U.S. Department of the Interior
Bureau of Land Management

Alaska State Office
222 West 7th Avenue, #13
Anchorage, Alaska 99513

United States Department of Agriculture
Natural Resources Conservation Service

BLM-Alaska Open File Report **
BLM/AK/ST-**********
[DATE]

Soil Survey of the Delta River Area, Alaska

Mark H. Clark

Mission Statement

The Bureau of Land Management sustains the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

Author

Mark H. Clark is a Soil Scientist for the U.S. Department of Agriculture, Natural Resources Conservation Service.

Techncal Contributors (USDA-NRCS)

Joe Moore, State Soil Scientist; Ted Cox, Geographic Information Systems Specialist; Darrell Kautz, Database Specialist; Dennis Moore, Soil Data Quality Specialist; Pam Taber, Editor.

Cover Photo

The Tangle Lakes portion of the Delta River Area. A large unnamed lake occupies the foreground with Upper Tangle Lake in the upper right and the Alaska Range in the background. Uplands surrounding the lakes consist of glaciated hills and outwash plains with numerous lakes and kettle ponds, which are landforms typical of the Alaska Mountains-Glaciated Uplands Subsection. The area provides excellent habitat for caribou and birds and is also a popular recreational area. Soils of the mid-ground landscape consist of sandy and gravelly glacial outwash materials, which are typical of the Schleyer soil, and are part of soil map unit G01—Schleyer-Geist complex, 0 to 30 percent slopes.

Open File Reports

Open File Reports issued by the Bureau of Land Management-Alaska present the results of inventories or other investigations on a variety of scientific and technical subjects that are made available to the public outside the formal BLM-Alaska technical publication series. These reports can include preliminary or incomplete data and are not published and distributed in quantity.

The reports are available while supplies last from BLM External Affairs, 222 West 7th Avenue #13, Anchorage, Alaska 99513 and from the Juneau Minerals Information Center, 100 Savikko Road, Mayflower Island, Douglas, Alaska 99824, (907) 364-1553. Copies are also available for inspection at the Alaska Resource Library and Information Service (Anchorage), the USDI Resources Library in Washington, D.C., various libraries of the University of Alaska, the BLM National Business Center Library (Denver), and other selected locations.

A complete bibliography of all BLM-Alaska scientific reports can be found on the Internet at: http://www.ak.blm.gov/affairs/sci_rpts.html. Related publications are also listed at http://juneau.ak.blm.gov.

Soil Survey of the Delta River Area, Alaska

by Mark H. Clark

fieldwork by:
Mark Clark, Mike Duffy, Scott Guyer, and Darrell Kautz

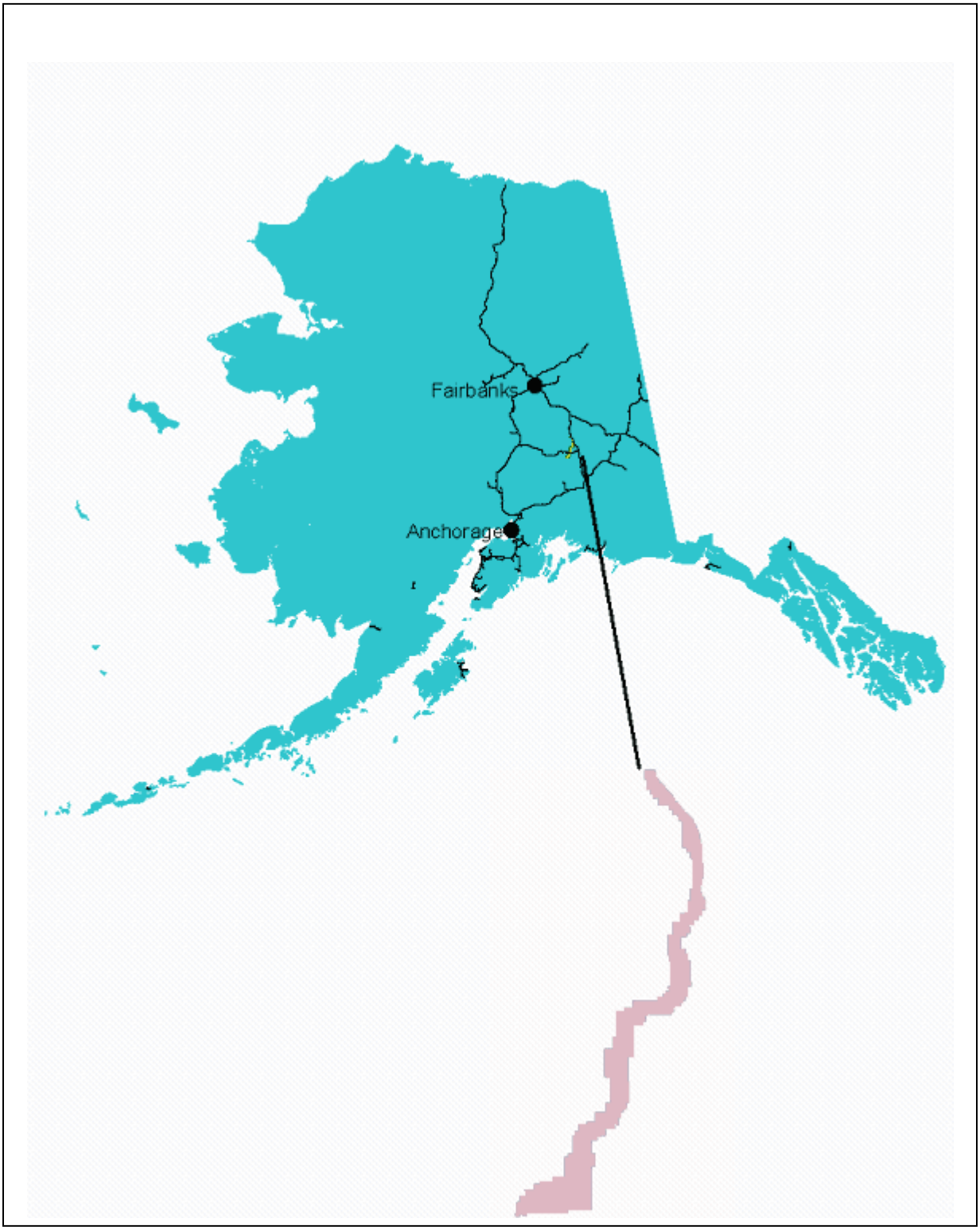
BLM-Alaska Open File Report **
Date

United States Department of Agriculture
Natural Resources Conservation Service

in cooperation with

United States Department of the Interior
Bureau of Land Management
Alaska State Office
222 W. 7th Avenue, #13
Anchorage, Alaska 99513

Figure 1. Location of the Delta River Area within the state of Alaska.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture, the Bureau of Land Management and other Federal agencies, State agencies including the Agricultural and Forestry Experiment Station and the Kenny Lake Soil and Water Conservation District. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

This survey was made cooperatively by the Natural Resources Conservation Service and the Bureau of Land Management; University of Alaska Fairbanks (Agricultural and Forestry Experiment Station); Kenny Lake Soil and Water Conservation District; and the Alaska Soil and Water Conservation District.

NRCS was responsible for survey design and methodology, data collection and analysis, and this report. Fieldwork was completed in June and July of 1997, 1998, and 1999. Soil names and descriptions were approved in 2005. Unless indicated otherwise, maps and supporting documentation in this report refer to conditions in the survey area in 2004.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The United States Department of Agriculture (USDA) prohibits discrimination in all of its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact the USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, D.C., 20250-9410, or call 202-720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

Additional information about the nation’s natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov.

Contents

Issued 2005

Soil Survey of
Delta River Area, Alaska

Introduction

The Delta River Soil Survey Area is located in the Alaska Range, approximately 220 miles northeast of Anchorage (Figure 1). The area, which includes lands adjacent to the Delta River and Tangle Lakes, includes public lands administered by the United States Department of Interior, Bureau of Land Management (BLM). Primary land uses include recreation and fish and wildlife habitat. In 1980, the upper stretches of the Delta River, all of the Tangle Lakes, and the Tangle River were designated as part of the National Wild and Scenic River System by the Alaska National Interest Lands Conservation Act. In 1983, a river management plan was developed by BLM to administer the lands of the area (USDI 1983).

The survey area is approximately 46,871 acres in size. This includes a corridor approximately 40 miles long and from one to two miles wide along the Tangle Lakes and the upper Delta River (Figure 1). The Delta River, which originates at the outlet of Long Tangle Lake, runs in a northerly direction to the survey area boundary at Black Rapids Glacier.

Survey Purpose

The primary purpose of the survey was to describe and map the soils and ecological sites of the Delta River area. Soils were mapped at a scale of 1:24,000 and detailed descriptions of the map units, soil types, and ecological sites were developed.

As an aid to understanding the detailed soil and vegetation information and to provide a more general description and maps of area resources, the detailed soil map was integrated into a multi-level ecological stratification of the area based on National Hierarchical Framework of Ecological Units (ECOMAP 1993). Subsection level units were mapped at a scale of 1:200,000. Landtype Association units were mapped at a scale of 1:100,000. Detailed descriptions of the Subsections and Landtype Associations were developed. Higher levels in the system were mapped and described as part of Alaska statewide (Nowacki and Brock 1995) and national efforts (McNab and Avers 1994; Bailey et al. 1994). The classification and mapping hierarchy for the survey area is described in Appendix A of this report.

