USDA Natural Resources
Conservation Service

Ecological site F227XY800AK
Escarpments cryorthents, cryochrepts

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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.

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 glauca*
Shrub	(1) *Betula glandulosa*
Herbaceous	(1) *Equisetum*

Physiographic features

: This site consists of moderately steep to very steep escarpments and bluffs formed by mass wasting and accelerated erosion during downcutting by rivers through thick glacial and glaciolacustrine deposits. Thermokarst features are evident on these sites where the river has undercut slopes and exposed permafrost. Slopes range from 20 to 80 percent. Slope aspect and gradient are the most influential characteristics on soils formation and present vegetation. Permafrost is often found within 60 inches of the surface on more northerly exposures and is generally absent on other aspects. Areas of mass wasting and accelerated erosion are extensive on the steepest slopes. Elevation is from 1850 to 2900 feet (564 to 884 m).

In the Gulkana River area, this site is found along all reaches of the River. The best development occurs within the Canyon on the Main Stem, along the mid portions of the West Fork, and near the West Fork-Main Stem confluence. This site is common along other major rivers and streams elsewhere in the Copper River basin.

Table 2. Representative physiographic features

Landforms	(1) Escarpment
Flooding frequency	None
Elevation	579–884 m
Slope	20–80%
Water table depth	152 cm
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 19 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)	483 mm

Influencing water features

Soil features

The soils on this site are formed in coarse grained alluvium, gravelly glacial till, and fine-grained glaciolacustrine deposits. Some soils have a mantle of silty eolian material up to 2 inches (5 cm) thick. Other characteristics range from poorly to moderately well developed, shallow to very deep over permafrost, and well to somewhat excessively drained.

Table 4. Representative soil features

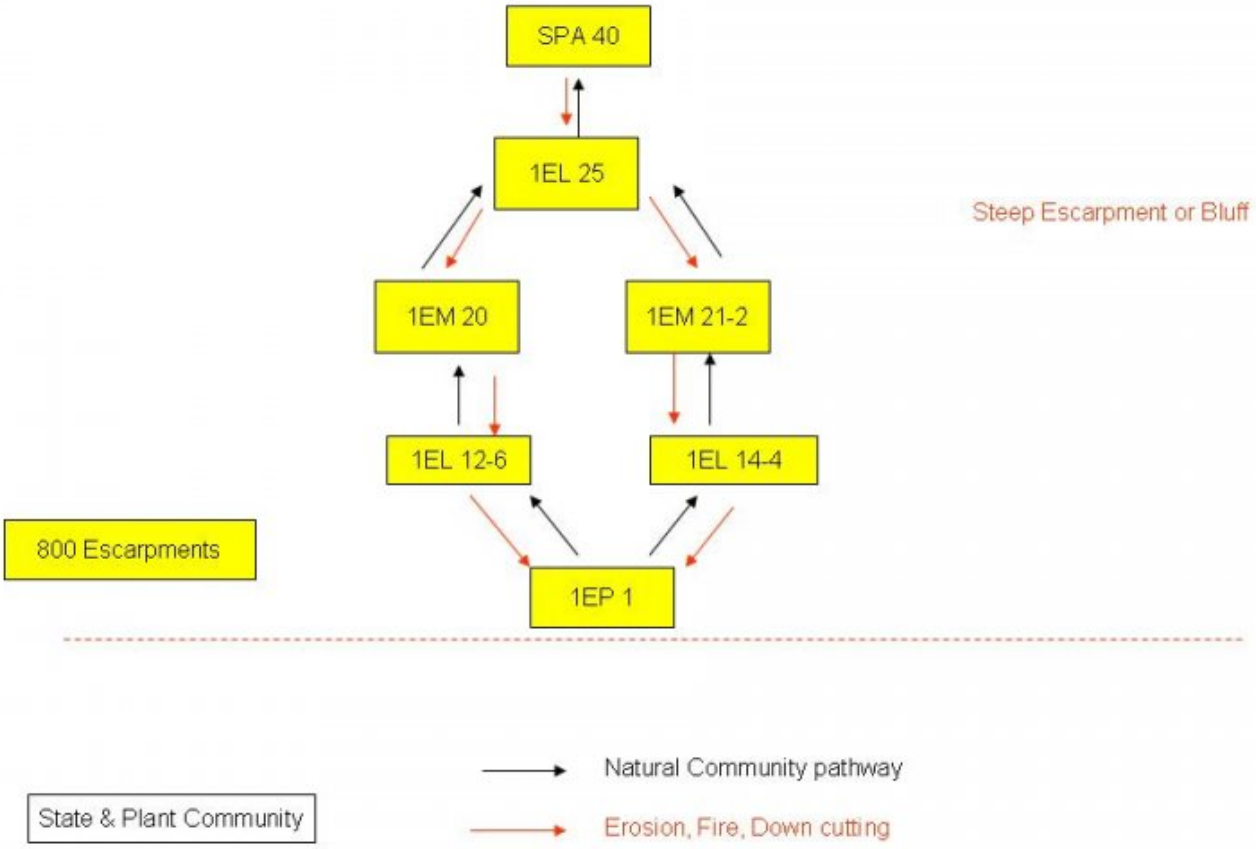
Surface texture	(1) Silty clay (2) Sandy loam (3) Clay loam
Family particle size	(1) Clayey
Soil depth	25–152 cm
Available water capacity (0-101.6cm)	0.36–0.51 cm

