

Ecological site R238XY405AK

Arctic Scrub Loamy Flood Plain

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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): 238X–Yukon-Kuskokwim Coastal Plain

Geography

The Yukon-Kuskokwim Coastal Plain area (MLRA 238x) consists of the broad, nearly level delta along the lower reaches of the Yukon and Kuskokwim rivers, where the rivers empty into the Bering Sea. The Yukon River runs along the northern edge of the area while the Kuskokwim River runs along the southern edge. This MLRA makes up 31,565 square miles. MLRA 238x is bordered by MLRA 240x (Nulato Hills-Southern Seward Peninsula Highlands) to the North, MLRA 237x (Ahklun Mountains) to the South, and MLRAs 230x (Yukon-Kuskokwim Highlands) and 229x (Interior Alaska Lowlands) to the East. Although the MLRA is mostly undeveloped wild land and is sparsely populated, there are 42 villages scattered along the coast or the banks of the Yukon and Kuskokwim Rivers. The principal communities are Aniak, Bethel, Emmonak, Hooper Bay, and Saint Mary's.

Physiography

Although primarily comprised of deltaic lowlands, in a few areas, isolated low hills rise above the surrounding coastal plain. Numerous low-gradient streams meander through this MLRA, many of which are tributaries or former channels of the Yukon and Kuskokwim Rivers. Depressions and shallow basins on the coastal plain are dotted with interconnecting stream channels, wetlands, and countless small and medium-size lakes. On the floodplains between channels and wetlands, low escarpments, meander scars, oxbow lakes, sloughs, and islands can be found. The coastline is broken by several large inlets and bays, including Baird Inlet, which forms a large inland sea behind Nelson Island.

Elevations generally range from sea level to 300 feet but reach heights of 2,342 feet at the

summit of Towak Mountain. A vast majority of the surface water from interior and western Alaska drains into the Bering Sea through MLRA 238x. Major rivers include the Yukon, Kuskokwim, Tovers, Black, Azun, Kashunuk, and Izaviknek Rivers. In addition to the various rivers and tributaries, lakes make up about 40 percent of this MLRA. This area is in the zone of discontinuous permafrost, where permafrost is thin to moderately thick and primarily occurs in fine textured soils. Permafrost does not generally occur on flood plains or in areas near bodies of water.

Geology

MLRA 238x was unglaciated during the Pleistocene, except for along the southern edge, where glaciers from the Ahklun mountains may have extended into portions of the lowlands. A majority of the sediments across the area are fine textured Holocene and Pleistocene deltaic deposits from the Yukon and Kuskokwim Rivers, and loamy and sandy Holocene fluvial deposits on flood plains and stream terraces. In the western part of the MLRA, low basalt hills, cinder cones, and volcanic craters from the Cretaceous and Tertiary can be found.

Climate

The climate of MLRA 238x is primarily maritime throughout the summer, and when Bering Sea ice pack forms in the winter, it becomes more characteristic of a continental climate. Summers are short, cloudy, and rainy while winters are long, cold, and foggy, especially in coastal areas. Windy conditions are common throughout the year. Mean annual precipitation is 12 to 30 inches and mean annual snowfall ranges from 40 to 90 inches. Freeze-free period range 116 to 150 days, but freezing temperatures can occur year-round, although rare in June, July, and August. This cold climate leads to MLRA 238x being included in the Arctic.

Soils

The dominant soil orders in MLRA 238x are Gelisols, Histosols, Inceptisols, and Entisols. Soils have a subgelic or cryic temperature regime, and an aquic or udic moisture regime. Fibristels, Hemistels, Histoturbels, and Aquiturbels are the most common Gelisol great groups. Fibristels and Hemistels have thick accumulations of organic material and occur in depressions and shallow basins. The Orthels and Turbels have comparably thinner surface organic material. The Histoturbels are common in elevated and convex areas and Aquiturbels are common on terraces and drainageways. Inceptisols, Entisols, and Histosols do not have permafrost within the soil profile. Histosols occur in depressions with thick accumulations of organic material. Inceptisols occur on the slopes of hills and mountains, swales, terraces, and flood plains. Entisols occur on shore complex and flood plains.