Report Format

This report is arranged in the following sections for ease of use:

- Descriptions for the Subsection and Landtype Association maps
- Map unit descriptions for the soil maps
- Interpretations for recreation
- Descriptions of soil properties and selected interpretative groups
- Classification and descriptions of the soils
- Descriptions of the ecological sites

Three sets of resource maps are also provided:

- Subsection map (Figure 2)
- Landtype Association map (Figure 3)
- Detailed soil map at 1:24,000 scale

The 1:24,000 soil maps are printed on an orthophoto background. Orthophotography was developed by NRCS from CIR aerial photography provided by BLM. The CIR was flowin in August, 1999.

Other Products

All data, maps, orthophotography, and this report have been produced and maintained in a digital format. Electronic copies of this report, including plates and figures, map data, and metadata, can be obtained either through the BLM District Manager in Glennallen or the BLM State Director in Anchorage. Soils field data and soil survey area aggregate tabular data can be obtained from the Soil Data Mart (http://soildatamart.nrcs.usda.gov).

Initial soil mapping was done on Alaska High Altitude color infrared aerial photography (AHAP). Original overlays are on file in the Mapping Division, BLM, in Anchorage.

Part 1—General Nature of the Area

The Soil Survey of the Delta River Area includes the Tangle Lakes and the Delta River from its source at Long Tangle Lake to Black Rapids from about 62° 55' to 62° 30' N latitude and 145° 55' to 146° 05' W longitude. The Denali Highway, which connects Paxson to the east on the Richardson Highway with Cantwell on the Park's Highway to the west, crosses the southern portion of the survey area at Tangle Lakes. The Richardson Highway runs along the northerneastern edge of the area.

Climate

The climate of the Alaska Range is subarctic continental and is characterized by long, cold winters and short, warm summers. Mean January temperature is 1 degree F at Paxson (north end of Paxson Lake outside the survey area) (Table 1). Daily low temperatures of -50 degrees F or less occur frequently during the winter. Two week or longer periods of severe cold weather are common. Mean July temperature is 53 degrees F at Paxson. Daily high temperatures in summer occasionally exceed 80 degrees F. Daily minimum temperatures in summer are generally between 37 and 42 degrees F; however, freezing temperatures have been recorded in every month. Short summer showers occur frequently in the Tangle Lakes area. The autumn freeze usually occurs in October and the spring thaw normally comes in late May or early June.

Mean annual precipitation at Paxson is 21.17 inches (Table 1) with an average annual snowfall of 102.3 inches.

Physiography

The survey area lies entirely within the Alaska Mountains Section physiographic unit (Nowacki and Brock 1995), which is further subdivided into several subdivisions or Subsections that are described in general terms below and in more detail in the Resource Descriptions portion of this report. Elevation at Upper Tangle Lake is approximately 2,900 feet and 2,201 feet at Black Rapids. The mountains near Long Tangle Lake are the highest point within the survey area, with an elevation of 5,295 feet.

The Tangle Lakes, in the southern half of the survey area, are part of the Alaska Mountains-Glaciated Uplands Subsection (Figure 2). This part of the survey area consists of a glaciated intermontane basin dominated by porous gravelly glacial outwash deposits. Landforms include hills, pitted outwash plains, kettle lakes, and sinuous eskers (Plate 1). At least four periods of glaciation have been recognized in the region (Wahrhaftig 1965). Surface drainage patterns are not well established and only a few of the many lakes within the area are connected by streams. The topography is covered in alpine communities. Shrub birch and willow scrub are interspersed with large patches of lichen and exposed sand and gravel. Cottongrass tussock communities occupy broad small depressions throughout the basin. Also included within the Tangle Lakes area are small areas of alpine flood plains, which are included within the Alaska Mountains-Interior Alpine Flood Plains, Terraces, and Fans Subsection.

The northern half of the survey area includes a narrow corridor of flood plains, terraces, and mountain slopes adjacent to the Delta River and is part of the Alaska Mountains-Interior Lowland Flood Plains, Terraces and Fans Subsection (Figure 2). The Delta River is a clear-water stream from its source at Long Tangle Lake to its confluence with Eureka Creek, a distance of about 10 miles. From the outlet to the gorge, the river is 130 wide, shallow, and of low velocity. The gorge is a narrow rock chasm with a constricted river channel of high velocity with small waterfalls that require portaging, and a canyon below the gorge that is narrow, with a channel of moderate velocity (Plate 2). Alpine scrub communities line the

river and canyon slopes and a narrow band of exposed bedrock caps the canyon rim.

Below the canyon the river slows, channels become deeper, and the valley widens. The river is braided into several channels with an average width of 35 feet (Plates 3 and 4). Beaver dams on some channels have created ponds that provide for excellent grayling fishing. Riparian scrub communities line the river, with occasional spruce woodlands interspersed with scrub on alluvial fans and mountain slopes adjacent to the river.

Approximately three miles above the Eureka Creek confluence the Delta River has a single main channel 100 feet wide, velocity is significantly lower and the bottom is sand and silt. Large alluvial fans and mountain slopes with ericaceous-sedge scrub descend to the rivers edge along this stretch.

At Eureka Creek, a glacial stream originating in the Alaska Range, the Delta River changes to a braided, turbid glacial river. Total flood plain width ranges from about 1,000 to 3,000 feet and consists of multiple channels and many non-vegetated islands. The average stream width is 200 feet (USDI 1983). Plant communities include riparian scrub on flood plains and fans with occasional riparian spruce forests on high flood plains and fans.

The entire survey area is bounded by mountains of the Alaska Range, which have been subdivided into three subsections. The most extensive is the Alaska Mountains.Alpine Mountains Subsection. Less extensive are the Alaska Mountains.Non vegetated Alpine Mountains Subsection and the Alaska Mountains.Boreal Mountains Subsection (Figure 2). Encircling the Tangle Lakes are low mountains rounded by past glaciations and covered with alpine scrub (Plate 5). Along the lower Delta River tectonically active fault-block mountains are mantled in colluvium and vegetated with tall alder scrub (Plate 6). Areas of ericaceous-sedge scrub with permafrost are found on more gently sloping mountains and more northerly exposures (Plate 7).

Many upland landforms are mantled with a thin, discontinuous layer of silty loess (Plate 8) in the Tangle Lakes area. Most loess was deposited rapidly at the end of the last glaciation when receding glaciers left large areas of ground exposed to winds. Along the lower part of the Delta River, winds continue to deposit dust from the broad barren flood plain onto the adjoining uplands. These deposits are locally thick because of their close proximity to the flood plain source. Areas with the thickest deposits (a foot or more) were observed on hills near the Delta River along the northern edge of the survey area.

Peat and other organic deposits occupy minor areas in depressions on flood plains, terraces, and glacial plains (Plate 9). These areas have surface organic mats that range from several inches thick to peat deposits in bogs, fens, and wet meadows that are several feet thick. Ice cored organic mounds are present on terraces and pond margins within the Tangle Lakes area.

Permafrost

The mean annual air temperature in the Delta River Area is less than 26 degrees F, and the area lies within the zone of discontinuous permafrost (Péwé 1975). In the Tangle Lakes area, shallow permafrost occupies less than one-third of the landscape and is generally limited to depressions with cottongrass tussock vegetation and ice cored mounds adjacent to lakes and streams with dwarf birch-ericaceous scrub (Plate 10). Permafrost is generally absent on flood plains and stream terraces along the Delta River. The mountains along the perimeter of both the Tangle Lakes and Delta River have a common distribution of permafrost, which appears to be related to certain site and soil properties. Permafrost is generally absent in gravelly and cobbly soils on steep slopes. Permafrost is continuous in soils formed in thick silty or loamy deposits on gentle sloping landform positions, including broad mountain summits and alluvial fans.

The depth at which permafrost occurs and the ice content vary widely. In most places, permafrost has small crystals and thin veins of ice disseminated throughout the soil (Plate 11). On gently sloping mountain summits and alluvial fans, permafrost restricts drainage resulting in a perched water table and saturated conditions. Peat mounds typically have shallow permafrost and a core of massive ice. The surface peat is usually well drained and relatively dry.

Wildfires, which are common in the boreal forest, appear to have a limited affect on landscapes and plant communities of the Delta River Area. Evidence of fire, such as charcoal, was rarely observed in area soils.

Wildlife

Approximately 33 species of mammals are known to inhabit the survey area (Rucks 1977). Caribou of the Nelchina herd utilize the area during all times of the year. However, the calving grounds lie southwest of the area in the Alphabet Hills. Moose are common throughout the area with local concentrations along Eureka Creek and Garrett Creek during winter. Both black and grizzly bears inhabit the area—black bears intensively utilize the flood plains and stream terraces; grizzly bears are present throughout the uplands and concentrate along the river when spawning salmon are present. Among the more important furbearers in the area are coyote, wolf, red fox, marten, mink, lynx, river otter, muskrat, and beaver. Snowshoe hare and porcupine are common and cause considerable damage to trees.

Approximately 135 species of birds are summer residents of interior Alaska; another three dozen or so are spring-fall migrants or occasional visitors to the region (Armstrong 1995). Numerous species of waterfowl, including Tundra Swans, nest in the survey area and utilize local lakes and ponds for rearing young. Along the river, bald eagles nest and fish and, prior to migration in August. Spruce grouse frequent spruce forests throughout the area.

Albin (1977) identified 11 fish species known to inhabit or migrate through the area. The Delta River is not a salmon spawning stream. However, Chinook and sockeye salmon and steelhead return to tributaries connected to the Gulkana River drainage, such as Dickey Lake along the southern edge of the Delta River Area. Arctic grayling and rainbow trout are year-round residents of area lakes and streams. Other fish species include lake trout, whitefish, burbot, sucker, sculpin, and lamprey.

