Major Land Resource Area 230X
Yukon-Kuskokwim Highlands

Accessed: 12/14/2025

Description

The Yukon-Kuskokwim Highlands (MLRA 230X) include the most western parts of Interior Alaska (Land Resource Region X2) and have a continental climate. MLRA 230X is approximately 42,300 square miles spread across mountain, hills, and valleys. Flood plain systems are common. The watershed drains into the Bering Sea to the west and Bristol Bay to the southwest. Major rivers include the Yukon, Innoko, Kuskokwim, Mulchatna, and Nushagak Rivers. This sparsely populated area is mostly undeveloped wildland. Residents use this remote area primarily for subsistence hunting, fishing, and gathering. Villages are primarily located along rivers along the MLRA 230X boundary and include Greyling, Nulato, and Koyukuk. Federally managed lands in the MLRA include parts of Innoko, Nowitna, and Koyukuk National Wildlife Refuges. • •Geology and Soils • • The Yukon-Kuskokwim Highlands MLRA was mostly unglaciated during the Pleistocene. Glaciers were limited to the Lime Hills in the southeast. Glacial moraines and drift are evident in areas of past glacial activity. Unglaciated upland areas are covered with colluvium and slope alluvium originating from bedrock. Loess deposits cover footslopes and low hillslopes of near-river hills. Bedrock material is primarily sedimentary rocks with intrusive volcanic rock (USDA, 2022). This MLRA is in the zone of discontinuous permafrost. Permafrost is most common in finely textured soils on low sloped landforms such as terraces, low hill slopes, and cold mountain footslopes. It is typically absent from flood plains and mountain backslopes. Across the MLRA, permafrost presence decreases as proximity to the Yukon-Kuskokwim delta increases. The dominant soil orders are Gelisols, Entisols, Inceptisols, and Spodosols. Gelisols support shallow to deep permafrost and often have a perched water table for at least part of the growing season. Inceptisols, Spodosols, and Entisols lack permafrost. Two important factors that prevent permafrost aggradation are groundwater connectivity and thick bands of sandy and/or gravelly soil horizons. Inceptisols have minimal development and are common on alpine scrublands and scoured flood plains. Entisols are common on mountain backslopes and higher flood plains. Spodosols support a spodic soil horizon and are common in the acidic soils underlying spruce forests and ericaceous shrublands. Non-soil areas such as rock outcrops, rubble lands and beaches make up approximately ten percent of the MLRA surface. • • Climate • • The Yukon-Kuskokwim Highlands MLRA has short, warm summers and cold, long winters. Mean annual precipitation is 10 to 15 inches at low elevations and increases to 20 to 40 inches at higher elevations (USDA, 2022). Annual snowfall is between 80 and 100 inches. Mean annual temperatures ranges from 25 to 32 degrees F (SNAP, 2014a; SNAP, 2014b). • • Vegetation • • Vegetation is mainly influenced by site

and soil characteristics such as temperature-degree days, exposure, soil depth, and soil hydrology. Dwarf scrublands are prevalent on shallow soils on convex slopes and in the alpine. Well drained, lowland slopes are a mix of forests and shrublands of alder, willow, and ericaceous shrubs. Cold slopes generally support black spruce, while warm slopes support white spruce. Valley bottoms and steep slopes support a deciduous forest. Tussock tundra is ubiquitous across much of the poorly drained, low-sloped footslopes and coastal plains (USDA, 2022). • • Fire • • Fire is a major disturbance across the Yukon-Kuskokwim Highlands. Low severity fires destroy the canopy but leave the organic mat and rootstock mostly undisturbed. The vegetative community progresses directly back to a forest. Severe forest fires are stand replacement events. Post-first communities typically pass through an herbaceous meadow community before ericaceous shrubs, birch, and willows colonize. Drier soils may support a deciduous aspen or birch forest, while moist soils support cottonwoods and spruce. On all forest and woodland ecological sites, post-fire succession leads to a relatively rapid accumulation of organic matter and mosses on the surface. This accumulation results in decreases in soil temperature, biologic activity, and nutrient availability and a gradual decrease in site productivity.

