

# Major Land Resource Area 231X

## Interior Alaska Highlands

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### Description

The Interior Alaska Uplands (MLRA 231X) is in the Interior Region of Alaska and includes the extensive hills, mountains, and valleys between the Tanana River to the south and the Brooks Range to the north. These hills and mountains surround the Yukon Flats Lowlands (MLRA 232X). MLRA 231X makes up about 69,175 square miles. The hills and mountains of the area tend to be moderately steep to steep resulting in high-relief slopes. The mountains are generally rounded at lower elevations and sharp-ridged at higher elevations. Elevation ranges from about 400 feet in the west, along the boundary with the Interior Alaska Lowlands (MLRA 229X), to 6,583 feet at the summit of Mt. Harper, in the southeast. Major tributaries include large sections of the Yukon, Koyukuk, Kanuti, Charley, Coleen, and Chatanika Rivers. This area is traversed by several major roads, including the Taylor Highway in the east and the Steese, Elliott, and Dalton Highways north of Fairbanks. The area is mostly undeveloped wild land that is sparsely populated. The largest community along the road system is Fairbanks with smaller communities like Alatna, Allakaket, Chicken, Eagle, Eagle Village, Hughes, and Rampart occurring along the previously mentioned rivers and highways. The vast majority of this MLRA was unglaciated during the Pleistocene epoch with the exceptions being the highest mountains and where glaciers extended into the area from the Brooks Range. For the most part, glacial moraines and drift are limited to the upper elevations of the highest mountains. Most of the landscape is mantled with bedrock colluvium originating from the underlying bedrock. Valley bottoms are filled with Holocene fluvial deposits and colluvium from the adjacent mountain slopes. Silty loess, which originated from unvegetated flood plains in and adjacent to this area, covers much of the surface. On hill and mountain slopes proximal to major river valleys (e.g., Tanana and Yukon Rivers), the loess is many feet thick. As elevation and distance from major river valleys increases, loess thickness decreases significantly. Bedrock is commonly exposed on the highest ridges. This area is in the zone of discontinuous permafrost. Permafrost commonly is close to the surface in areas of the finer textured sediments throughout the MLRA. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. Solifluction lobes, frost boils, and circles and stripes are periglacial features common on mountain slopes in this area. Pingos, thermokarst pits and mounds, ice-wedge polygons, and earth hummocks are periglacial features common on terraces, lower slopes of hills and mountains, and in upland valleys in the area. The dominant soil orders in this area are Gelisols, Inceptisols, Spodosols, and Entisols. The soils in the area have a subgelic or cryic soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. Gelisols are common on north facing slopes, south facing footslopes, valley bottoms, and stream terraces. Gelisols are typically shallow or moderately deep to permafrost (10 to 40 inches) and are poorly or very poorly drained. Wildfires can disturb the insulating organic material at the surface, lowering the permafrost layer, eliminating perched water tables from Gelisols, and thus changing the soil classification. Inceptisols and Spodosols commonly form on south facing hill and mountain slopes. Entisols are common on flood plains and high elevation mountain slopes. Miscellaneous (non-soil) areas make up about 2 percent of this MLRA. The most common miscellaneous areas are rock outcrop and rubble land. In many valleys placer mine tailings are common. Short, warm summers and long, cold winters characterize the subarctic continental climate of the area. The mean annual temperature of the area ranges from 22 to 27 degrees F. The mean annual temperature of the southern half of the area is approximately 3 degrees warmer compared to the northern half (PRISM 2018). The warmest months span June through August with mean monthly temperatures ranging from 50 to 56 degrees F. The coldest months span November through February with mean monthly temperatures ranging from -5 to 3 degrees F. When compared to the high-elevation alpine and subalpine life zones, the lower elevation boreal life zone tends to be 2-3 degrees F colder during the coldest months and 1-2 degrees F warmer during the warmest months (PRISM 2018). The freeze-free period at the lower elevations averages about 60 to 100 days, and the temperature usually remains above freezing from June through mid-September. Precipitation is limited across this area, with the average annual precipitation ranging from 12 to 19 inches. The southern half of the areas receives approximately 2.5 inches more annual precipitation than the northern half (PRISM 2018). The lower elevation boreal life zone receives approximately 2.5 inches less annual precipitation than the high-elevation alpine and subalpine life zones (PRISM 2018). Approximately 3/5th of the annual precipitation occurs during the months of June through September with thunderstorms being common. The average annual