Recreation

Except for a BLM campground and limited commericial facilities along the Denali Highway, the Delta River Area has little development and is largely wilderness. The area provides excellent remote and backcountry recreational opportunities, including flat water and white water boating, camping, moose and caribou hunting, fishing, wildlife viewing, and hiking. The Tangle Lakes area provides a myriad of alpine lakes accessible by foot or by water, often with short portages between lakes. Camp sites are many along the lakes, with areas of obvious concentration near portages and especially where trails access lakes or cross streams. Popular camping sites and fire rings are obvious at several locations along lake shores.

The Delta River begins at the north end of Long Tangle Lake and descending the river requires a portage around Juneau Falls at the end of the lake. From the beginning of the gorge to the river's confluence with Eureka Creek, a distance of about 10 miles, the river is clear and consists of Class I–III rated water based on the American Whitewater Association rating. From Eureka Cree to Black Rapids, the Delta River is a wide, braided, silt laden river also rated as Class I–III. Strong afternoon winds and blowing dust are common along this stretch of the river. The Class IV Black Rapids marks the northern boundary of the survey area.

Impacts of recreational use are obvious along the upper section of the Delta River, where favorable camping spots are scarce. Clear water and exceptional grayling fishing concentrates use along this section. Impacts include fire rings, a general lack of firewood, trampling of vegetation, and minor erosion at heavily used campsites (Plate 12). Along the lower reaches of the river, campsites are more abundant and impacts of recreational use are less apparent (Plate 13).

Part 2—Resource Descriptions

ECOMAP Subsection and Landtype Association Maps

Subsections and Landtype Associations of the Delta River Area are based on the National Hierarchical Framework of Ecological Units (ECOMAP 1993). The seven levels of the hierarchy, beginning with the highest and most general level, are Domain, Division, Province, Section, Subsection, Landtype Association, and Landtype (Ecological Site). A complete description of the ECOMAP Hierarchy is provided in Appendix A. A description of the Subsections and Landtype Associations of the Delta River Area are provided in this section.

The descriptions in this section refer to the Subsection map (Figure 2) and Landtype Association map (Figure 3). The soil map units and the 1:24,000 soil map, are also described in Part 2. The Soil Map Units are considered as divisions of the Landtype Association level of the Hierarchy. Table 2 lists the complete hierarchy for the Delta River Area, from the Domain through the Soil Map Unit levels.

The Subsection and Landtype Association levels for the Delta River Area are defined as follows:

Subsections. Subsections are aggregations of Landtype Associations based on similarities in surficial geology, geomorphic processes, soil groups, and potential vegetation.

Landtype Associations. Landtype Associations are aggregations of soil map units based on similar pattern and composition of ecological sites. Landtype associations represent land areas having a distinctive pattern of landforms, soil types, relief, drainage, vegetation cover types, and channel characteristics. Soil map units making up one Landtype Association can occur in other units but in a different pattern and composition.

The Subsection and Landtype Association maps and descriptions provide a general overview and understanding of the pattern and distribution of landform, soil, and vegetation resources of the Delta River area. The Subsection and Landtype Association maps and descriptions can be used to help assimilate, understand, and apply the more detailed resource information associated with the soil maps. Resource information at the Subsection and Landtype Association levels is directly relevant to statewide and area-wide planning, modeling, and management activities.

Figure 2. Delta River Subsection Map

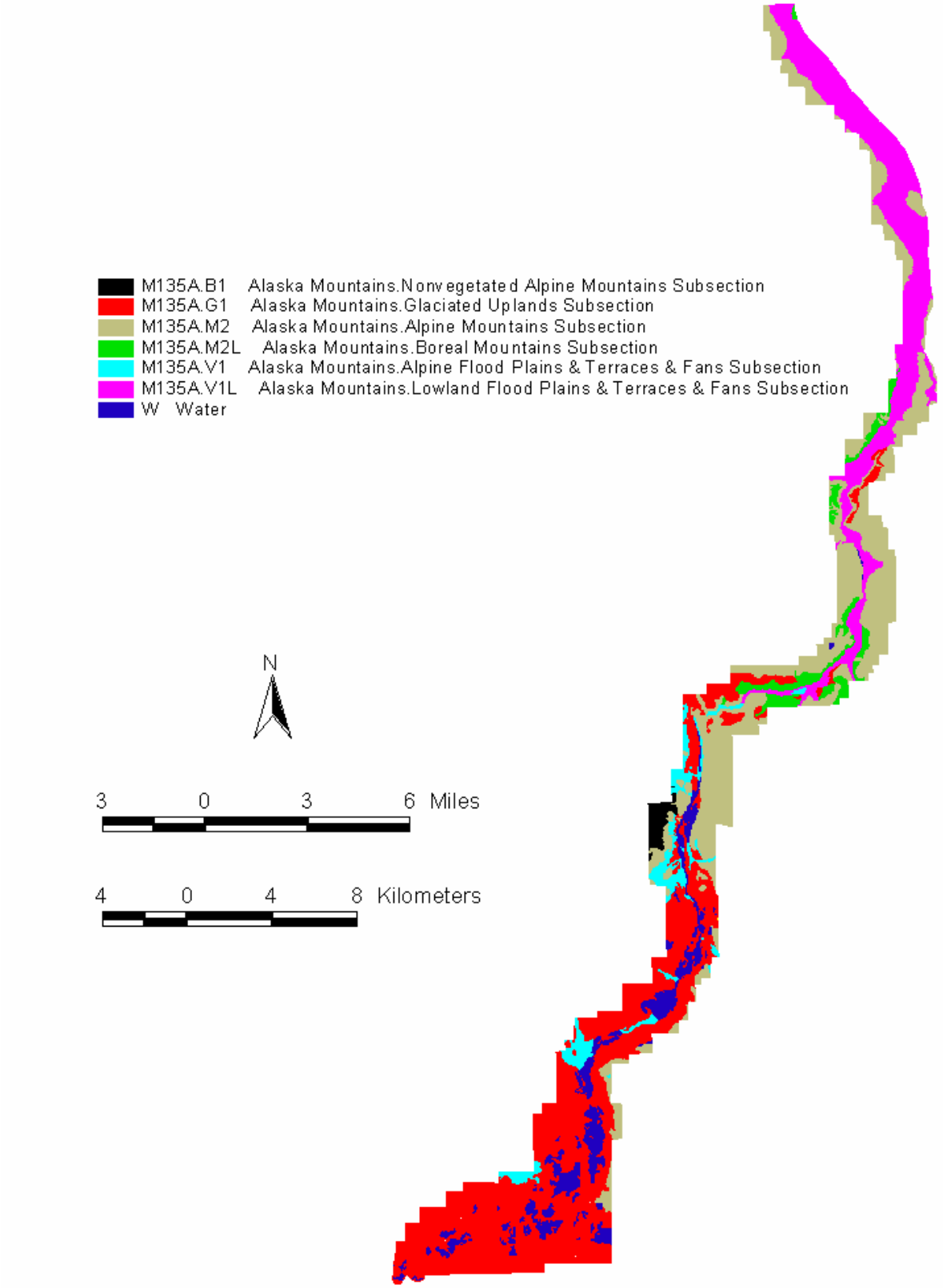
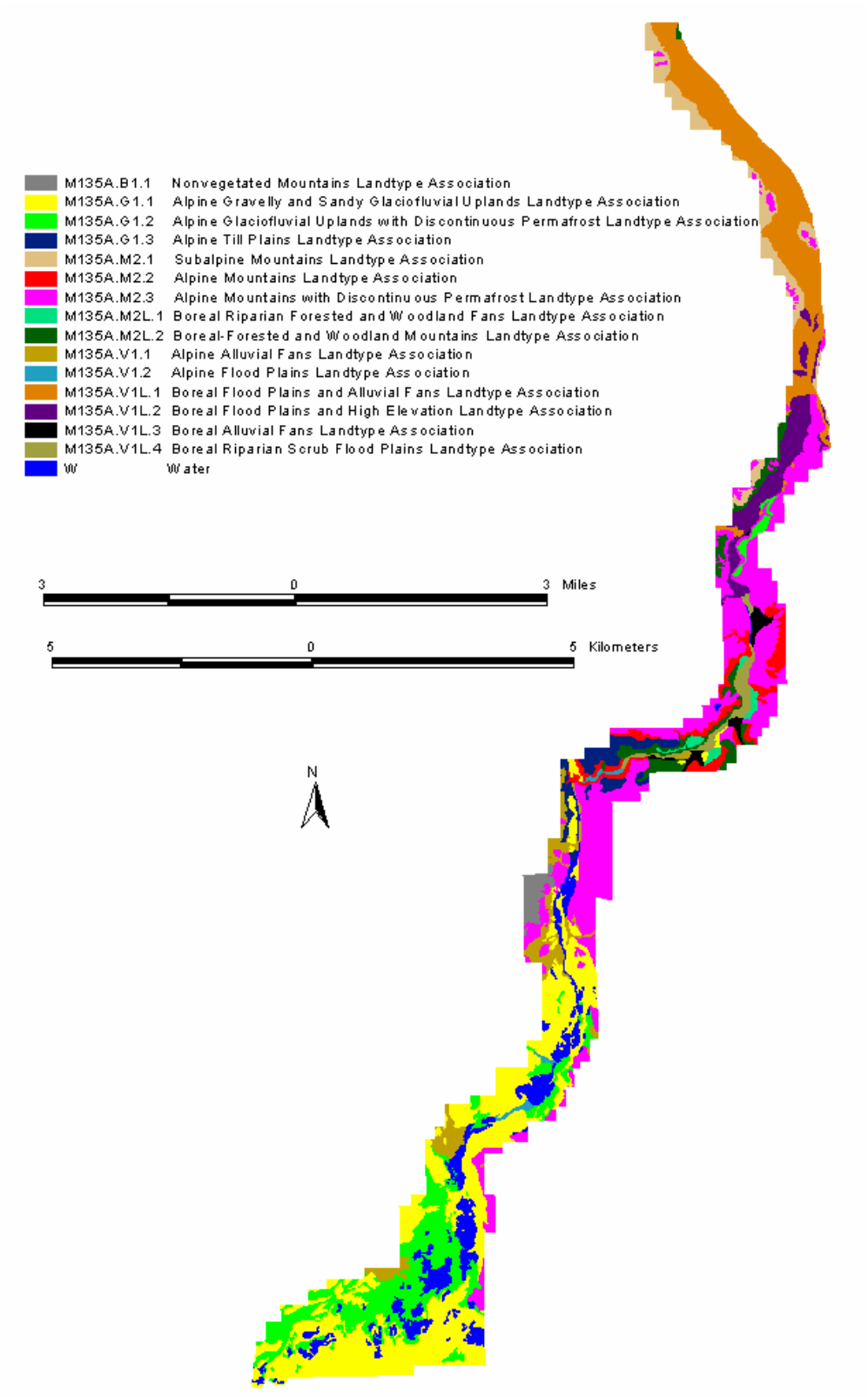