Ecological site keys

Nulato Hills AK630 Survey_ full key

I. Maritime

A. Coastal Plains

1 Berms - R240XY136AK

2 Talfs

i. Scrub Coastal Plain - R240XY135AK

ii. Grass Tidal Plains and Depressions - R240XY139AK

B. All Other Landforms

1 Plains

i. Lava Flow (or Proximal to Lava Flow)

a. Lava Flow

1) Lava flow - R240XY151AK

2) Swale on lava flow - R240XY150AK

b. Proximal to lava flow

1) Boulder field - well drained - R240XY155AK

2) Tussock tundra - poorly drained - R240XY166AK

ii. Other Landforms

a. Polygonal ground - R240XY169AK

b. Non-polygonal ground

1) Concave landforms

a) Organic soil - swale, drainageway, depression - R240XY162AK

b) Mineral soil

(1) Drainageway - R240XY160AK

(2) Swale - R240XY161AK

2) Linear and Convex landforms and microfeatures

a) Plain talf - R240XY166AK

b) Peat mounds - R240XY162AK

2 Mountains and Hills

i. Dunes and Sandy Ridges ... F230XY113AK – Woodland Terrace, non-thermokarst

ii. All Other Landforms

a. Hills and Low Elevation Mountains

1) Volcanic Cones

a) Backslopes, warm - R240XY153AK

b) Backslopes and shoulders, moist - R240XY180AK

2) Slopes - broad, bedrock controlled

a) Upper Mountain Sites - summits, shoulders, upper backslopes & saddles

(1) Summits & Shoulders

(a) Summits - R240XY183AK

(b) Shoulders - R240XY182AK

(2) Upper Backslopes and Saddles

(a) Slopes

(1) Upper Backslopes

(a) Dry slopes

(1) Linear - R240XY181AK

(2) Exposed - R240XY186AK

(b) Moist slopes - R240XY150AK

(2) Saddles - R240XY168AK

(b) Slope microfeatures: depressions & mounds - R240XY162AK

b) Other Slopes

(1) Drainageway & associated flood plain - R240XY160AK

(2) Slopes

(a) Backslopes and Noseslopes

(1) Lower elevation - alder slopes

(a) Dryer sites - R240XY150AK

(b) Moist sites - R240XY180AK

(2) Higher elevations - ericaceous scrub

(a) Dry sites - R240XY168AK

(b) Moist sites - R240XY181AK

(b) Headslopes and Footslopes

(1) Boulders present - R240XY155AK

(2) Boulders absent

(a) Forest sites - F240XY146AK

(b) Scrub sites

(1) Swales and Narrow Headslopes - R240XY172AK

(2) Headslopes of wide valley - R240XY173AK

b. High Elevation Mountains

1) Summits, Shoulders and Upper Backslopes

a) Alpine

(1) Summits - R240XY183AK

(2) Other Landforms

(a) Shoulders

(1) Warm Slopes - R240XY185AK

(2) Cold Slopes - R240XY184AK

(b) Upper Backslopes - R240XY182AK

b) Subalpine

(1) Permafrost absent - R240XY181AK

(2) Permafrost present - R240XY168AK

2) Other Mountain Positions

a) Drainageways

(1) Heather scrub valley terrace ... R230XY112AK – Scrub Terrace, poorly drained

(2) Willow drainage - poorly drained

b) Backslopes

(1) Very steep slope - R240XY186AK

(2) Slopes less than 45%

(a) Linear to convex slope - R240XY186AK

(b) Linear to concave slope

(1) Wetter sites - swales and concave lower backslopes - R240XY187AK

(2) Drier sites - linear to concave mid backslopes - R240XY180AK

II. Boreal

A. Organic depressions ... R230XY100AK – Open Scrub Organic Depressions

B. Other Landforms

1 Mountains and Hills

i. Saddles ... R230XY131AK – Subalpine Open Tall Scrub Saddles

ii. Other Mountain Positions

a. Summits, Shoulders and Convex Backslopes ... F230XY102AK – Woodland Low Mountain Slopes, dry