snowfall ranges from about 45 to 100 inches. The ground is consistently covered with snow from November through March. Most of this area is forested below an elevation of about 2500 feet. Dominant tree species on slopes are white spruce and black spruce. Black spruce stands are most common on north-facing slopes, stream terraces, and other sites with poor drainage and permafrost. White spruce stands are most common on warm slopes with dry soils. At lower elevations, lightning-caused wildfires are common, often burning many thousands of acres during a single fire. Following wildfires, forbs, grasses, willow, ericaceous shrubs, paper birch, and quaking aspen communities are common until they are eventually replaced by stands of spruce. Tall willow and alder scrub is extensive on low flood plains. White spruce and balsam poplar are common on high flood plains. With increasing elevation, the forests and woodlands give way to subalpine communities dominated by krummholz spruce, shrub birch, willow, and ericaceous shrubs. At even higher elevations, alpine communities prevail which are characterized by diverse forbs, dwarf ericaceous shrubs, and eightpetal mountain-avens. Many of these high elevation communities have a considerable amount of lichen cover and bare ground.

**Vegetation Life Zones** This area supports three life zones defined by the physiological limits of plant communities along an elevational gradient: boreal, subalpine, and alpine. The boreal life zone is the elevational band where forest communities dominate. Not all areas in the boreal life zone are forest communities, however, particularly in places with too wet or dry soil to support tree growth (e.g., bogs or river bluffs). Above the boreal band of elevation, subalpine and alpine vegetation dominate. The subalpine zone is typically a narrow transitional band between the boreal and the alpine life zones, and is characterized by sparse, stunted trees. In the subalpine, certain types of birch and willow shrub species grow at  $\geq 1$  m in height (commonly *Betula glandulosa* and *Salix pulchra*). In the alpine, trees no longer occur, and all shrubs are dwarf or lay prostrate on the ground. In this area, the boreal life zone occurs below 2500 feet elevation on average. The transition between boreal and alpine vegetation can occur within a range of elevations, and is highly dependent on slope, aspect, and shading from adjacent mountains. Within each life zone, there are plant assemblages that are typically associated with cold slopes and warm slopes. Cold slopes and warm slopes are created by the combination of the steepness of the slope, the aspect, and shading from surrounding ridges and mountains. Warm slope positions typically occur on southeast to west facing slopes that are moderate to very steep ( $>10\%$  slope) and are not shaded by the surrounding landscape. Cold slopes typically occur on northwest to east facing slopes, occur in shaded slope positions, or occur in low-lying areas that are cold air sinks. Examples of shaded positions include head slopes, low relief backslopes of hills, and the base of hills and mountains shaded by adjacent mountain peaks. Warm boreal slope soils have a cryic soil temperature regime and lack permafrost. In this area, white spruce forests are an indicator of warm boreal slopes. Cold boreal slope soils typically have a gelic soil temperature regime and commonly have permafrost. In this area, black spruce forests and woodlands are an indicator of cold boreal slopes. The boreal life zone can occur at higher elevations on warm slopes, and lower elevations on cold slopes.

## Ecological site keys

### Interior Alaska Uplands - MLRA 231 - Life Zone Key

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- I. Elevations above 2500 feet. In this area, the subalpine and alpine life zones typically occur above 2500 feet.
  - A. The subalpine life zone has sparse stunted trees and birch and willow shrub species grow at  $\geq 1$  m in height. ... Key 2 – Interior Alaska Uplands - MLRA 231 - Alpine Life Zone
  - B. The alpine life zone is where trees no longer occur and all shrubs are dwarfed or lay prostrate on the ground. ... Key 3 – Interior Alaska Uplands - MLRA 231 - Subalpine Life Zone
- II. Elevations below 2500 feet. The boreal life zone is a place where stands of trees dominate and typically occurs below 2500 feet. On warm slopes, this life zone transition can occur at higher elevations. On cold slopes, this life zone transition can occur at lower elevations. ... Key 4 – Interior Alaska Uplands - MLRA 231 - Boreal Life Zone

### Interior Alaska Uplands - MLRA 231 - Alpine Life Zone

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- I. Streams and drainageways. ... R231XY152AK – High-elevation scrub gravelly drainageways
- II. All other landforms.
  - A. Wetland soils. These include soils that pond, have a water table at very shallow to shallow depths for long

durations of time (0 to 20 inches), and/or are classified as very poorly to poorly drained.

1 Depressions with  $\geq 40$  cm of saturated organic material. ... R231XY149AK – High-elevation Sedge Peat Depressions

2 Not as above.

i. Calcareous soils.

a. Soils with  $>20$  cm of organic matter and permafrost at depth. ... R231XY103AK – Alpine Dwarf Scrub Gravelly Frozen Alkaline Slopes

b. Thinner organic cap, soils do not have permafrost. Extremely gravelly soils. ... R231XY106AK – Alpine Dwarf Scrub Gravelly Frozen Alkaline Slopes

ii. Not as above.

a. Soils very gravelly with no permafrost. Commonly associated with large solifluction lobes. ... R231XY113AK – Alpine Dwarf Scrub Gravelly Moist Slopes

b. Soils associated with permafrost.

