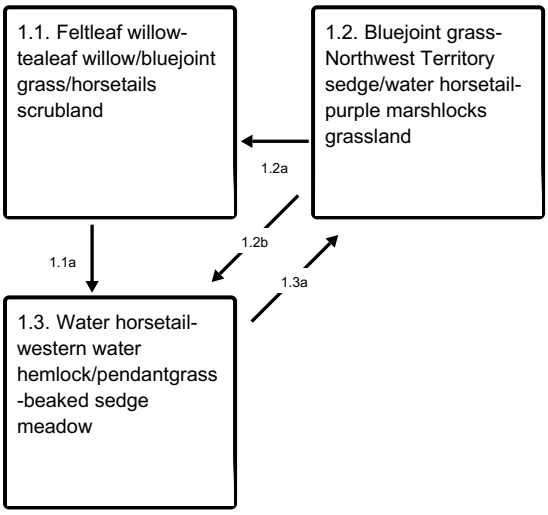
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant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

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - Raised water table or increased flooding or ponding period

1.2a - Lowered water table or decreased flooding or ponding period

1.2b - Raised water table or increased flooding or ponding period

1.3a - Lowered water table or decreased flooding or ponding period

State 1
Reference State

The reference state supports three community phases, which are grouped by the structure and dominance of the vegetation (e.g., shrubs, forbs, and graminoids) and by their ecological function and stability. The presence of these communities is dictated temporally by flooding. The reference community phase is represented by closed scrubland that has intermittent graminoids and forbs throughout. No alternate states have been observed.

Community 1.1

Feltleaf willow-tealeaf willow/bluejoint grass/horsetails 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	Feltleaf willow	*Salix alaxensis*	SAAL	88	65
S	Tealeaf willow	*Salix pulchra*	SAPU15	88	7
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	88	15
F	Purple marshlocks	*Comarum palustre*	COPA28	65	9
F	Western touch-me-not	*Impatiens noli-tangere*	IMNO	38	15
F	Horsetails	*Equisetum spp.*	EQUIS^	88, 38, 38	15, 9, 2

^ Horsetails (*Equisetum spp.*) are represented by three species: *E. arvense*, *E. pratense* and *E. sylvaticum*, respectively.

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

The reference community phase is characterized by dense willow scrubland that has some graminoids and forbs in the understory. Typically, this community consists of a mix of medium and tall feltleaf willow (*Salix alaxensis*) and tealeaf willow (*S. pulchra*) and bluejoint grass (*Calamagrostis canadensis*), horsetails (Equisetum spp.), and purple marshlocks (*Comarum palustre*). Other common hydrophilic species may include thinleaf alder (*Alnus incana* ssp. tenufolia), Northwest Territory sedge (*Carex utriculata*), water sedge (*Carex aquatilis*), fireweed (*Chamerion angustifolium*), and kneeling angelica (*Angelica genuflexa*). Individual regenerative or stunted paper birch (*Betula papyrifera*) trees may be present. Moss commonly is in the ground cover (about 10 percent total mean cover), and lichens are rare. Other ground cover commonly includes herbaceous litter (about 45 percent cover), woody litter (about 1 percent), rock fragments (about 1 percent), and water (about 1 percent). About 50 percent is bare soil.

Community 1.2
Bluejoint grass-Northwest Territory sedge/water horsetail-purple marshlocks grassland

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	75	35
F	Purple marshlocks	*Comarum palustre*	COPA28	100	10
F	Water horsetail	*Equisetum fluviatile*	EQFL	50	35
F	Mackenzie's water hemlock	*Cicuta virosa*	CIVI5	50	Trace

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

The late flooding community phase is characterized by grassland consisting of facultative or obligate wetland graminoids and forbs. Typically, this community consists of a mix of various graminoids and forbs, including bluejoint grass (*Calamagrostis canadensis*), Northwest Territory sedge (*Carex utriculata*), water horsetail (*Equisetum fluviatile*), Mackenzie's water hemlock (*Cicuta virosa*), and purple marshlocks (*Comarum palustre*). Other species may include dwarf birch (*Betula nana*), feltleaf willow (*Salix alaxensis*), water sedge (*Carex aquatilis*), arctic sweet coltsfoot (*Petasites frigidus*), and marsh pea (*Lathyrus palustris*). Mosses are prevalent in the ground cover (45 percent total mean cover), including one or more species of sphagnum moss (Sphagnum spp.). Other ground cover commonly includes herbaceous litter (about 20 percent cover) and woody litter (about 2 percent). About 55 percent is bare soil.