b. Other Mountain Positions

1) Headslopes ... F230XY121AK – Woodland Tall Mountain Backslopes, wet

2) Backslopes and Toeslopes

a) Backslopes

(1) Steep, dry slopes - F240XY193AK

(2) Other Backslopes

(a) Warmer, drier slopes

(1) Mixed woodland ... F230XY105AK – Open Forest Hill Slopes, steep

(2) Spruce woodland ... F230XY102AK – Woodland Low Mountain Slopes, dry

(b) Wetter slopes ... F230XY102AK – Woodland Low Mountain Slopes, dry

b) Toeslopes and Footslopes

(1) Colder, wetter areas ... F230XY103AK – Woodland Low Mountain Slopes, wet

(2) Warmer, drier areas ... F230XY102AK – Woodland Low Mountain Slopes, dry

2 Flood Plains and Valleys

i. Thermokarst Landscape ... F230XY108AK – Woodland Terrace, thermokarst

ii. Non-thermokarst Landscape

a. Drainages on Flood Plains and Terraces ... R230XY119AK – Closed Scrub Valley Flood Plain, poorly drained

b. Flood Plains and Terraces

1) Flood Plains

a) Depressions on Flood Plain ... R230XY109AK – Meadow Floodplain Depression

b) Flood Plains

(1) River Flood Plain

(a) Braided river system ... F230XY110AK – Forest Floodplain, braided river system

(b) Mountain stream system ... R230XY111AK – Open Scrubland Valley Flood Plain, somewhat poorly drained

(2) Mountain Drainage ... R230XY119AK – Closed Scrub Valley Flood Plain, poorly drained

2) Terraces

a) Depression on Terrace ... R230XY100AK – Open Scrub Organic Depressions

b) Terraces

(1) Earth hummocks absent ... R230XY112AK – Scrub Terrace, poorly drained

(2) Earth hummocks present ... F230XY113AK – Woodland Terrace, non-thermokarst

AK630 Survey_MLRA 230 only

I. Boreal

A. Organic depressions ... R230XY100AK – Open Scrub Organic Depressions

B. Other Landforms

1 Mountains and Hills

i. Saddles ... R230XY131AK – Subalpine Open Tall Scrub Saddles

ii. Other Mountain Positions

a. Summits, Shoulders and Convex Backslopes ... F230XY102AK – Woodland Low Mountain Slopes, dry

b. Other Mountain Positions

1) Headslopes ... F230XY121AK – Woodland Tall Mountain Backslopes, wet

2) Backslopes and Toeslopes

a) Backslopes

(1) Steep, dry slopes - F240XY193AK

(2) Other Backslopes

(a) Warmer, drier slopes

(1) Mixed woodland ... F230XY105AK – Open Forest Hill Slopes, steep

(2) Spruce woodland ... F230XY102AK – Woodland Low Mountain Slopes, dry

(b) Wetter slopes ... F230XY102AK – Woodland Low Mountain Slopes, dry

b) Toeslopes and Footslopes

(1) Colder, wetter areas ... F230XY103AK – Woodland Low Mountain Slopes, wet

(2) Warmer, drier areas ... F230XY102AK – Woodland Low Mountain Slopes, dry

2 Flood Plains and Valleys

i. Thermokarst Landscape ... F230XY108AK – Woodland Terrace, thermokarst

ii. Non-thermokarst Landscape

a. Drainages on Flood Plains and Terraces ... R230XY119AK – Closed Scrub Valley Flood Plain, poorly drained

b. Flood Plains and Terraces

1) Flood Plains

a) Depressions on Flood Plain ... R230XY109AK – Meadow Floodplain Depression

b) Flood Plains

(1) River Flood Plain

(a) Braided river system ... F230XY110AK – Forest Floodplain, braided river system

(b) Mountain stream system ... R230XY111AK – Open Scrubland Valley Flood Plain, somewhat poorly drained

(2) Mountain Drainage ... R230XY119AK – Closed Scrub Valley Flood Plain, poorly drained

