USDA Natural Resources
Conservation Service

Ecological site F227XY111AK
Peat Mounds Pergelic Cryohemists, Dry

Accessed: 05/13/2025

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.

Table 1. Dominant plant species

Tree	(1) *Picea mariana*
Shrub	(1) *Vaccinium uliginosum*
Herbaceous	Not specified

Physiographic features

This site occurs on frozen peat mounds (also called palsa) adjacent to ponds, lakes, and wet meadows on glaciolacustrine uplands and occasionally on stream terraces. The rounded to flat-topped mounds and ridges are elevated 2 to 30 feet (0.6 to 9.1 m) above the adjacent landscape. Frozen peat, often with thin lenses or large ice masses, is usually encountered within 40 inches (102 cm) of the surface and most mounds have a core of massive ice at varying depths. Slopes range from 0 to 100 percent. Elevation is 1900 to 2500 feet (579 to 762 m).

In the Gulkana River area, this site is found in scattered locations usually of small extent on lacustrine terraces above the North Branch, West Fork and Main Stem. It is also found occasionally on stream terraces near the confluence of the Middle Fork and the Main Stem. This site likely occurs elsewhere in the Copper River basin.

Table 2. Representative physiographic features

Landforms	(1) Lake terrace

Elevation	579–762 m
Slope	1–100%
Aspect	Aspect is not a significant factor

Climatic features

The subarctic continental climate of this site is characterized by long cold winters and short warm summers. Mean January temperature is -2 °F.; mean July temperature is 54 °F. Mean annual precipitation ranges from 15 to 21 inches. Annual snowfall ranges from 54 to 102 inches. The frost-free season is about 60 to 80 days (28 °F. base temperature). The growing season varies greatly from year to year and frosts can occur during any summer month.

Table 3. Representative climatic features

Frost-free period (average)	80 days
Freeze-free period (average)	0 days
Precipitation total (average)	533 mm

Influencing water features

Soil features

The soils on this site are formed in slightly to moderately decomposed organic materials derived from Sphagnum spp., Carex spp., and ericaceous shrubs. Mineral lenses and horizons are present in some soils. In most places, the soils are shallow or moderately deep over permafrost. Most soils do not have a water table perched on the permafrost and are well drained.

Table 4. Representative soil features

Drainage class	Well drained
Soil depth	61–81 cm
Available water capacity (0-101.6cm)	0.76–0.89 cm

Ecological dynamics

This site is probably highly susceptible to wild fire in most places. During summer and in otherwise dry years, the elevated, convex mounds are well drained and the surface organic matter is dry. This site also occurs adjacent to other glaciolacustrine upland ecological sites, which are highly susceptible to wild fire. Adjacent ponds and Sedge wet meadows may provide some degree of fire protection.

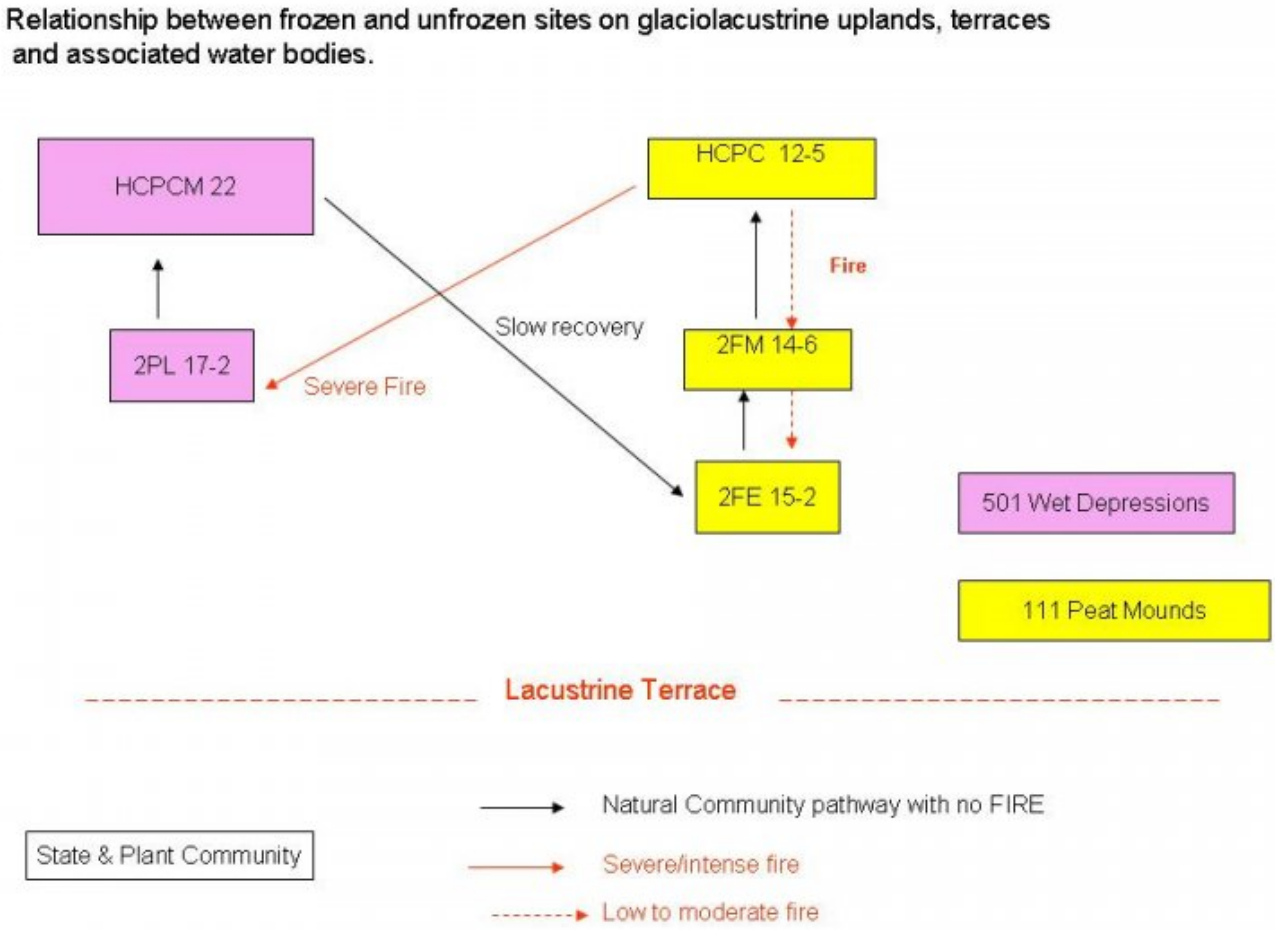
Following a light burn, vegetative succession should lead directly and rather quickly to scrub vegetation dominated by *Betula glandulosa* and ericaceous shrubs. Spruce trees would not likely survive the fire and would be expected to regenerate slowly.