Figure 3. Delta River Landtype Association Map



M135A.B1—Alaska Mountains.Nonvegetated Alpine Mountains Subsection

Climatic Data:
Climatic Domain: polar
Sub-regional Climate: subarctic continental
Mean Annual Precipitation: 28 to 57 inches (712 to 1,450 mm)
Mean Annual Air Temperature: 24 to 25 degrees F (-4.7 to -4.1 °C)
Site Description:
Location: central part of the survey area
Biome: Interior alpine
Elevation: 2,900 to 5,131 feet (884 to 1,564 m)
Landform: mountains
General Vegetation: non-vegetated
Parent Materials: colluvium of variable lithology
Geomorphic Processes: colluviation
Permafrost Extent: none
Major Soil Taxa: not described
Detailed Soil Map Units: RO

M135A.B1.1—Nonvegetated Mountains Landtype Association

Geographic Setting
Distribution: central portion of the area west of Long Tangle Lake.
Approximate extent: 523 acres (209.4 ha); 1.1 percent of the survey
Principal Ecological Sites
Not described

Principal Soil Map Units
RO—Rock Outcrop, 35 to 90 percent slopes
Physiography
Landforms: barren talus, scree, and rock on mountains
Elevation: 2,900 to 5,131 feet (884 to 1,564 m)
Slope: 35 to 90 percent
Physiography notes: Permafrost is absent in this unit.
Dominant Soils
Not described
Climax Plant Community
Not described

M135A.G1—Alaska Mountains.Glaciated Uplands Subsection

Climatic Data:
Climatic Domain: polar
Sub-regional Climate: sub-arctic continental
Mean Annual Precipitation: 22 to 35 inches (564 to 894 mm)
Mean Annual Air Temperature: 24 to 25 degrees F (-4.3 to -3.7 °C)
Site Description:
Location: southern part of the survey area
Biome: Interior alpine
Elevation: 2,671 to 3,442 feet (815 to 1,049 m)
Landforms: till plains, outwash plains, and hills
General Vegetation: shrub birch-ericaceous low and dwarf scrub, shrub birch/sedge scrub and ericaceous dwarf scrub, tussock and shrub birch/sedge scrub, alpine shrub scrub and shrub/sedge scrub, and tussock/shrub meadow
Parent Materials: thin mantle of loess over glacial outwash or till, organic materials
Geomorphic Processes: podzolization, hydromorphism, and cryoturbation
Permafrost Extent: common
Major Soil Series: Typic Haplogelods, Typic Eutrogelepts, Typic Historthels, Typic Histoturbels, Glacic Folistels, Schleyer, Geist, Slana, Phalarope, Kuswash, Fels, Shand, Bonot
Detailed Soil Map Units: GO1, GO2, GO3, GO4, and OPB

M135A.G1.1—Alpine Gravelly and Sandy Glaciofluvial Uplands Landtype Association

Geographic Setting
Distribution: Tangle Lakes
Approximate extent: 11,493 acres (4,597 ha); 24.2 percent of the survey area
Principal Ecological Sites
Gravelly slopes, high elevation
Gravelly slopes
Principal Soil Map Units
GO1—Schleyer-Geist complex, 0 to 30 percent slopes
GO2—Schleyer-Slana-Geist complex, 0 to 70 percent slopes
OPB—Phalarope silt loam, 0 to 5 percent slopes
Physiography
Landforms: pitted glacial outwash plains and hills
Elevation: 2,674 to 3,107 feet (815 to 947 m)
Slope: 0 to 70 percent
Physiography notes: Local relief ranges from 5 to 100 feet (1.5 to 33 m) or more.
Dominant Soils
Schleyer (very deep, somewhat excessively drained soils formed in a thin mantle of silty loess over gravelly glacial outwash on hills and outwash plains)
Climax Plant Community
Shrub birch-dwarf ericaceous scrub mosaic
Shrub birch-bog blueberry scrub

M135A.G1.2—Alpine Glaciofluvial Uplands with Discontinuous Permafrost Landtype Association

Geographic Setting
Distribution: Tangle Lakes
Approximate extent: 5,572 acres (2,228.9 ha); 11.8 percent of the survey area
Principal Ecological Sites
R173XY356—Gravelly slopes, high elevation
R173XY173—Loamy frozen slopes, high elevation
R173XY114—Peat mounds, low elevation
R173XY500—Pond margins
Principal Soil Map Units
GO3—Turbellina-Schleyer complex, 0 to 30 percent slopes
GO4—Kuswash-Turbellina-Schleyer complex, 0 to 30 percent slopes
IM—Shand-Bonot-Fels complex, 0 to 60 percent slopes
Physiography
Landforms: pitted glacial outwash plains and hills
Elevation: 2,546 to 3,012 feet (776 to 918 m)
Slope: 0 to 60 percent
Physiography notes: Local relief ranges from 5 to 100 feet (1.5 to 33 m) or more.
Dominant Soils
Turbellina (shallow over permafrost, very poorly drained soils formed in silty outwash on plains and toeslopes of hills)
Schleyer (very deep, somewhat excessively drained soils formed in a thin mantle of silty loess over gravelly glacial outwash on hills and outwash plains)
Kuswash (shallow over permafrost, poorly drained soils formed in loamy outwash on plains and summits and toeslopes of hills)

Shand (very deep, very poorly drained, flooded soils formed in organic materials over gravelly alluvium on flood plains)
Soils of minor extent:
Bonot are shallow or moderately deep to permafrost, very poorly drained soils formed in organic materials in depressions on outwash plains.
Fels are moderately deep to permafrost, well drained soils formed in organic materials on ice-cored mounds on outwash plains.

Climax Plant Community
Shrub birch-dwarf ericaceous scrub mosaic
Tussock cottongrass/mixed ericaceous shrub meadow
Diamondleaf willow/sedge meadow scrub

M135A.G1.3—Alpine Till Plains Landtype Association

Geographic Setting
Distribution: Tangle Lakes
Approximate extent: 1,125 acres (449.9 ha); 2.4 percent of the survey area

Principal Ecological Sites
R173XY356—Gravelly slopes, high elevation
R173XY253—Loamy slopes, high elevation

Principal Soil Map Units
TPA—McCumberson-Phelanna complex, 2 to 12 percent slopes

Physiography
Landforms: till plains and mountain toeslopes
Elevation: 2,782 to 3,442 feet (848 to 1,049 m)
Slope: 0 to 12 percent

Dominant Soils
McCumberson (very deep, well drained soils formed in silty loess over gravelly glacial till)
Phelanna (very deep, poorly drained soils formed in silty loess over gravelly glacial till)

Climax Plant Community
Shrub birch-dwarf ericaceous scrub mosaic
Diamondleaf willow scrub, moist

M135A.M2—Alaska Mountains.Alpine Mountains Subsection

Climatic Data:
Climatic Domain: polar
Sub-regional Climate: sub-arctic continental
Mean Annual Precipitation: 23 to 52 inches (583 to 1,310 mm)
Mean Annual Air Temperature: 24 to 26 degrees F (-4.4 to -3.6 °C)

Site Description:
Location: northern half of the survey area
Biome: alpine
Elevation: 2,231 to 5,295 feet (680 to 1,614 m)
Landform: mountains
General Vegetation: shrub birch-ericaceous scrub, mountain avens-ericaceous dwarf alpine scrub, shrub scrub, and shrub/sedge scrub
Parent Materials: eolian deposits over colluvium or drift

Geomorphic Processes: braunification and colluviation
Permafrost Extent: common
Major Soil Series: Basaltlake, Fields, Minya, Frost Cirlce, Castnot, and Petrokov
Detailed Soil Map Units: AFP, BRA, ESB, EST, MSB, MSD, MSHP, MSS, MST