2) Terraces

a) Depression on Terrace ... R230XY100AK – Open Scrub Organic Depressions

b) Terraces

(1) Earth hummocks absent ... R230XY112AK – Scrub Terrace, poorly drained

(2) Earth hummocks present ... F230XY113AK – Woodland Terrace, non-thermokarst

MLRA_230

I. Boreal

A. Organic depressions ... R230XY100AK – Open Scrub Organic Depressions

B. Other Landforms

1 Mountains and Hills

i. Saddles ... R230XY131AK – Subalpine Open Tall Scrub Saddles

ii. Other Mountain Positions

a. Summits, Shoulders and Convex Backslopes ... F230XY102AK – Woodland Low Mountain Slopes, dry

b. Other Mountain Positions

1) Headslopes ... F230XY121AK – Woodland Tall Mountain Backslopes, wet

2) Backslopes and Toeslopes

a) Backslopes

(1) Steep, dry slopes - F240XY193AK

(2) Other Backslopes

(a) Warmer, drier slopes

(1) Mixed woodland ... F230XY105AK – Open Forest Hill Slopes, steep

(2) Spruce woodland ... F230XY102AK – Woodland Low Mountain Slopes, dry

(b) Wetter slopes ... F230XY102AK – Woodland Low Mountain Slopes, dry

b) Toeslopes and Footslopes

(1) Colder, wetter areas ... F230XY103AK – Woodland Low Mountain Slopes, wet

(2) Warmer, drier areas ... F230XY102AK – Woodland Low Mountain Slopes, dry

2 Flood Plains and Valleys

i. Thermokarst Landscape ... F230XY108AK – Woodland Terrace, thermokarst

ii. Non-thermokarst Landscape

a. Drainages on Flood Plains and Terraces ... R230XY119AK – Closed Scrub Valley Flood Plain, poorly drained

b. Flood Plains and Terraces

1) Flood Plains

a) Depressions on Flood Plain ... R230XY109AK – Meadow Floodplain Depression

b) Flood Plains

(1) River Flood Plain

(a) Braided river system ... F230XY110AK – Forest Floodplain, braided river system

(b) Mountain stream system ... R230XY111AK – Open Scrubland Valley Flood Plain, somewhat poorly drained

(2) Mountain Drainage ... R230XY119AK – Closed Scrub Valley Flood Plain, poorly drained

2) Terraces

a) Depression on Terrace ... R230XY100AK – Open Scrub Organic Depressions

b) Terraces

(1) Earth hummocks absent ... R230XY112AK – Scrub Terrace, poorly drained

(2) Earth hummocks present ... F230XY113AK – Woodland Terrace, non-thermokarst

MLRA 230X Provisional Ecological Site Key

I. Flooding Landforms

A. Flood Plains - no permafrost, no ponding ... R230XY601AK – Boreal Forest Flood Plain Complex

B. Drainages - permafrost, ponding ... R230XY610AK – Boreal Scrub Silty Frozen Drainages

II. Not as above

A. Organic Slope Depressions ... R230XY606AK – Boreal Sedge Peat Depressions

B. Slopes - not as above

1 Alpine & Subalpine Climate

i. Alpine

a. Soils without a growing season water table, commonly well drained soils ... R230XY630AK – Alpine Dwarf Scrub Gravelly Slopes

b. Soils with a very shallow water table, commonly poorly drained soils ... R230XY634AK – Alpine Sedge Gravelly Frozen Slopes

ii. Subalpine

a. Water table between 20 and 40 inches in June, commonly somewhat poorly drained soils. ... R230XY632AK – Subalpine Tall Scrub Gravelly Moist Slopes

b. Soils without a growing season water table, commonly well drained soils ... R230XY633AK – Subalpine Scrub Loamy Slopes

2 Boreal Slopes

i. Wetland Soils (Poorly to Very Poorly Drained)

a. Frequent, long ponding, very poorly drained; includes peat plateaus ... R230XY620AK – Boreal Peat Frozen Flats Complex

b. Soils do not pond but have a very shallow water table; poorly drained. ... F230XY611AK – Boreal Forest Loamy Frozen Slopes

ii. Upland Soils

a. Moist Soils. Water table commonly at 10-20 inches during extended portions of the growing season (somewhat poorly drained). ... F230XY613AK – Boreal Forest Loamy Moist Slopes

b. Drier Soils

1) Slope mostly >20% ... F230XY615AK – Boreal Deciduous Forest Loamy Steep Slopes

2) Slope mostly <20%

a) Warm Slopes, thin (<6") organic cap ... F230XY612AK – Boreal Forest Loamy Slopes

b) Cool Slopes, thick (>6") organic cap ... F230XY614AK – Boreal Black Spruce Unfrozen Well Drained Slopes