Vegetation

Lakes, ponds, and other types of surface water are common in this area and vegetation

near these water bodies include wet sedge meadows, sedge-shrub meadows, and sedge-moss meadows. Low uplands support low and dwarf ericaceous shrubs, tussock-forming sedges, other hydrophytic plants, and mosses. Sites with higher local relief and better drainage support low ericaceous scrub with mosses, lichens, willows, and forbs. Low ericaceous shrubs, willow, alder, and mosses are understory associated in these forests and woodlands.

Land use

Residents use this area primarily for subsistence hunting, fishing, and gathering. Less than one percent of the MLRA is urban, and most communities are along the coast or major rivers and lakes. Disturbance of fragile permafrost soils is the major soil resource concern in this area, resulting from damage of insulating organic material that allows permafrost in upper soil layers to thaw. This can lead to ponding, soil subsidence, erosion, and altered hydrologic function. In order to slow the thawing of permafrost, management is needed to protect organic material and promote thermal balance of soils.

Classification relationships

Landfire Biophysical Settings:

Landfire BPS – 17150 – Alaska Arctic Floodplain

Landfire BPS – 17140 – Alaska Arctic Large River Floodplain
(LANDIRE biophysical settings 2009)

Viereck Communities:

open tall scrub - willow – II.B.2.a
(Viereck et al. 1992)

Ecological site concept

- This arctic ecological site occurs on flood plains and channels of flood plains.
- Soils formed in silty and/or sandy alluvium.
- Soils flood frequently or occasionally for brief durations.
- Soils have a shallow to moderately deep water table early in the growing season and are considered somewhat poorly to moderately well drained.
- Soils are very deep without restrictions.
- The reference plant community is characterized as open to closed tall scrub (Viereck et al. 1992) with feltleaf willow and tealeaf willow as common plants. Three plant communities were identified within the reference state related to flood regime and depth to a water table in the soil profile.

Associated sites

R238XY101AK	Arctic Silty Shore Complex Ecological site 101 occurs downstream on shore complex with tidal influences that support halophytic sedge wet meadow.
R238XY402AK	Arctic Scrub Hills and Mountains Complex Ecological site 402 occurs on adjacent terraces and slopes with moist soils without permafrost that support dwarf scrub communities.
R238XY404AK	Arctic Loamy Frozen Tussock Tundra Ecological site 404 occurs on adjacent stream terraces and slopes with wet soils underlain by permafrost that supports tussock tundra.
R238XY407AK	Arctic Sedge Peat Depressions Ecological site 407 occurs in adjacent depressions with wet sedge meadow communities.

Similar sites

R238XY408AK	Arctic Scrub Loamy Frozen Swales and Drainageways Occurs on swales and drainageways with willow scrub communities but with different kinds and amounts of vegetation including much more sedge and other obligate wetland plants.
R239XY020AK	Arctic Scrub Gravelly Flood Plains Associated with similar flood plain vegetation but to the west in the Northern Bering Sea Islands MLRA (239X).

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Salix alaxensis</i> (2) <i>Salix pulchra</i>
Herbaceous	(1) <i>Calamagrostis canadensis</i> (2) <i>Equisetum arvense</i>

Physiographic features

- Occurs on flood plains and channels on flood plains. These flood plains occasionally have small depressions.
- Elevations typically range from 10 to to 300 feet above sea level.
- Slope is nearly level and occur on all aspects.
- Frequent to occasional flooding for brief durations of time. Low flood plain levels flood more frequently then high flood plain levels.
- Flood plains do not pond. Small depressions on flood plains occasionally pond for brief durations.
- A water table typically occurs at shallow to moderate depths (10 to 40 inches). The water table occurs closer to the soil surface in depressions and much deeper on the highest

levels of the flood plain.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain (2) Alluvial plain > Flood plain > Channel (3) Alluvial plain > Depression
Runoff class	Negligible to very low
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding duration	Not specified
Ponding frequency	None
Elevation	3–91 m
Slope	0–2%
Ponding depth	Not specified
Water table depth	25–102 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding duration	Not specified
Flooding frequency	Not specified
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to occasional
Elevation	3–160 m
Slope	Not specified
Ponding depth	10 cm
Water table depth	0–152 cm

Climatic features

Sea ice strongly influences the climate of MLRA 238x, as it does throughout Western Alaska. The climate is characteristically maritime throughout the summer months, where cool, moist air moves from the Bering Sea into coastal lowlands. As sea ice forms in the winter, the climate becomes more characteristic of a continental climate. These cold year-round conditions is the reason MLRA 238x is considered Arctic despite being approximately 500 miles south of the Arctic circle.