Ecological dynamics

Vegetation on escarpments varies widely. Very steep, unstable slopes subject to on-going mass wasting and accelerated soil erosion are barren to occasionally sparsely vegetated with scattered shrubs and herbs (Cover type - Sparsely vegetated escarpments). In a few locations along the West Fork, dense herbaceous vegetation has developed and apparently stabilized the slope. On more stable slopes, escarpments support open to closed forest and scrub. Depending on such factors as aspect, slope, soil materials, and fire history, vegetation cover includes Quaking aspen forest, Quaking aspen-white spruce forest, White spruce forest, Spruce/alder woodland, Spruce/shrub birch woodland, and Low shrub birch scrub.

Moderately closed White spruce forest apparently is the most successionally advanced and stable vegetation type found on warm aspects and moderately steep and steep slopes. Spruce/shrub birch woodland is the latest successional stage on cooler, northerly aspects.

State and transition model



State 1
White spruce forest

Community 1.1
White spruce forest

White spruce forest primarily consists of open to moderately closed stands of *Picea glauca* with occasional *Populus balsamifera*, *P. tremuloides*, and, in a few locations, *Betula papyrifera*. Understory composition and structure varies considerably in White spruce forest. White spruce forest is probably late seral vegetation on stable, moist escarpments. This type has greater abundance and cover of shrubs and herbs, but otherwise is similar to White spruce/moss on stream terraces. Riparian-Wetland Classification: upland

Forest overstory. Forest canopy cover ranges from 25 to 65 percent. Trees range in height from 25 to 60 feet (7.6 to 18.3 m) or more. Tree basal area in one sample stand was 160 feet2/acre (36.7 m2/ha).

Forest understory. Most stands have a sparse to open low shrub layer dominated by Ledum spp. and Vaccinium uliginosum. In other stands, Rosa acicularis or Shepherdia canadensis are the most important low shrubs. Salix bebbiana and other willows form a prominent tall shrub layer in some stands. The ground layer consists of sparse to well-represented dwarfs shrubs and herbs in a nearly continuous cover of feathermoss. Important dwarf shrubs and herbs include Vaccinium vitis-idaea, Empetrum nigrum, Epilobium angustifolium, Geocaulon lividum, and Linnaea borealis.

Table 5. Ground cover

Tree foliar cover	1-65%
Shrub/vine/liana foliar cover	1-25%
Grass/grasslike foliar cover	1-4%
Forb foliar cover	1-15%
Non-vascular plants	1-90%
Biological crusts	0%
Litter	3%
Surface fragments >0.25" and <=3"	10%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	1-3%

State 2
Spruce/alder woodland

Community 2.1
Spruce/alder woodland

Spruce/alder woodland consists of woodland, open, and occasionally moderately open, stands of *Picea glauca*, *P. mariana*, and mixed *P. glauca* and *P. mariana*. Spruce/alder woodland appears to be restricted to cool and moist sites such as north aspects and ephemeral drainages and seepage areas on escarpments and steep slopes. This cover type is probably stable on these sites. Riparian-Wetland Classification: upland and Palustrine needle-leafed evergreen forested, intermittently flooded, mineral (Cowardin et al. 1979); occasionally riparian

Forest overstory. Tree canopy cover ranges from 20 to 45 percent. Tree size within most stands is variable, ranging from medium to tall, 20 to 55 feet (6.1 to 16.8 m) in height.

Forest understory. The understory is characterized by a sparse to moderately closed tall shrub layer dominated by Alnus crispa (occasionally A. tenuifolia). Salix glauca is a common to well-represented tall shrub in many stands. Tall shrubs range from 10 to 65 percent canopy cover and 7 to 15 feet (2.1 to 4.6 m) in height. Medium and low shrubs form an open to occasionally closed secondary shrub layer 3 to 6 feet (0.9 to 1.8 m) in height. Important medium and low shrubs include Betula glandulosa, Salix planifolia, Ledum spp., and Vaccinium uliginosum. Dwarf shrubs, primarily V. vitis-idaea and Empetrum nigrum, are common in many stands.

Except for Equisetum spp., which is abundant in many stands, herbs are generally only a minor component in Spruce/alder woodland. Patches of moss and leaf litter cover the ground surface.

Table 6. Ground cover

Tree foliar cover	1-30%
Shrub/vine/liana foliar cover	1-50%
Grass/grasslike foliar cover	1-5%
Forb foliar cover	1-7%
Non-vascular plants	10-60%
Biological crusts	0%
Litter	1-50%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%

Water	0%
Bare ground	1%

State 3
Quaking Aspen-White Spruce Forest

Community 3.1
Quaking Aspen-White Spruce Forest

Quaking aspen-white spruce forest consists of moderately open to closed stands of mixed *Populus tremuloides* and *Picea glauca*. The understory of Quaking aspen-white spruce forest varies considerably but in most stands is dominated by scattered shrubs and sparse herbs.