M135A.M2.1—Subalpine Mountains Landtype Association

Geographic Setting
Distribution: Tangle Lakes
Approximate extent: 5,146 acres (2,058.2 ha); 10.9 percent of the survey area
Principal Ecological Sites
R173XY303—Gravelly colluvial slopes, acid
Principal Soil Map Units
AFP—Basaltlake, 12 to 25 percent slopes
BRA—Fields silt loam, 18 to 65 percent slopes
MSB—Fields-Minya-Frostcircle association, 0 to 70 percent slopes
Physiography
Landforms: mountains and alluvial fans on mountains
Elevation: 2,231 to 3,409 feet (680 to 1,039 m)
Slope: 12 to 65 percent
Dominant Soils
Basaltlake (very deep, well drained soils formed in silty loess over gravelly colluvium)
Fields (moderately deep over consolidated bedrock, well drained soils formed in silty loess over gravelly colluvium)
Climax Plant Community
Green alder/red current/bluejoint scrub

M135A.M2.2—Alpine Mountains Landtype Association

Geographic Setting
Distribution: northern part of the survey area
Approximate extent: 1,656 acres (662.4 ha); 3.5 percent of the survey area

Principal Ecological Sites
R173XY358—Gravelly slopes
R173XY356—Gravelly slopes, high elevation
R173XY303—Gravelly colluvial slopes, acid
Principal Soil Map Units
ESB—Castnot-Minya-Rock Outcrop complex, 12 to 90 percent slopes
EST—Petrokov-Basaltlake-Castnot Complex, 6 to 65 percent slopes
Physiography
Landform: mountains
Elevation: 815 to 947 feet (838 to 914 m)
Slope: 6 to 90 percent
Dominant Soils
Castnot (very deep, well drained soils formed in silty loess over gravelly glacial till or colluvium on mountains)
Minya (shallow over consolidated bedrock, well drained soils formed in silty loess over gravelly glacial till on mountains)
Rock Outcrop (non-vegetated rock and talus on mountains)
Petrokov (very deep, somewhat excessively drained soils formed in silty loess over gravelly glacial outwash on mountains)
Basaltlake (very deep, well drained soils formed in silty loess over gravelly colluvium in mountain swales)
Climax Plant Community
Shrub birch-bog blueberry scrub
Shrub birch-dwarf ericaceous scrub mosaic
Green alder/red current/bluejoint scrub

M135A.M2.3—Alpine Mountains with Discontinuous Permafrost Landtype Association

Geographic Setting
Distribution: northern part of the survey area
Approximate extent: 6,007 acres (2,402.8 ha); 12.7 percent of the survey area
Principal Ecological Sites
R173XY180—Gravelly frozen slopes
R173XY182—Gravelly frozen slopes, ruptic
R173XY358—Gravelly slopes
R173XY303—Gravelly colluvial slopes, acid
Principal Soil Map Units
L1—Owhat peat, 2 to 15 percent slopes
MSB—Fields-Minya-Frostcircle association, 0 to 75 percent slopes
MSD—Frostcircle-Minya-Minya, cool complex, 0 to 28 percent slopes
MSHP—Steps-Basaltlake association, 14 to 75 percent slopes
MSS—Frostcircle peat, 0 to 25 percent slopes
MST—Frostcircle-Ogive association, 0 to 25 percent
Physiography
Landforms: mountains
Elevation: 2,365 to 5,295 feet (721 to 1,614 m)
Slope: 2 to 75 percent
Dominant Soils
Frostcircle (deep over permafrost, poorly drained soils formed in gravelly cryoturbate on mountain summits)
Minya (cool are shallow over consolidated bedrock, well drained soils formed in silty loess over gravelly glacial till on mountains)

Steps (shallow over permafrost, poorly drained soils formed in cryoturbate on mountains)
Basaltlake (cool are very deep, well drained soils formed in silty loess over gravelly colluvium on mountains)

Climax Plant Community

Shrub birch-mixed ericaceous shrub/sedge scrub
Shrub birch/sedge scrub mosaic
Shrub birch-bog blueberry scrub
Green alder/red current/bluejoint scrub

M135A.M2L—Alaska Mountains.Boreal Mountains Subsection

Climatic Data:

Climatic Domain: polar
Sub-regional Climate: sub-arctic continental
Mean Annual Precipitation: 31 to 35 inches (776 to 894 mm)
Mean Annual Air Temperature: 24 to 26 inches (-4.2 to -3.7 °C)

Site Description:

Location: northern half of the survey area
Biome: Interior boreal
Elevation: 2,244 to 3,438 feet (684 to 1,048 m)
Landform: mountains
General Vegetation: white spruce/mixed scrub woodland, white spruce woodland, white spruce forest, and shrub scrub
Parent Materials: loess over colluvium, drift or alluvium

Geomorphic Processes: braunification and hydromorphism
Permafrost Extent: common
Major Soil Series: Osar, Klute, Waitabit, Ogive, Elting, and Basaltlake
Detailed Soil Map Units: AFM, ESA, and MSF

M135A.M2L.1—Boreal Riparian Forested and Woodland Fans Landtype Association

Geographic Setting
Distribution: northern part of the survey area
Approximate extent: 318 acres (127.3 ha); 0.7 percent of the survey area
Principal Ecological Sites
F173XY354—Loamy slopes, wet
F173XY151—Loamy high flood plains
Principal Soil Map Units
AFM—Osar-Klute complex, 6 to 18 percent
Physiography
Landform: mountains
Elevation: 2,667 to 2,930 feet (813 to 893 m)
Slope: 6 to 18 percent
Dominant Soils
Osar (very deep, poorly drained soils formed in silty loess over gravelly alluvium on fan terraces)
Klute (very deep, well drained flooded soils formed in loamy alluvium over sandy and gravelly alluvium on flood plains on alluvial fans)
Climax Plant Community
White spruce/willow woodland, wet
White spruce/bog blueberry/feathermoss forest

M135A.M2L.2—Boreal-Forested and Woodland Mountains Landtype Association

Geographic Setting
Distribution: northern part of the survey area
Approximate extent: 1,361 acres (544.6 ha); 2.9 percent of the survey area
Principal Ecological Sites
F173XY355—Gravelly colluvial slopes, warm
R173XY420—Swales, high elevation
R173XY303—Gravelly colluvial slopes, acid
Principal Soil Map Units
ESA—Waitabit-Ogive complex, 22 to 60 percent slopes
MSF—Elting-Basaltlake-Sonderna complex, 2 to 48 percent slopes
Physiography
Landform: mountains
Elevation: 2,244 to 3,438 feet (684 to 1,048 m)
Slope: 2 to 60 percent
Dominant Soils
Waitabit (very deep, well drained soils formed in silty loess over gravelly glacial till on mountains)
Ogive (very deep, well drained soils formed in silty loess over gravelly glacial till in mountain swales)
Elting (very deep, well drained soils formed in silty loess over sandy and gravelly outwash on mountains)
Basaltlake (very deep, well drained soils formed in silty loess over gravelly colluvium on mountains)
Climax Plant Community:
White spruce/green alder forest
Diamondleaf willow-mixed willow scrub mosaic
Green alder/red current/bluejoint scrub

M135A.V1—Alaska Mountains.Alpine Flood Plains, Terraces and Fans Subsection

Climatic Data:
Climatic Domain: polar
Sub-regional Climate: sub-arctic continental
Mean Annual Precipitation: 32 to 42 inches (813 to 1,069 mm)
Mean Annual Air Temperature: 24 to 25 degrees F (-4.3 to -3.9 °C)
Site Description:
Location: southern half of the survey area
Biome: Interior alpine
Elevation: 1,896 to 2,933 feet (578 to 894 m)
Landforms: flood plains, terraces, and alluvial fans
General Vegetation: riparian mixed scrub
Parent Materials: flood plains consist of gravelly alluvium or loamy alluvium over gravelly alluvium; stream terraces are mantled with a thin loess layer over gravelly alluvium
Geomorphic Processes: fluvial processes on flood plains and braunification and podzolization on terraces
Permafrost Extent: common
Major Soil Series: Skarland, Broxson, and Schleyer
Detailed Soil Map Units: AFF, AFK, AFL, FPA1, and FPF

M135A.V1.1—Alpine Alluvial Fans Landtype Association

Geographic Setting
Distribution: Tangle Lakes
Approximate extent: 1,735 acres (694.0 ha); 3.7 percent of the survey area
Principal Ecological Sites
R173XY257—Gravelly low flood plains, high elevation
R173XY258—Gravelly flood plains, cool
R173XY356—Gravelly slopes, high elevation

Principal Soil Map Units
AFF—Schleyer silt loam, 0 to 5 percent slopes
AFK—Skarland-Schleyer complex, 8 to 20 percent slopes
AFL—Schleyer-Broxson-Riverwash complex
Physiography
Landforms: flood plains and fan terraces on alluvial fans
Elevation: 815 to 947 m (838 to 914 m)
Slope: 0 to 20 percent
Dominant Soils
Schleyer (very deep, somewhat excessively drained soils formed in loess over sandy and gravelly alluvium on fan terraces)
Skarland (very deep, somewhat excessively drained, flooded soils formed in sandy and gravelly alluvium on flood plain positions on alluvial fans)
Broxson (very deep, somewhat poorly drained, flooded soils formed in sandy and gravelly alluvium on flood plain positions on alluvial fans)
Climax Plant Community
Feltleaf willow scrub, cool
Feltleaf willow-mixed shrub/herbaceous scrub
Shrub birch-dwarf ericaceous scrub mosaic