Winters are cold and long, with average low temperatures between 0 and 4 degrees (F) December through February. Winter and early spring is the driest time of the year with less than an inch of precipitation per month falling January through April. Summers in this area are cool, short, and often cloudy and rainy. June through October are considerably wetter, with the most precipitation falling in August and September. This area receives, on average, 19 inches of precipitation and 89 frost free days per year.

Table 4. Representative climatic features

Frost-free period (characteristic range)	89 days
Freeze-free period (characteristic range)	119 days
Precipitation total (characteristic range)	483 mm
Frost-free period (actual range)	89 days
Freeze-free period (actual range)	119 days
Precipitation total (actual range)	483 mm
Frost-free period (average)	89 days
Freeze-free period (average)	119 days
Precipitation total (average)	483 mm

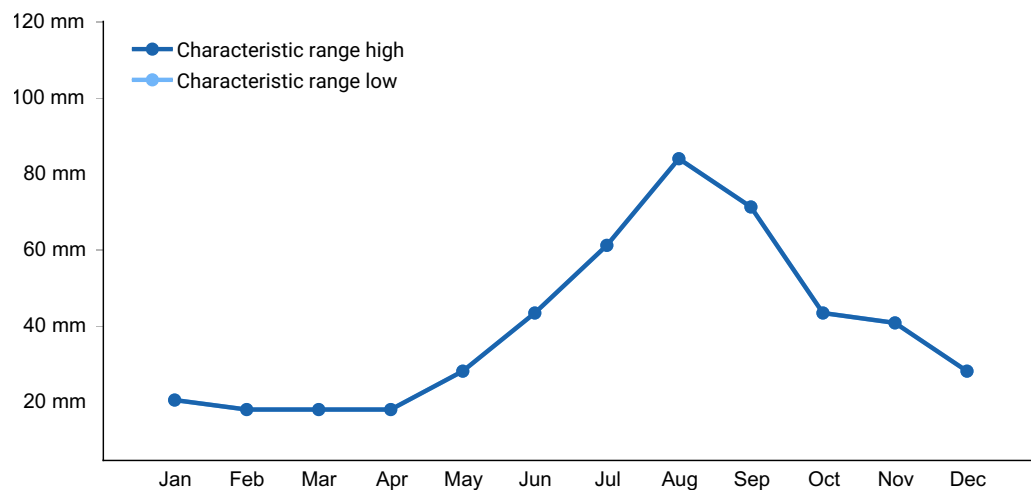


Figure 1. Monthly precipitation range

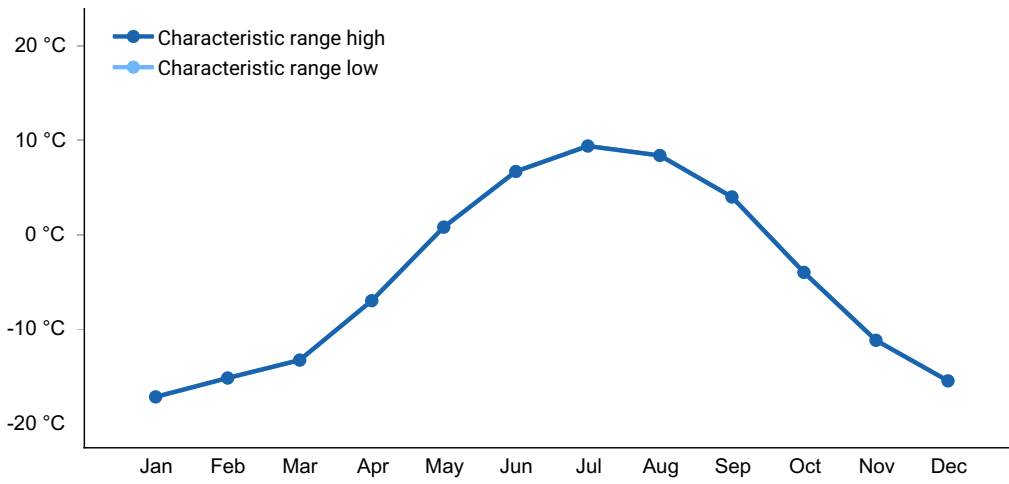


Figure 2. Monthly minimum temperature range

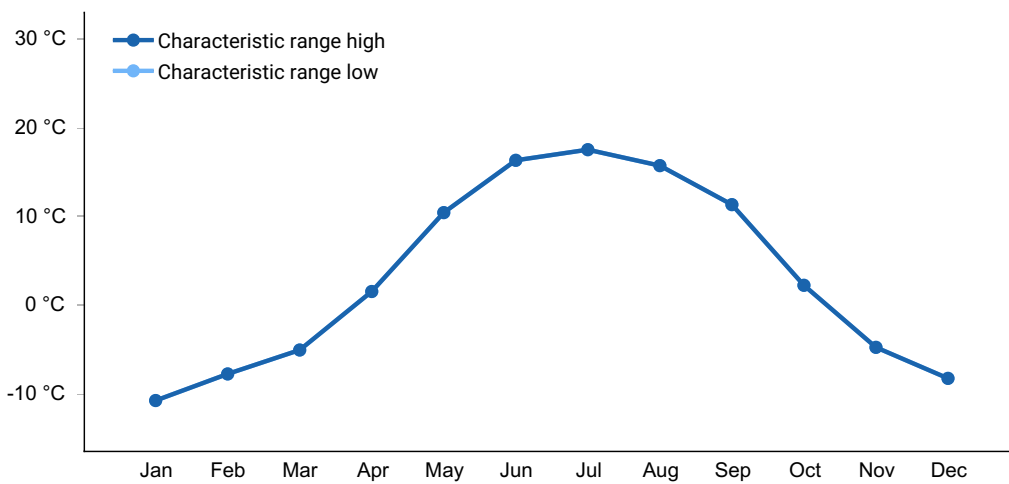


Figure 3. Monthly maximum temperature range

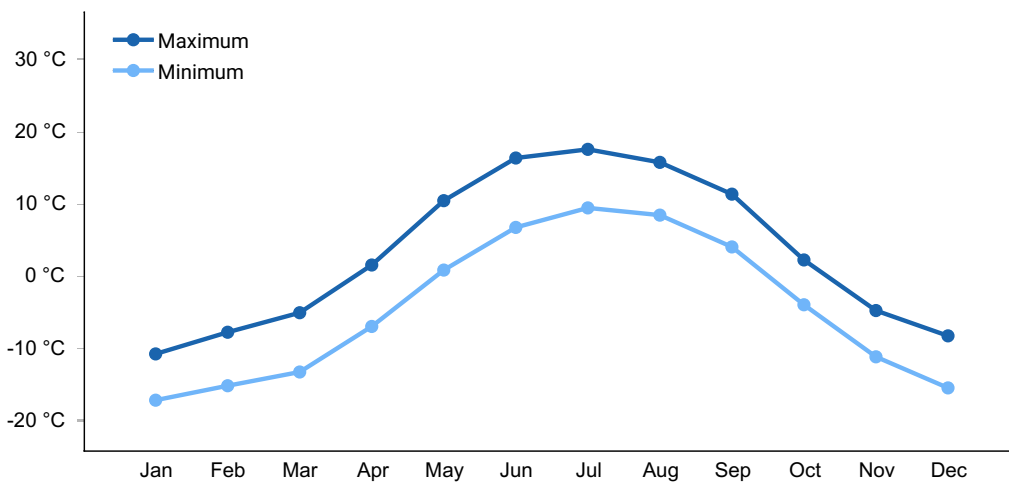


Figure 4. Monthly average minimum and maximum temperature

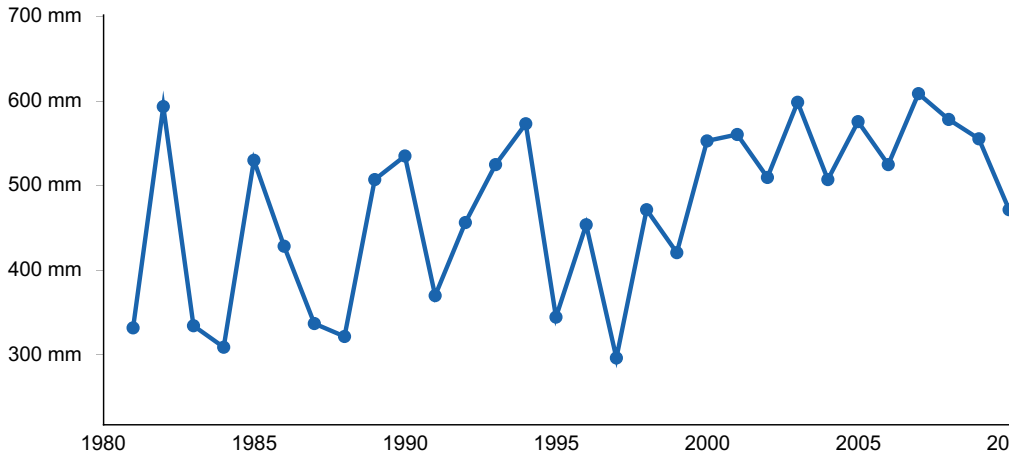


Figure 5. Annual precipitation pattern

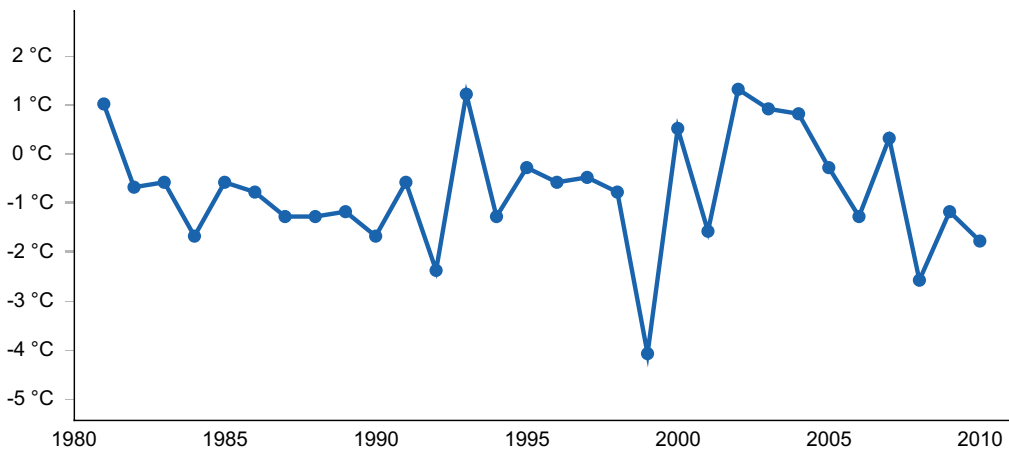


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BETHEL AP [USW00026615], Bethel, AK