Forest overstory. In many stands, Picea glauca is primarily a subdominant tree in the lower canopy layer. Picea mariana is the dominant spruce in occasional stands. Tree canopy cover ranges from 40 to 80 percent.

Forest understory. Frequently occurring shrubs include Shepherdia canadensis, Rosa acicularis, Ledum spp., Vaccinium uliginosum, V. vitis-idaea, and Arctostaphylos uva-ursi. Many stands have common tall Salix bebbiana and S. glauca.

Herb cover is generally sparse; commonly occurring species include Epilobium angustifolium, Geocaulon lividum, Linnaea borealis, and Festuca altaica. Woody debris and other litter and small, scattered patches of moss and lichen cover the ground surface.

Table 7. Ground cover

Tree foliar cover	1-70%
Shrub/vine/liana foliar cover	1-60%
Grass/grasslike foliar cover	1-10%
Forb foliar cover	1-10%
Non-vascular plants	1-30%
Biological crusts	0%
Litter	35-80%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	1-10%

State 4
Quaking Aspen Forest

Community 4.1
Quaking Aspen Forest

Quaking aspen forest consists of moderately open to closed stands of *Populus tremuloides* and common *Picea glauca* and/or *P. mariana*. The understory varies considerably but in most stands is dominated by scattered shrubs and sparse herbs.

Forest overstory. Tree canopy cover ranges from 50 to 80 percent. Populus tremuloides trees are often relatively short and poorly formed with open, sparsely limbed crowns. On steep escarpments, the lower bole is frequently

crooked or bowed from soil creep.

Forest understory. Frequently occurring shrubs include Shepherdia canadensis, Rosa acicularis, Vaccinium uliginosum, V. vitis-idaea, and Arctostaphylos uva-ursi. Many stands have common tall and medium Salix spp. Herbs are generally sparse; frequently occurring species include Epilobium angustifolium, Geocaulon lividum, Linnaea borealis, and Festuca altaica. Woody debris and other litter and small, scattered patches of moss and lichen cover the ground surface.

Table 8. Ground cover

Tree foliar cover	10-65%
Shrub/vine/liana foliar cover	1-15%
Grass/grasslike foliar cover	1%
Forb foliar cover	1-7%
Non-vascular plants	1-2%
Biological crusts	0%
Litter	5-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	10%

State 5
Spruce/Shrub Birch Woodland

Community 5.1
Spruce/Shrub Birch Woodland

Spruce/shrub birch woodland consists of woodland to occasionally moderately open stands of spruce. Overstory composition varies from *Picea glauca* to mixed *P. glauca* and *P. mariana*. The understory is dominated by abundant to very abundant medium, low, and dwarf shrubs.

Forest overstory. 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. 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 9. Ground cover

Tree foliar cover	1-45%

Shrub/vine/liana foliar cover	1-40%
Grass/grasslike foliar cover	1-3%
Forb foliar cover	1-27%
Non-vascular plants	25-80%
Biological crusts	0%
Litter	5-40%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	1-15%

State 6
Low Shrub Birch Scrub

Community 6.1
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. *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. 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. 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.

Table 10. Ground cover

Tree foliar cover	5%
Shrub/vine/liana foliar cover	1-45%
Grass/grasslike foliar cover	1-6%
Forb foliar cover	1-7%
Non-vascular plants	55%
Biological crusts	0%
Litter	5-20%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

State 7
Sparsely vegetated alluvium

Community 7.1
Sparsely vegetated alluvium

Sparsely vegetated alluvium consists of sparse stands of pioneering species on areas of recently deposited or exposed alluvium. Vegetative cover in these stands is generally low, ranging from less than 20 percent to 45 percent, or occasionally more. A wide variety of plant species in various combinations are in these stands. Common species on areas of Sparsely vegetated alluvium are listed in the Species Summary List. Sparsely vegetated alluvium is a pioneering stage of flood plain succession in both the willow and alder zones. All species in the Sparsely vegetated alluvium type appear to share several key adaptive traits—the ability to rapidly invade disturbed sites and exposed alluvium, and the ability to tolerate annual flooding and repeated siltation. Many of these pioneering species are dominants in later stages of vegetative progression. Examples include *Salix alaxensis*, Alnus tenuifolia, *Populus balsamifera*, and *Picea glauca*. Others are apparently intolerant of competition and soon become rare or absent as vegetation development progresses. Examples include Epilobium latifolium, *Achillea millefolium*, *Fragaria virginiana*, and Erigeron spp. Wetland Status Classification: Palustrine vegetated unconsolidated shore, Palustrine persistent emergent, Palustrine broad-leaved deciduous scrub-shrub (Cowardin et al. 1979); water regime ranges from temporarily to intermittently flooded; soils are mineral; usually riparian

Additional community tables

Contributors

Michelle Schuman

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):**

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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):**

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:**