M135A.V1.2—Alpine Flood Plains Landtype Association

Geographic Setting
Distribution: Tangle Lakes; occasionally along the Delta River
Approximate extent: 213 acres (85.2 ha); 0.4 percent of the survey area
Principal Ecological Sites
R173XY257—Gravelly low flood plains, high elevation
R173XY100—Loamy flood plains
Principal Soil Map Units
FPA1—Broxson sandy loam
FPF—Broxson-Nizina, cool complex
Physiography
Landforms: flood plains and alluvial fans
Elevation: 2,667 to 2,933 feet (813 to 894 m)
Slope: 0 to 4 percent
Dominant Soils
Nizina (very deep, somewhat excessively or excessively drained, flooded soils formed in a thin mantle of stratified loamy alluvium over sandy and gravelly alluvium on flood plains)
Broxson (very deep, somewhat poorly drained, flooded soils formed in sandy and gravelly alluvium on flood plains)
Climax Plant Community
Feltleaf willow scrub, cool
Poplar/mixed shrub scrub

M135A.V1L—Alaska Mountains.Lowland Flood Plains, Terraces and Fans Subsection

Climatic Data:
Climatic Domain: polar
Sub-regional Climate: sub-arctic continental
Mean Annual Precipitation: 23 to 52 inches (578 to 1,330 mm)

Mean Annual Air Temperature: 22 to 26 degrees F (-5.3 to -3.6 °C

Site Description:

Location: northern half of the survey area
Biome: Interior boreal
Elevation: 2,201 to 2,933 feet (671 to 894 m)
Landforms: flood plains, terraces, and alluvial fans
General Vegetation: forest and scrub
Parent Materials: flood plains consist of gravelly alluvium or loamy alluvium over gravelly alluvium; stream terraces are mantled with a thin loess layer over gravelly alluvium

Geomorphic Processes: fluvial processes on flood plains and podzolization on terraces
Permafrost Extent: common
Major Soil Series: Nizina, Swedna, Tangoe, Dackey, and Riverwash
Detailed Soil Map Units: AFA, AFE, AFN, BA, FPA, FPB, FPC, FPD, FPG, and STA

M135A.V1L.1—Boreal Flood Plains and Alluvial Fans Landtype Association

Geographic Setting

Distribution: northern part of the Delta River
Approximate extent: 5,679 acres (2,271.6 ha); 12 percent of the survey area

Principal Ecological Sites

F173XY151—Loamy high flood plains
F173XY204—Gravelly flood plains
F173XY355—Gravelly colluvial slopes, warm
R173XY258—Gravelly flood plains, cool

Principal Soil Map Units

AFA—Nizina-Sinona-Riverwash complex
AFN—Sonderna very fine sandy loam, 0 to 4 percent slopes
BA—Riverwash
STA—Nizina-Nizina, rarely flooded complex

FPG—Tangoe-Nizina, dry complex

Physiography

Landforms: flood plains and alluvial fans
Elevation: 671 to 836 feet (838 to 914 m*)*
Slope: 0 to 4 percent

Dominant Soils

Nizina (somewhat excessively or excessively drained, flooded soils formed in a thin mantle of stratified loamy alluvium over sandy and gravelly alluvium on flood plains)
Sinona (very deep somewhat excessively drained soils formed in a thin mantle of silty loess over sandy and gravelly alluvium on terraces)
Sonderna (very deep, well drained soils formed in silty loess deposits over sandy and gravelly alluvium on fan terraces)
Riverwash (barren gravelly and sandy materials within the flood plain)

Climax Plant Community

White spruce/bog blueberry/feathermoss forest
White spruce-poplar/soapberry forest
Feltleaf willow-mixed shrub/herbaceous scrub
White spruce/green alder forest

M135A.V1L.2—Boreal Flood Plains, High Elevation Landtype Association

Geographic Setting

Distribution: northern part of the survey area
Approximate extent: 1,850 acres (739.9 ha); 3.9 percent of the survey area

Principal Ecological Sites

R173XY152—Loamy wet flood plains, high elevation
R173XY100—Loamy flood plains
R173XY258—Gravelly flood plains, cool

Principal Soil Map Units

FPA—Swedna-Riverwash-Dackey complex
FPB—Dackey-Tangoe-Riverwash complex

Physiography

Landform: flood plains
Elevation: 2,451 to 2,785 feet (747 to 849 m)
Slope: 0 to 4 percent

Dominant Soils

Swedna (very deep, poorly drained, flooded soils formed in a loamy mantle of alluvium over sandy and gravelly alluvium on flood plains)
Riverwash (barren gravelly and sandy materials within the flood plain)
Dackey (very deep, somewhat poorly drained, flooded soils formed in a loamy mantle of alluvium over sandy and gravelly alluvium on flood plains)
Tangoe (very deep, somewhat poorly drained, flooded soils formed in sandy and gravelly alluvium on flood plains)

Climax Plant Community

Diamondleaf willow/horsetail-fragile sedge scrub
Poplar/mixed shrub forest
Feltleaf willow-mixed shrub/herbaceous scrub

M135A.V1L.3—Boreal Alluvial Fans Landtype Association

Geographic Setting

Distribution: southern part of the Delta River

Approximate extent: 414 acres (165.8 ha); 0.9 percent of the survey area

Principal Ecological Sites

F173XY151—Loamy high flood plains

Principal Soil Map Units

AFE—Nizina silt loam, 6 to 18 percent

Physiography

Landform: alluvial fans
Elevation: 2,546 to 2,930 feet (776 to 893 m)
Slope: 6 to 18 percent

Dominant Soils

Nizina (very deep, somewhat excessively or excessively drained, flooded soils formed in a thin mantle of silty loess over stratified loamy alluvium underlain by sandy and gravelly alluvium on flood plains)

Climax Plant Community

Feltleaf willow scrub, cool
Poplar/mixed shrub forest

M135A.V1L.4—Boreal Riparian Scrub Flood Plains Landtype Association

Geographic Setting

Distribution: northern part of the survey area
Approximate extent: 646 acres (285.5 ha); 1.4 percent of the survey area

Principal Ecological Sites

F173XY151—Loamy high flood plains

Principal Soil Map Units

FPC—Dackey-Tangoe-Riverwash complex
FPD—Dackey-Swedna-Tangoe complex

Physiography

Landform: alluvial fans
Elevation: 815 to 947 feet (838 to 914 m)
Slope: 6 to 18 percent

Dominant Soils

Dackey (very deep, somewhat poorly drained, flooded soils formed in a loamy mantle of alluvium over sandy and gravelly alluvium on flood plains)
Tangoe (very deep, somewhat poorly drained, flooded soils formed in sandy and gravelly alluvium on flood plains)
Swedna (very deep, poorly drained, flooded soils formed in a loamy mantle of alluvium over sandy and gravelly alluvium on flood plains)

Climax Plant Community

Poplar/mixed shrub forest
Feltleaf willow-mixed shrub/herbaceous scrub
Diamondleaf willow/horsetail-fragile sedge scrub

Soil Resources

Delineations on the attached soil maps represent the soil map units of the Delta River Area. Survey methods used to make this map are described in Appendix C. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses, and to plan the management needed for those uses. More information about each map unit is provided in the section Use and Management of the Soils.

Each of the delineations on the detailed soil maps has a map unit symbol to indicate the map unit and to link it to the corresponding map unit description on the following pages. Each of these delineations represents an area on the landscape and consists of one or more soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, on-site investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a soil series. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soil components, the building blocks of map units, for the Delta River Area are classified to the series level. One example of a soil classified to the series level is Nizina. Soil phases (Soil Survey Staff 1999) are defined if the range of properties for a soil is too broad to maintain the correlation with vegetative and other ecological properties. Phases are applied to soil series when two distinctive climax plant communities are present and can readily be correlated to specific site or soil conditions. To accommodate two distinctive communities on Nizina soils a “rarely flooded” phase is assigned to Nizina soils with a significantly different climax plant community associated with a lower flooding frequency. Each soil is assigned to an ecological site. Ecological sites are synonomous with the term “landtype” in the ECOMAP Hierarchy. A complete description of the relation between soils, ecological sites, and landtypes is provided in Appendix A.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, consociations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or

miscellaneous areas are somewhat similar in all areas. AFA—Nizina-Sinona-Riverwash complex, 0 to 12 percent slopes is an example.

In a *consociation,* delineated areas are dominated by a single soil taxon (or miscellaneous area) and similar soils. As a rule, at least one-half of the pedons in each delineation of a soil consociation are of the same taxonomic unit and provide the name for the map unit. FPA1—Broxson sandy loam is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Riverwash is an example.

Table 3 gives the acreage and proportionate extent of each map unit. Table 4 lists the ecological site correlated to each map unit component. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Appendix D gives the classification and description of the soils. Appendix E gives the detailed descriptions of ecological sites listed in the following map unit descriptions and Appendix A described mapping and classification hierarchies used in this project.