Influencing water features

This ecological site is considered a riverine wetland. Dominant water sources are often overbank flow from the channel or subsurface hydraulic connections between the stream channel and wetlands.

Wetland description

This ecological site is classified as a riverine wetland under the Hydrogeomorphic (HGM) classification system (Smith et al. 1995; USDA-NRCS 2008).

Soil features

- Soils formed in sandy and/or silty alluvium
- Rock fragments are not common on the soil surface or in the soil profile

- Soils that flood more frequently have exposed mineral soils that lack an organic cap. As flooding decreases, organic material can increase to several inches or more thick. Surface mineral horizon textures are commonly stratified silt loam, fine sand, and silts.
- Soils are considered very deep and typically lack restrictions. The highest levels of the flood plain occasionally have permafrost at shallow to moderate depths (12 to 35 inches).
- Soil pH ranges from moderately acidic to slightly alkaline
- Soils are typically somewhat poorly to moderately well drained.

The Arctic Scrub Loamy Flood Plain ecological site is correlated to 20 soil components. Soils typically classify as Entisols in the great groups Cryaquents, Cryofluvents, and Cryorthents. Inceptisols (Cryaquepts) and Gelisols (Aquorthels) can occasionally occur on less frequently flooded levels of the flood plain.

Table 5. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam (2) Fine sand (3) Silt