1) silty soils commonly associated with turf hummocks on rounded mountains. ... R231XY115AK – Alpine sedge silty frozen slopes

2) gravelly soils commonly associated with non-sorted circles and stripes on all mountains. ... R231XY134AK – Alpine Dwarf Scrub Gravelly Frozen Slopes

B. Not as above, non-wetland soils.

1 Calcareous soils.

i. Cold slopes. ... R231XY104AK – Alpine Dwarf Scrub Gravelly Alkaline Cold Slopes

ii. Warm slopes. ... R231XY105AK – Alpine Dwarf Scrub Gravelly Alkaline Slopes

2 Not as above. ... R231XY101AK – Alpine dwarf scrub gravelly slopes

## Interior Alaska Uplands - MLRA 231 - Subalpine Life Zone

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I. Streams and drainageways. ... R231XY152AK – High-elevation scrub gravelly drainageways

II. All other landforms.

A. Wetland soils. These include soils that pond, have a water table at very shallow to shallow depths for long durations of time (0 to 20 inches), and/or are classified as very poorly to poorly drained.

1 Depressions with  $\geq 40$  cm of saturated organic material. ... R231XY149AK – High-elevation Sedge Peat Depressions

2 Sloping landforms.

i. Occurs in protected positions like headslopes that accumulate snow, reduce wind, and reduce the harsh climate in the subalpine life zone. This site supports high elevations stands of trees. ...

F231XY184AK – Subalpine Forest Gravelly Moist Slopes

ii. Not as above, exposed positions.

a. Backslopes with a thick layer of saturated organic material ( $\geq 20$  cm) over permafrost. ... R231XY129AK – Subalpine Scrub Loamy Frozen Slopes

b. Footslopes and toeslopes with extensive turf hummocks and thick layer of saturated organic material ( $\geq 20$  cm) over permafrost. ... R231XY185AK – Subalpine Scrub Loamy Frozen Footslopes

B. Not as above, non-wetland soils.

1 Oxyaquic soils. Commonly associated with swales on backslopes. ... R231XY148AK – Subalpine Scrub Gravelly Slopes Moist

2 Well drained soils. ... R231XY164AK – Subalpine Scrub Gravelly Slopes Dry

## Interior Alaska Uplands - MLRA 231 - Boreal Life Zone

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### I. Ecological sites of the boreal life zone

#### A. The site occurs on drainageway, flood-plain steps, or stream terraces

##### 1 The site occurs drainageways.

i. Steeper drainageways. Slopes commonly 10 to 40 percent. ... F231XY195AK – Boreal Forest Loamy Drainages

ii. Nearly level to gentle sloping drainageways.

a. Silty and wet soils that are prone to having permafrost. ... F231XY193AK – Boreal Woodland Loamy Frozen Drainageways

b. Gravelly and wet soils that do not typically have permafrost. ... R231XY191AK – Boreal Scrubland Gravelly Drainageways Wet

##### 2 The site occurs on flood-plain steps. Flooding happens at least one time in one hundred years.

i. Large order streams distal from the mountains. Soils commonly lack thick bands of gravels in the soil profile. Permafrost common in the high flood plain. Potentially restricted to the Yukon River.

a. Depressions ... R231XY138AK – Boreal Sedge Loamy Flood Plain Depressions

b. flood-plain steps

###### 1) frequent to occasional flooding

a) low flood plain; frequent flooding, shrubby communities. ... R231XY198AK – Boreal Scrubland Loamy Flood Plain

b) Middle flood plain; occasional flooding, commonly supports stands of balsam poplar. ... F231XY189AK – Boreal Forest Loamy Flood Plain

2) Rare Flooding. The high flood plain commonly supports stands of white spruce. ... F231XY196AK – Boreal Forest Loamy Frozen Flood Plain

ii. Small order streams proximal to the mountains like Beaver Creek and Chatanika River. Soils generally have gravelly horizons

a. Depressions. ... R231XY138AK – Boreal Sedge Loamy Flood Plain Depressions

b. flood-plain steps

1) Low floodplain; frequent flooding, shrubby communities. ... R231XY130AK – Boreal Scrubland Gravelly Floodplain

2) Occasional to rare flooding, forested communities when not recently burned.

a) high flood plain; occasional to rare flooding. Comparatively drier soils with more productive stands of trees. ... F231XY131AK – Boreal Forest Gravelly Floodplain

b) high flood-plain step. rare flooding. Comparitively wetter soils and less productive stands of trees. ... F231XY151AK – Boreal Forest Loamy Frozen Floodplain Moist