AFA—Nizina-Sinona-Riverwash complex, 0 to 12 percent slopes

Elevation: 2,211 to 2,634 feet
Mean annual precipitation: 28 to 40 inches
Frost-free period: 60 to 80 days

Nizina, cool, and similar soils

Extent: 30 to 80 percent of the map unit
Landform: flood plains on alluvial fans
Slope shape: linear
Slope range: 5 to 10 percent
Parent material: loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 2 to 7 inches
Hazard of erosion (organic mat removed): by water—moderate; by wind—moderate
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: occasional
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 0.9 inches
Climax plant community: Poplar-feltleaf willow scrub
Ecological site: Loamy flood plains
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A, AC—2 to 3 inches; sandy loam, moderately high permeability
2C—3 to 60 inches; extremely gravelly coarse sand, high permeability

Sinona and similar soils

Extent: 10 to 55 percent of the map unit
Landform: fan terraces on alluvial fans
Slope shape: linear
Slope range: 5 to 12 percent
Parent material: loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 6 to 8 inches

Hazard of erosion (organic mat removed): by water—severe; by wind—moderate
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.3 inches
Climax plant community: White spruce/green alder forest
Ecological site: Gravelly mountains, warm
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
A—1 to 6 inches; silt loam, moderately high permeability
2Bw—6 to 15 inches; very gravelly sandy loam, moderately high permeability
2C—15 to 60 inches; extremely gravelly coarse sand, high permeability

Riverwash

Extent: 5 to 30 percent of the map unit
Landform: flood plains
Slope range: 0 to 6 percent

Minor Components

Klute and similar soils: 0 to 15 percent of the map unit
Nizina, dry, and similar soils: 0 to 15 percent of the map unit

AFE—Nizina silt loam, 6 to 18 percent slopes (Plate 14)

Elevation: 2,546 to 2,930 feet
Mean annual precipitation: 31 to 35 inches
Frost-free period: 60 to 80 days

Nizina and similar soils

Extent: 70 to 90 percent of the map unit
Landform: flood plains on alluvial fans
Slope shape: linear
Slope range: 6 to 18 percent
Parent material: silty eolian deposits over loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 3 to 11 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: occasional
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.7 inches
Climax plant community: White spruce/bog blueberry/feathermoss forest
Ecological site: Loamy high flood plains
Representative Profile:
Oi—0 to 4 inches; slightly decomposed plant material, high permeability
A—4 to 6 inches; silt loam, moderately high permeability
2CA, 2C—6 to 60 inches; extremely gravelly coarse sand, high permeability

Minor Components

Nizina, cool, and similar soils: 5 to 15 percent of the map unit
Tangoe and similar soils: 0 to 20 percent of the map unit

AFF—Schleyer silt loam, 0 to 5 percent slopes

Elevation: 2,674 to 3,133 feet
Mean annual precipitation: 23 to 35 inches
Frost-free period: 50 to 70 days

Schleyer and similar soils

Extent: 85 to 95 percent of the map unit
Landform: fan terraces on alluvial fans
Slope shape: linear
Slope range: 0 to 5 percent
Parent material: silty eolian deposits over gravelly alluvium
Depth to strongly contrasting textural stratification: 2 to 11 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—severe
Runoff: low
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.4 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly slopes, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
E/A, Bs1—2 to 6 inches; silt loam, moderately high permeability
2Bs2, 2BC—6 to 21 inches; extremely cobbly coarse sand, high permeability
2C—21 to 60 inches; extremely cobbly coarse sand, high permeability

Minor Components

Broxson and similar soils: 5 to 15 percent of the map unit

AFK—Skarland-Schleyer complex, 8 to 20 percent slopes

Elevation: 2,779 to 3,507 feet
Mean annual precipitation: 25 to 28 inches
Frost-free period: 50 to 70 days

Skarland and similar soils

Extent: 45 to 75 percent of the map unit
Landform: flood plains on alluvial fans
Slope shape: linear
Slope range: 8 to 20 percent
Parent material: loamy alluvium over sandy and gravelly alluvium

Depth to strongly contrasting textural stratification: 2 to 7 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—moderate
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: occasional
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.7 inches
Climax plant community: Feltleaf willow-mixed shrub/herbaceous scrub
Ecological site: Gravelly flood plains, cool
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A/Oe—2 to 5 inches; moderately decomposed plant material, moderately high permeability
A/Oe—2 to 5 inches; stratified sand to silt, moderately high permeability
2CA, 2C—5 to 60 inches; extremely cobbly coarse sand, high permeability

Schleyer and similar soils

Extent: 20 to 50 percent of the map unit
Landform: fan terraces on alluvial fans
Slope shape: linear
Slope range: 10 to 20 percent
Parent material: silty eolian deposits over gravelly alluvium
Depth to strongly contrasting textural stratification: 2 to 11 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.4 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly slopes, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
E/A, Bs1—2 to 6 inches; silt loam, moderately high permeability
2Bs2, 2BC—6 to 21 inches; extremely cobbly coarse sand, high permeability
2C—21 to 60 inches; extremely cobbly coarse sand, high permeability

Minor Components

Nizina, cool, and similar soils: 5 to 20 percent of the map unit

AFL—Schleyer-Broxson-Riverwash complex (Plate 15)

Elevation: 2,848 to 2,943 feet
Mean annual precipitation: 23 to 25 inches
Frost-free period: 50 to 70 days

Schleyer and similar soils

Extent: 25 to 55 percent of the map unit
Landform: fan terraces on alluvial fans

Slope shape: linear
Slope range: 0 to 1 percent
Parent material: silty eolian deposits over gravelly alluvium
Depth to strongly contrasting textural stratification: 2 to 11 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—severe
Runoff: low
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.4 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly slopes, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
E/A, Bs1—2 to 6 inches; silt loam, moderately high permeability
2Bs2, 2BC—6 to 21 inches; extremely cobbly coarse sand, high permeability
2C—21 to 60 inches; extremely cobbly coarse sand, high permeability

Broxson and similar soils

Extent: 30 to 45 percent of the map unit
Landform: flood plains on alluvial fans
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: silty alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 1 to 9 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: low
Drainage class: somewhat poorly drained
Flooding: frequent
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none
Available water capacity (approximate): 1.5 inches
Climax plant community: Feltleaf willow scrub, cool
Ecological site: Gravelly low flood plains, high elevation
Representative Profile:
A/Oe, A/C—0 to 8 inches; silt loam, high permeability
2C—8 to 60 inches; extremely cobbly loamy coarse sand, high permeability

Riverwash

Extent: 15 to 30 percent of the map unit
Landform: flood plains
Slope range: 0 to 1 percent

AFM—Osar-Klute complex, 6 to 18 percent slopes

Elevation: 2,667 to 2,930 feet
Mean annual precipitation: 31 to 35 inches
Frost-free period: 60 to 80 days

Osar and similar soils

Extent: 35 to 70 percent of the map unit
Landform: fan terraces on alluvial fans
Slope shape: linear
Slope range: 12 to 18 percent
Parent material: silty eolian deposits over gravelly alluvium
Depth to strongly contrasting textural stratification: 8 to 17 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: very high
Drainage class: poorly drained
Flooding: none
Depth to high water table (approximate): April-May—0 to 30 inches; June-Sept.—0 to 10 inches
Ponding: none
Available water capacity (approximate): 2.2 inches
Climax plant community: White spruce/willow woodland, wet
Ecological site: Loamy slopes, wet
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A—2 to 10 inches; mucky silt loam, moderately high permeability
2Bw—10 to 21 inches; gravelly sandy loam, moderately high permeability
2C—21 to 60 inches; gravelly loam, moderately high permeability

Klute and similar soils

Extent: 20 to 60 percent of the map unit
Landform: flood plains on alluvial fans
Slope shape: linear
Slope range: 6 to 12 percent
Parent material: loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 16 to 41 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: low
Drainage class: well drained
Flooding: occasional
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 3.8 inches
Climax plant community: White spruce/bog blueberry/feathermoss forest
Ecological site: Loamy high flood plains
Representative Profile:
Oi/A—0 to 4 inches; slightly decomposed plant material, high permeability
A/Oe—4 to 8 inches; silt loam, high permeability
AC, C1—8 to 21 inches; stratified sand to silt, high permeability
2C2—21 to 60 inches; extremely gravelly coarse sand, high permeability

Minor Components

Sonderna and similar soils: 0 to 20 percent of the map unit

AFN—Sonderna very fine sandy loam, 0 to 4 percent slopes

Elevation: 2,451 to 2,743 feet
Mean annual precipitation: 28 to 33 inches
Frost-free period: 60 to 80 days

Sonderna and similar soils

Extent: 85 to 95 percent of the map unit
Landform: fan terraces on alluvial fans
Slope shape: linear
Slope range: 0 to 4 percent
Parent material: loamy eolian deposits over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 5 to 14 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—severe
Runoff: low
Drainage class: well drained
Flooding: rare
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 3.2 inches
Climax plant community: White spruce/green alder forest
Ecological site: Gravelly mountains, warm
Representative Profile:
Oi—0 to 3 inches; slightly decomposed plant material, high permeability
A, Bw1—3 to 14 inches; very fine sandy loam, moderately high permeability
2Bw2—14 to 21 inches; extremely gravelly coarse sand, high permeability
2C—21 to 60 inches; extremely gravelly coarse sand, high permeability

Minor Components

Klute and similar soils: 0 to 10 percent of the map unit

AFP—Basaltlake, 12 to 25 percent slopes

Elevation: 2,251 to 3,192 feet
Mean annual precipitation: 28 to 40 inches
Frost-free period: 60 to 80 days

Basaltlake and similar soils

Extent: 80 to 95 percent of the map unit
Landform: mountains
Position on slope: backslopes
Slope shape: linear
Slope range: 12 to 25 percent
Parent material: silty eolian deposits over gravelly colluvium
Depth to strongly contrasting textural stratification: 2 to 10 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: well drained
Flooding: none

Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.7 inches
Climax plant community: Green alder/red current/bluejoint scrub
Ecological site: Gravelly mountains, acid
Representative Profile:
Oi—0 to 4 inches; slightly decomposed plant material, high permeability
A, Bw1—4 to 6 inches; silt loam, moderately high permeability
2Bw2—6 to 9 inches; very cobbly sandy loam, moderately high permeability
2C—9 to 60 inches; very cobbly sandy loam, moderately high permeability

Minor Components

Nizina, cool, and similar soils: 2 to 10 percent of the map unit
Steps and similar soils: 2 to 10 percent of the map unit
Fields and similar soils: 0 to 5 percent of the map unit

BA—Riverwash

Elevation: 2,201 to 2,703 feet
Mean annual precipitation: 28 to 40 inches
Frost-free period: 60 to 80 days