Family particle size	(1) Coarse-silty (2) Coarse-loamy
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Moderately rapid
Depth to restrictive layer	Not specified
Soil depth	152 cm
Surface fragment cover ≤3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	9.91–18.54 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Clay content (0-50.8cm)	0–10%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-25.4cm)	5.6–7.5

Subsurface fragment volume ≤3" (0-152.4cm)	0%
Subsurface fragment volume >3" (0-152.4cm)	0%

Table 6. Representative soil features (actual values)

Drainage class	Poorly drained to well drained
Permeability class	Not specified
Depth to restrictive layer	30 cm
Soil depth	Not specified
Surface fragment cover ≤3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	2.29–50.04 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Clay content (0-50.8cm)	Not specified
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–3
Soil reaction (1:1 water) (0-25.4cm)	3.7–8
Subsurface fragment volume ≤3" (0-152.4cm)	0–70%
Subsurface fragment volume >3" (0-152.4cm)	0–5%

Ecological dynamics

The Yukon-Kuskokwim Coastal Plain MLRA has a harsh climate and cold soils and occurs in the zone of discontinuous permafrost. This MLRA occurs in the arctic biome and has a growing season that is both short and cold. As a result, the vertical and horizontal structure of vegetation is severely limited. Vegetation within the arctic biome is typically restricted to dwarf shrubs, mosses, and lichens.