##### 3 This site occurs on stream terraces. No flooding in one hundred years.

i. Wetland soils. These include soils that pond, have a water table at very shallow to shallow depth for long durations of time (0 to 20 inches), and/or are classified as very poorly to poorly drained.

a. abandoned channels ... R231XY137AK – Boreal Sedge Peat Depressions

b. terrace tread and thermokarst pits

1) Soils with >40 cm of organic material, prone to thermokarst. ... F231XY169AK – Boreal Woodland Peat Frozen Flats

2) Soils with <40 cm of organic material, not as prone to thermokarst. ... F231XY171AK – Boreal Woodland Loamy Frozen Terraces

ii. Not as above, non-wetland soils. Thick gravels at very shallow to shallow depth. ... F231XY250AK – Boreal Woodland Gravelly Terraces

#### B. This site occurs on sloping landforms like hills, plains, and mountains.

1 This site occurs on cold slopes which are northwest to east facing slopes, occur in shaded slope positions, and/or occur in low-lying areas that are cold air sinks

i. Alkaline/Calcareous soils.

a. forested wetlands.

1) Soils typically have > 20 cm of organic matter, have minimal gravel content, and have permafrost. ... F231XY053AK – Boreal Woodland Organic Frozen Alkaline Slopes

2) Gravelly soils that lack permafrost. ... F231XY054AK – Boreal Woodland Gravelly Moist Alkaline Slopes

b. non-wetland soils. ... F231XY057AK – Boreal Woodland Gravelly Cold Alkaline Slopes

ii. Not as above, acidic parent material.

a. Steep, north facing slopes. Slope is typically > 35%

1) Thick organic matter and permafrost. ... F231XY166AK – Boreal Woodland Gravelly Frozen Slopes

2) Dry soils. Potentially restricted to North facing slopes adjacent to the Yukon River. ... F231XY181AK – Boreal Forest Gravelly Slopes Steep Cold

b. Less steep slopes.

1) Wetland soils. These include soils that pond, have a water table at very shallow to shallow depth for long durations of time (0 to 20 inches), and/or are classified as very poorly to poorly drained.

a) broad slopes, commonly summits. Supports mixed shrub-sedge tussock bog. ... R231XY128AK – Boreal Tussock Peat Frozen Slopes

b) Not as above, supports woodlands and forests.

(1) Footslope and Toeslope with peaty, frozen soils. ... F231XY118AK – Boreal Woodland Organic Frozen Slopes

(2) Summits, shoulders, and backslopes.

(a) loamy soils with permafrost. Assumes no recent fires. ... F231XY111AK – Boreal Forest Loamy Frozen Slopes

(b) gravelly soils with permafrost. Assumes no recent fires. ... F231XY160AK – Boreal Forest Loamy Frozen Slopes

2) Not as above, non-wetland soils.

a) Deep loess cap over paralithic bedrock or gravelly soils ... F231XY190AK – Boreal Forest Silty Slopes Cold

b) Gravelly soils at very shallow to shallow depth. ... F231XY162AK – Boreal Woodland Gravelly Slopes Cold

2 This site occurs on warm slopes which are southeast to west facing slopes that are moderate to very steep (>10% slope) and are not shaded by the surrounding landscape.

i. Alkaline/calcareous soils.

a. Very steep, erosive slopes. ... R231XY109AK – Boreal Scrub Gravelly Slopes Dry

b. Not as above. ... F231XY055AK – Boreal Woodland Gravelly Alkaline Slopes

ii. Not as above, acidic parent material.

a. Very steep slopes. Slope is typically >50%.

1) erosive slopes. ... R231XY109AK – Boreal Scrub Gravelly Slopes Dry

2) Not as erosive. ... F231XY110AK – Boreal Forest Gravelly Slopes Steep

b. Less steep slopes

1) Soils with >20 inches of silt over gravelly soil or paralithic bedrock

a) Somewhat poorly to moderately well drained soils, soils prone to thermokarst, commonly on lower third of slope. ... F231XY187AK – Boreal Forest Silty Slopes Moist

b) Drier soils.

(1) 20-40 inches of silt over gravelly soil or paralithic bedrock. ... F231XY188AK – Boreal Forest Silty Slopes Bedrock

(2) More than 40 inches of silt over gravelly soils or paralithic bedrock. ... F231XY186AK – Boreal Forest Silty Slopes

2) Soils with < 20 inches of silt over gravelly soils or paralithic bedrock.

a) 0-10 inches of silty soil over gravelly soil or paralithic bedrock. ... F231XY180AK – Boreal Woodland Gravelly Slopes Dry

b) 10-20 inches of silt over gravelly soils or paralithic bedrock. ... F231XY182AK – Boreal Forest Gravelly Slopes