Community 1.3
Water horsetail-western water hemlock/pendantgrass-beaked sedge meadow

Figure 12. Typical area of community 1.3.

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	Pendantgrass	*Arctophila fulva*	ARFU2	100	4
G	Beaked sedge	*Carex rostrata*	CARO6	50	8
F	Water horsetail	*Equisetum fluviatile*	EQFL	100	95
F	Western water hemlock	*Cicuta douglasii*	CIDO	100	3

Figure 13. Constancy and canopy cover of plants in community 1.3.

The early flooding community phase is characterized by a forb meadow. Typically, this community consists of water horsetail (*Equisetum fluviatile*) and scattered western water hemlock (*Cicuta douglasii*), pendantgrass (*Arctophila fulva*), and beaked sedge (*Carex rostrata*) throughout. Other species may include northern bedstraw (*Galium boreale*), bluejoint grass (*Calamagrostis canadensis*), and some regenerative shrubs such as feltleaf willow (*Salix alaxensis*). The presence of mosses and lichens in this recently disturbed phase commonly is negligible. Ground cover typically is not present, but some herbaceous litter is present. Some areas of the surface are covered by water. Note: The vegetation and soils for this community were sampled at two locations. Due to the limited data available, personal field observations were used to aid in describing the plant community.

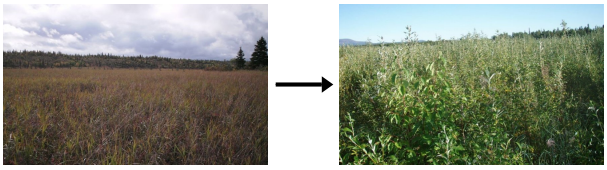
Pathway 1.1a
Community 1.1 to 1.3

Feltleaf willow-tealeaf willow/bluejoint grass/horsetails scrubland

Water horsetail-western water hemlock/pendantgrass-beaked sedge meadow

A hydrologic shift that consistently raises the water table during the growing season can shift the scrubland community towards a wetland meadow. A sustained increase in watershed precipitation may raise the water table. Similarly, a watershed fire can lead to increased runoff and a higher water table. Additionally, increased flooding frequency or duration may retard the reproduction of slow-reproducing species such as shrubs and cause a shift to faster growing, disturbance-loving herbaceous species.

Pathway 1.2a
Community 1.2 to 1.1



Bluejoint grass-Northwest Territory sedge/water horsetail-purple marshlocks grassland

Feltleaf willow-tealeaf willow/bluejoint grass/horsetails scrubland

This pathway occurs as the effects of ponding decreases or the growing season water table drops to levels noted in the reference plant community.

Pathway 1.2b
Community 1.2 to 1.3

Bluejoint grass-Northwest Territory sedge/water horsetail-purple marshlocks grassland

Water horsetail-western water hemlock/pendantgrass-beaked sedge meadow

A hydrologic shift that consistently raises the water table can alter the established community. A sustained increase in watershed precipitation may raise the water table. A watershed fire can lead to increased runoff and a higher water table.

Pathway 1.3a
Community 1.3 to 1.2

Water horsetail-western water hemlock/pendantgrass-beaked sedge meadow

Bluejoint grass-Northwest Territory sedge/water horsetail-purple marshlocks grassland

This pathway occurs as the effects of ponding decreases or the growing season water table drops.

Additional community tables

Inventory data references

Modal points for Community 1.1
09AO12101
09SS11804
09SS15009
10TD11201

Modal points for community 1.2
08MM13206
08LL09604

Modal points for community 1.3
08MM10402
08LL07407

References

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Other 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	05/12/2025
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):**

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):**

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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:**