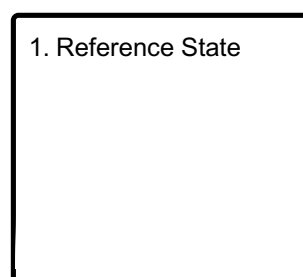
Flooding

For this Arctic Scrub Loamy Flood Plain ecological site, bare mineral soil is common

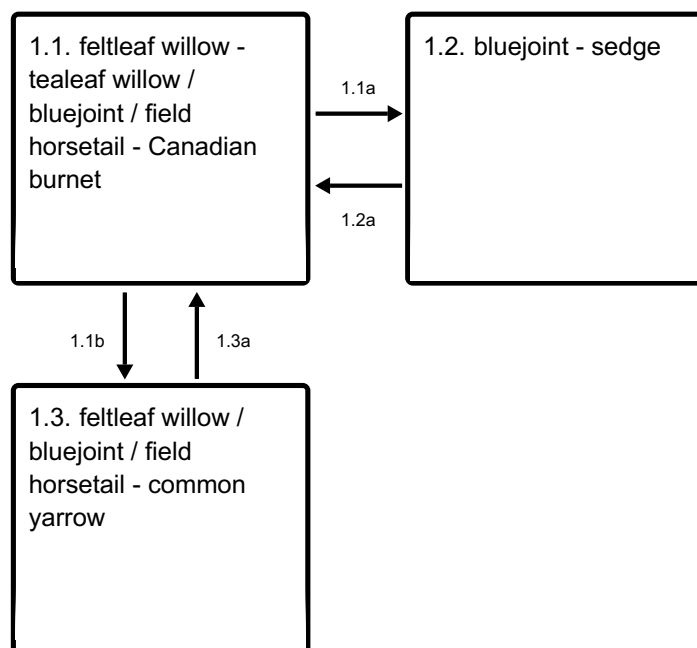
directly adjacent to the active channel. Colonizing this bare alluvium are two pioneering plant communities largely composed of sparse shrubs, grasses, and/or forbs (community 1.2 and 1.3). Community 1.2 has moist soils, while community 1.3 has comparatively wetter soils. For this ecological site, these plant communities have the most frequent and longest duration flooding. As flooding becomes less severe, willow shrub cover increases substantially (community 1.1). The reference plant community has open to closed low scrub vegetation (Viereck et al. 1992) with feltleaf willow and tealeaf willow dominant shrubs.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - more frequent and longer duration flooding associated with wet soils

1.1b - more frequent and longer duration flooding with moist soils

1.2a - less frequent and shorter duration flooding

1.3a - less frequent and shorter duration flooding

State 1 Reference State

The reference plant community is characterized as open to closed tall scrub willow

(Vioreck et al. 1992). Three plant communities occur within the reference state and the vegetation differs in large part due to flood regime and hydrology. All plant communities associated with this ecological site have limited data, so the state-and-transition model is provisional.

Dominant plant species

- feltleaf willow (*Salix alaxensis*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- field horsetail (*Equisetum arvense*), other herbaceous

Community 1.1

feltleaf willow - tealeaf willow / bluejoint / field horsetail - Canadian burnet

Plant community 1.1 is characterized as open to closed tall scrub (Vioreck et al. 1992) with the dominant overstory vegetation being feltleaf willow and/or tealeaf willow. The scrub layer does not typically exceed 5 feet in height. Other common species include bluejoint, field horsetail, and Canadian burnet. The soil surface is primarily covered with herbaceous litter. The vegetative strata that characterize this community are medium shrubs (between 3 and 10 feet), medium graminoids (between 4 and 24 inches) and medium forbs (between 4 and 24 inches). The binomial name of these and other less common associated plants can be found in the dominant plant species table below.