In most places this site occurs in complex with ecological site 172Xy501AK - Wet Depressions and Sedge wet meadow vegetation. In many situations the peat mounds are believed to have developed from the wet meadows. Initial stages of peat ;mound development probably is due to an unusually thin cover of snow (Williams and Smith 1989), which allow for deep frost penetration and frost heaving. Heaving ground often forms discrete, irregularly spaced bumps several inches in height. The drier peat near the surface of these slightly elevated areas increases the overall insulating qualities of the peat, maintaining frozen soil conditions throughout the summer and promoting the formation of ice crystals and masses. The developing ice core of the mound is fed by the abundant water from the adjacent wet meadows and ponds. Free water in contact with the frozen core in turn freezes, increasing the size and extent of the frozen core. Peat mounds are usually formed as the core of massive ice enlarges and pushes the surface up and above the surrounding landscape.

All stages of mound development can be observed in the Gulkana River area, from low, small diameter mounds dispersed throughout areas of wet meadow to high, steep sided mounds elevated as much as 30 feet (9.1 m) above adjacent wet meadows and lakes. Small, low relief mounds typically support Low shrub birch/closed sheath cottongrass scrub. *Eriophorum brachyantherum* and other wetland plant species decline in abundance as the mound is further elevated above the surrounding landscape.

The impact of wild fire on ecological site 172Xy111AK - Peat Mounds depends to a large degree on its effects on the thermal balance of the mound and is likely to range from slight to devastating. Following a very light burn, vegetative succession should lead directly and rather quickly to scrub vegetation dominated by *Betula glandulosa* and ericaceous shrubs. Spruce trees would not likely survive the fire and would be expected to regenerate slowly. Moderate to severe burning, on the other hand, could lead to complete destruction of the site. Blackening and partial combustion of the surface organic layers by fire could dramatically effect the insulating capacity of the organic surface and disrupt the thermal balance of the mound. During particularly dry conditions, the fire could possibly consume the organic material to a considerable depth. The blackened surface in combination with the loss of the surface vegetation would result in a significant increase in the amount of solar energy hitting and being absorbed at the mound surface. In the most extreme case, the ice core would melt sufficiently for the peat mound to collapse. In this situation, a portion, if not all, of the mound would likely retrogress to ecological site 172Xy501AK - Wet Depressions and Sedge wet meadow vegetation or to a pond.

State and transition model



State 1
Spruce/Shrub Birch Woodland

Community 1.1
Spruce/Shrub Birch Woodland

Spruce/shrub birch woodland consists of woodland to occasionally moderately open stands of spruce. This is the PNC for this site.

Forest overstory. Overstory composition varies from Picea glauca to mixed P. glauca and P. mariana. Tree canopy cover ranges from 10 to 55 percent. Trees are typically 15 to 35 feet (4.6 to 10.7 m) in height and 4 to 6.5 inches (10 to 16.5 cm) in diameter at ground level. Trees and small stands to 60 feet (18.3 m) in height occasionally occur. Basal area of trees varies considerably between stands, ranging from 23 to 130 feet2/acre (5.3 to 29.8 m2/ha) in 18 sample stands. Snags and charred boles and downfall are well-represented in burned stands.