Dominant plant species

- feltleaf willow (*Salix alaxensis*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- Richardson's willow (*Salix richardsonii*), shrub
- Sitka alder (*Alnus viridis ssp. sinuata*), shrub
- thinleaf alder (*Alnus incana ssp. tenuifolia*), shrub
- grayleaf willow (*Salix glauca*), shrub
- entireleaf mountain-avens (*Dryas integrifolia*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- field horsetail (*Equisetum arvense*), other herbaceous
- Canadian burnet (*Sanguisorba canadensis*), other herbaceous
- dwarf fireweed (*Chamerion latifolium*), other herbaceous
- arctic lupine (*Lupinus arcticus*), other herbaceous
- alpine sweetvetch (*Hedysarum alpinum*), other herbaceous

Community 1.2

bluejoint - sedge

Community 1.2 is characterized as bluejoint meadow (Vioreck et al. 1992) with the dominant plant being bluejoint. It occurs in areas where flood plain morphology results in wet soils (e.g. channels, backswamps, distal positions to levees). Other common species

include various sedge, field horsetail, purple marshlocks, and Canadian burnet. The soil surface is primarily covered with herbaceous litter. The vegetative strata that characterize this community are medium graminoids (between 4 and 24 inches). The binomial name of these and other less common associated plants can be found in the dominant plant species table below.

Dominant plant species

- bluejoint (*Calamagrostis canadensis*), grass
- sedge (*Carex*), grass
- field horsetail (*Equisetum arvense*), other herbaceous
- purple marshlocks (*Comarum palustre*), other herbaceous
- Canadian burnet (*Sanguisorba canadensis*), other herbaceous

Community 1.3

feltleaf willow / bluejoint / field horsetail - common yarrow

Community 1.3 is a pioneering plant community on flood plain areas with drier soils (e.g. point bars and levees). This community is sparsely vegetated and is commonly characterized as open low scrub (Viereck et al. 1992). Within the reference state for this site, this community has the most severe flood regime. This community is often highly diverse. Commonly observed species include feltleaf willow, bluejoint, field horsetail, common yarrow, yellow marsh marigold, dwarf fireweed, Tilesius' wormwood, and nootka lupine. The binomial name of these and other less common associated plants can be found in the dominant plant species table below.

Dominant plant species

- feltleaf willow (*Salix alaxensis*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- field horsetail (*Equisetum arvense*), other herbaceous
- common yarrow (*Achillea millefolium*), other herbaceous
- dwarf fireweed (*Chamerion latifolium*), other herbaceous
- Tilesius' wormwood (*Artemisia tilesii*), other herbaceous
- yellow marsh marigold (*Caltha palustris*), other herbaceous
- arctic lupine (*Lupinus arcticus*), other herbaceous

Pathway 1.1a

Community 1.1 to 1.2

More frequent and longer duration flooding over wet soils. Flooding removes or kills vegetation. This community pathway associated with wet soils on flood plain is favorable for recovery by herbaceous species and less favorable for willow.

Pathway 1.1b

Community 1.1 to 1.3

More frequent and longer duration flooding over moist soils. Soils are not as wet as in pathway 1.1a. Flooding removes vegetation. This community pathway associated with moist soils on flood plain results in a mix of willow and herbaceous species at a young or pioneering growth stage.

Pathway 1.2a

Community 1.2 to 1.1

Flood regime changes resulting in deposition of gravelly alluvium that favors willow dominance and soils that are less wet.

Pathway 1.3a

Community 1.3 to 1.1

Less frequent and shorter duration flooding. Areas on the flood plain further from the active stream channel (height and distance) tend to have willow dominant plant communities. These distal areas receive comparably less intense flood events that allow for shrub colonization and growth.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
2	Shrubs Annual Production			3811–5716	
	feltleaf willow	SAAL	<i>Salix alaxensis</i>	2242–4708	–
	tealeaf willow	SAPU15	<i>Salix pulchra</i>	179–673	–
	Alaska bog willow	SAFU	<i>Salix fuscescens</i>	0–336	–
Grass/Grasslike					
3	Grass/Grasslike Annual Production			448–673	
	bluejoint	CACA4	<i>Calamagrostis canadensis</i>	897–2690	–
	water sedge	CAAQ	<i>Carex aquatilis</i>	0–67	–
	tall cottongrass	ERAN6	<i>Eriophorum angustifolium</i>	0–67	–
	sweetgrass	HIERO	<i>Hierochloe</i>	0–67	–
	Alpine Meadow-Foxtail	ALMA8	<i>Alopecurus magellanicus</i>	0–67	–
Forb					