Forest understory. The understory is dominated by abundant to very abundant medium, low, and dwarf shrubs. There are usually two relatively distinct shrub layers. The upper layer is approximately 4.5 to 6 feet (1.4 to 1.8 m) in height. The overall dominant medium shrub is Betula glandulosa; however, Salix planifolia is common in most stands. S. glauca and other tall willows are common to well-represented in many stands. The lower shrub layer is composed of a number of low and dwarf ericaceous shrub 0.5 to 3.5 feet (0.2 to 1.1 m) in height. Common to abundant species include Ledum spp., Vaccinium uliginosum, V. vitis-idaea, Empetrum nigrum, and Arctostaphylos rubra. Total shrub canopy cover ranges from around 45 to 90 percent or more.

Herbs generally are of minor importance in Spruce/shrub birch woodland. Commonly occurring species include Petasites frigidus, Arctagrostis latifolia, Equisetum spp., Rubus chamaemorus, and Carex lugens. Mosses and lichens on the ground surface range from sparse, scattered patches to nearly continuous, luxuriant cover, depending on fire history and stand age.

Table 5. Ground cover

Tree foliar cover	25%
Shrub/vine/liana foliar cover	10-15%
Grass/grasslike foliar cover	4-15%
Forb foliar cover	1-20%
Non-vascular plants	15-70%
Biological crusts	0%
Litter	15%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 6. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	2-15%	2-15%
>0.3 <= 0.6	–	40-80%	–	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	5-25%	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

State 2
Low Shrub Birch Scrub

Community 2.1
Low Shrub Birch Scrub

Low shrub birch scrub consists of moderately open to closed stands of medium and low shrubs dominated by *Betula glandulosa*, Ledum spp., and *Vaccinium uliginosum*. Dwarf shrub, primarily *Vaccinium vitis-idaea* and *Empetrum nigrum*, also are usually abundant. In most stands, the herb layer is sparse to open. The number of different herb species is usually fairly high; however, no species are particularly abundant.

Forest understory. B. glandulosa is typically 4.5 to 7 feet (1.4 to 2.1 m) in height and forms an irregular, broken upper shrub layer. Other shrubs are usually about 3 feet (0.9 m) in height or less and fill in the spaces between and below the birch. In many stands, Picea glauca and/or P. mariana saplings, small trees, and relic trees are common to well-represented. Canopy cover of the upper shrub layer ranges from 25 to 70 percent. Total shrub canopy cover is usually between 50 and 90 percent.
Important herbs include Equisetum spp., Petasites frigidus, Epilobium angustifolium, Arctagrostis latifolia, and Calamagrostis canadensis. A mosaic of feathermoss, lichen, and litter covers the ground surface. In some stands on more mesic sites, Carex lugens is abundant to very abundant, and lichen is usually considerably more abundant. Most stands show evidence of recent burns, and snags and woody litter are common to well-represented.

State 3
Low Shrub Birch/closed sheath cottongrass scrub

Community 3.1
Low Shrub Birch/closed sheath cottongrass scrub

Low shrub birch/closed sheath cottongrass scrub is dominated by moderately dense to dense *Eriophorum brachyantherum* tussocks, with an open to moderately closed overstory of low and dwarf shrubs and scattered stunted trees and tree regeneration. Except for *Rubus chamaemorus*, *Petasites frigidus*, and *Arctagrostis latifolia*, other herbs are uncommon in Low shrub birch/closed sheath cottongrass scrub. *R. chamaemorus* forms a moderately open cover in occasional stands. Throughout Low shrub birch/closed sheath cottongrass scrub, mosses, in particular Sphagnum, cover much of the soil surface, and ponded water and saturated conditions are common between the tussocks.

Forest understory. Tussock cover ranges from 25 to 85 percent. In areas of the best development, tussocks range from 9 to 30 inches (23 to 76 cm) in height with spacing between tussocks of 8 to 16 inches (20 to 41 cm). Where tussock development is weaker, other sedges are common among the tussocks. The most frequently occurring sedges are Carex aquatilis and C. lugens.

Canopy cover of the scrub layer typically ranges from 20 to 60 percent. In some stands with weak tussock development, scrub cover occasionally exceeds 75 percent. Important low and dwarf shrubs include Betula

glandulosa, Ledum spp., Vaccinium uliginosum, V. vitis-idaea, Salix planifolia, and Andromeda polifolia in some stands. Picea mariana, and to a lesser extent P. glauca, are common in most stands. Trees are usually less than 15 feet (less than 4.6 m) in height and form less than 10 percent canopy cover. Tree regeneration is well-represented in some stands.

Additional community tables

Contributors

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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	
Approved by	
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):**

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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:**