4	Fob Annual Production			224–336	
	Canadian burnet	SACA14	<i>Sanguisorba canadensis</i>	90–336	–
	field horsetail	EQAR	<i>Equisetum arvense</i>	90–336	–
	water horsetail	EQFL	<i>Equisetum fluviatile</i>	0–67	–
	oysterleaf	MEMA3	<i>Mertensia maritima</i>	0–67	–
	arctic sweet coltsfoot	PEFR5	<i>Petasites frigidus</i>	0–67	–
	tall Jacob's-ladder	POAC	<i>Polemonium acutiflorum</i>	0–67	–
	northern Jacob's-ladder	POBO2	<i>Polemonium boreale</i>	0–67	–
	silverweed cinquefoil	ARAN7	<i>Argentina anserina</i>	0–67	–
	purple marshlocks	COPA28	<i>Comarum palustre</i>	0–67	–
	cloudberry	RUCH	<i>Rubus chamaemorus</i>	0–67	–
	seacoast angelica	ANLU	<i>Angelica lucida</i>	0–67	–
	boreal sagebrush	ARAR9	<i>Artemisia arctica</i>	0–67	–
	yellow marsh marigold	CAPA5	<i>Caltha palustris</i>	0–67	–
	arctic daisy	CHARA	<i>Chrysanthemum arcticum</i> <i>ssp. arcticum</i>	0–67	–
	Pacific hemlockparsley	COGM	<i>Conioselinum gmelinii</i>	0–67	–
	spiked saxifrage	SASP4	<i>Saxifraga spicata</i>	0–67	–
	Aleutian violet	VILA6	<i>Viola langsdorffii</i>	0–67	–
Moss					
5	Total Bryophyte Biomass			6–56	
	sphagnum	SPHAG2	<i>Sphagnum</i>	6–56	–
Lichen					
6	Total Lichen Biomass			–	

Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	Shrubs Annual Production			–	

Grass/Grasslike					
2	Grass/Grasslike Annual Production			1211–2118	
	bluejoint	CACA4	<i>Calamagrostis canadensis</i>	1009–2001	–
	common woodrush	LUMU2	<i>Luzula multiflora</i>	28–140	–
	sedge	CAREX	<i>Carex</i>	0–45	–
	Altai fescue	FEAL	<i>Festuca altaica</i>	0–45	–
	American dunegrass	LEMOV	<i>Leymus mollis ssp. villosissimus</i>	0–22	–
Forb					
3	Fob Annual Production			135–235	
	field horsetail	EQAR	<i>Equisetum arvense</i>	2–140	–
	Canadian burnet	SACA14	<i>Sanguisorba canadensis</i>	28–95	–
	purple marshlocks	COPA28	<i>Comarum palustre</i>	11–73	–
	tall Jacob's-ladder	POAC	<i>Polemonium acutiflorum</i>	0–45	–
	ledge stonecrop	RHIN11	<i>Rhodiola integrifolia</i>	11–45	–
	silverweed cinquefoil	ARAN7	<i>Argentina anserina</i>	0–22	–
	cloudberry	RUCH	<i>Rubus chamaemorus</i>	0–22	–
	woolly geranium	GEER2	<i>Geranium erianthum</i>	0–22	–
	tall bluebells	MEPA	<i>Mertensia paniculata</i>	0–22	–
	Fremont's beardtongue	PEFR	<i>Penstemon fremontii</i>	0–22	–
	arctic sweet coltsfoot	PEFRF	<i>Petasites frigidus var. frigidus</i>	0–22	–
	Tilesius' wormwood	ARTI	<i>Artemisia tilesii</i>	0–22	–
	Sierra larkspur	DEGL3	<i>Delphinium glaucum</i>	0–22	–
Moss					
4	Total Bryophyte Biomass			–	
Lichen					
5	Total Lichen Biomass			–	

Animal community

Not available.

Hydrological functions

Not available.

Recreational uses

Not available.

Wood products

Not available.

Other products

Not available.

Other information

Not available.

Inventory data references

The vegetation modeled for this site has limited data and is considered provisional. The associated model was largely developed from NRCS staff with working knowledge of the area and literature review.

Other references

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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	04/11/2026
Approved by	Blaine Spellman
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):**

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:**