Riverwash

Extent: 90 to 100 percent of the map unit
Landform: flood plains
Slope range: 0 to 2 percent

Minor Components

Nizina, dry, and similar soils: 0 to 5 percent of the map unit
Tangoe and similar soils: 0 to 5 percent of the map unit

BRA—Fields silt loam, 18 to 65 percent slopes

Elevation: 2,231 to 3,409 feet
Mean annual precipitation: 28 to 40 inches
Frost-free period: 60 to 80 days

Fields and similar soils

Extent: 80 to 90 percent of the map unit
Landform: mountains
Position on slope: backslopes
Slope shape: linear
Slope range: 18 to 65 percent
Parent material: silty eolian deposits over gravelly colluvium and/or till
Depth to strongly contrasting textural stratification: 4 to 11 inches
Depth to bedrock (lithic): 22 to 39 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe

Runoff: high
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.9 inches
Climax plant community: Green alder/red current/bluejoint scrub
Ecological site: Gravelly mountains, acid
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
A1—1 to 9 inches; silt loam, moderately high permeability
2A2—9 to 18 inches; loam, moderately high permeability
2Bw, 2C—18 to 36 inches; very cobbly loam, moderately high permeability
2R—36 to 60 inches; unweathered bedrock, impermeable

Minor Components

Rock outcrop: 5 to 20 percent of the map unit
Steps and similar soils: 0 to 10 percent of the map unit

ESA—Waitabit-Ogive complex, 22 to 60 percent slopes (Plate 16)

Elevation: 2,671 to 3,438 feet
Mean annual precipitation: 28 to 35 inches
Frost-free period: 50 to 70 days

Waitabit and similar soils

Extent: 30 to 65 percent of the map unit
Landform: mountains
Position on slope: backslopes
Slope shape: linear
Slope range: 22 to 60 percent
Parent material: silty eolian deposits over gravelly till
Depth to strongly contrasting textural stratification: 0 to 6 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: high
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.6 inches
Climax plant community: White spruce/green alder forest
Ecological site: Gravelly mountains, warm
Representative Profile:
Oi—0 to 3 inches; slightly decomposed plant material, high permeability
E/Bs—3 to 6 inches; silt loam, moderately high permeability
2Bs/E—6 to 15 inches; gravelly sandy loam, moderately high permeability
2Bs, 2C—15 to 60 inches; very cobbly sandy loam, moderately high permeability

Ogive and similar soils

Extent: 20 to 65 percent of the map unit

Landform: swales on mountains
Position on slope: footslopes
Slope shape: concave
Slope range: 26 to 45 percent
Parent material: silty eolian deposits over gravelly till
Depth to strongly contrasting textural stratification: 6 to 17 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: very high
Drainage class: somewhat poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—0 to more than 60 inches
Ponding: none
Available water capacity (approximate): 2.2 inches
Climax plant community: Diamondleaf willow-mixed willow scrub mosaic
Ecological site: Swales, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A—2 to 10 inches; silt loam, moderately high permeability
2Bw, 2C—10 to 60 inches; very cobbly loam, moderately high permeability

Minor Components

Castnot and similar soils: 0 to 15 percent of the map unit
Osar and similar soils: 0 to 15 percent of the map unit

ESB—Castnot-Minya-Rock Outcrop complex, 12 to 90 percent slopes

Elevation: 2,661 to 3,163 feet
Mean annual precipitation: 28 to 35 inches
Frost-free period: 50 to 70 days

Castnot and similar soils

Extent: 35 to 55 percent of the map unit
Landform: mountains
Position on slope: backslopes
Slope shape: linear
Slope range: 40 to 65 percent
Parent material: silty eolian deposits over gravelly colluvium and/or till
Depth to strongly contrasting textural stratification: 2 to 7 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: high
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.3 inches
Climax plant community: Shrub birch-bog blueberry scrub
Ecological site: Gravelly slopes
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A/E—2 to 5 inches; silt loam, moderately high permeability

2Bs, 2BC—5 to 18 inches; gravelly sandy loam, moderately high permeability
2C—18 to 60 inches; very cobbly sandy loam, moderately high permeability

Minya and similar soils

Extent: 15 to 30 percent of the map unit
Landform: mountains
Position on slope: summits
Slope shape: linear
Slope range: 12 to 65 percent

Parent material: silty eolian deposits over colluvium and/or gravelly till
Depth to strongly contrasting textural stratification: 2 to 3 inches
Depth to bedrock (lithic): 10 to 19 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 0.8 inches
Climax plant community: Shrub birch-bog blueberry scrub
Ecological site: Gravelly slopes
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
A, E—1 to 3 inches; silt loam, moderately high permeability
2Bs, 2BC—3 to 17 inches; very cobbly loam, moderately high permeability
3R—17 to 60 inches; unweathered bedrock, impermeable

Rock outcrop

Extent: 10 to 30 percent of the map unit
Landform: mountains
Slope range: 60 to 90 percent

Minor Components

Schleyer, cool, and similar soils: 0 to 15 percent of the map unit

EST—Petrokov-Basaltlake-Castnot complex, 6 to 65 percent slopes

Elevation: 2,667 to 3,812 feet
Mean annual precipitation: 31 to 37 inches
Frost-free period: 50 to 70 days

Petrokov and similar soils

Extent: 25 to 50 percent of the map unit
Landform: mountains
Position on slope: summits, shoulders
Slope shape: convex
Slope range: 6 to 50 percent

Parent material: silty eolian deposits over gravelly outwash
Depth to strongly contrasting textural stratification: 2 to 6 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—slight
Runoff: high
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.3 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly slopes, high elevation
Representative Profile:

Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A—2 to 5 inches; silt loam, moderately high permeability
2Bw—5 to 23 inches; extremely cobbly coarse sand, high permeability
2C—23 to 60 inches; extremely cobbly loamy coarse sand, high permeability

Basaltlake and similar soils

Extent: 25 to 45 percent of the map unit
Landform: swales on mountains
Position on slope: backslopes
Slope shape: linear
Slope range: 30 to 60 percent
Parent material: silty eolian deposits over gravelly colluvium
Depth to strongly contrasting textural stratification: 2 to 10 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: high
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.7 inches
Climax plant community: Green alder/red current/bluejoint scrub
Ecological site: Gravelly mountains, acid
Representative Profile:

Oi—0 to 4 inches; slightly decomposed plant material, high permeability
A, Bw1—4 to 6 inches; silt loam, moderately high permeability
2Bw2—6 to 9 inches; very cobbly sandy loam, moderately high permeability
2C—9 to 60 inches; very cobbly sandy loam, moderately high permeability

Castnot and similar soils

Extent: 30 to 45 percent of the map unit
Landform: mountains
Position on slope: backslopes, footslopes
Slope shape: linear
Slope range: 40 to 65 percent
Parent material: silty eolian deposits over gravelly colluvium and/or till
Depth to strongly contrasting textural stratification: 2 to 7 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: high
Drainage class: well drained
Flooding: none

Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.3 inches
Climax plant community: Shrub birch-bog blueberry scrub
Ecological site: Gravelly slopes
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A/E—2 to 5 inches; silt loam, moderately high permeability
2Bs, 2BC—5 to 18 inches; gravelly sandy loam, moderately high permeability
2C—18 to 60 inches; very cobbly sandy loam, moderately high permeability

Minor Components

Ogive and similar soils: 0 to 10 percent of the map unit

FPA—Swedna-Riverwash-Dackey complex

Elevation: 2,451 to 2,730 feet
Mean annual precipitation: 28 to 33 inches
Frost-free period: 60 to 80 days

Swedna and similar soils

Extent: 35 to 80 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: sandy and silty alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 15 to 60 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: high
Drainage class: poorly drained
Flooding: frequent
Depth to high water table (approximate): April-May—0 to 8 inches; June-Sept.—0 to 4 inches
Ponding: none
Available water capacity (approximate): 4.2 inches
Climax plant community: Diamondleaf willow/horsetail-fragile sedge scrub
Ecological site: Loamy wet flood plains, high elevation
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
AC—1 to 5 inches; fine sandy loam, moderately high permeability
C1, Cg—5 to 29 inches; stratified sand to silt, moderately high permeability
2C2—29 to 60 inches; extremely gravelly coarse sand, high permeability

Riverwash

Extent: 20 to 40 percent of the map unit
Landform: flood plains
Slope range: 0 to 1 percent

Dackey and similar soils

Extent: 10 to 20 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: sandy and silty alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 15 to 60 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: negligible
Drainage class: somewhat poorly drained
Flooding: occasional
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none
Available water capacity (approximate): 4.0 inches
Climax plant community: Poplar-feltleaf willow scrub
Ecological site: Loamy flood plains
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
AC, ACb, Ab—1 to 5 inches; fine sandy loam, moderately high permeability
C1, Cg—5 to 28 inches; stratified sand to silt, moderately high permeability
2C2—28 to 60 inches; extremely gravelly coarse sand, high permeability

Minor Components

Tangoe and similar soils: 0 to 30 percent of the map unit

FPA1—Broxson silt loam

Elevation: 2,792 to 2,933 feet
Mean annual precipitation: 25 to 25 inches
Frost-free period: 50 to 70 days

Broxson and similar soils

Extent: 80 to 95 percent of the map unit
Landform: flood plains on alluvial fans
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: silty alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 1 to 9 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: low
Drainage class: somewhat poorly drained
Flooding: frequent
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none
Available water capacity (approximate): 1.5 inches
Climax plant community: Feltleaf willow scrub, cool
Ecological site: Gravelly low flood plains, high elevation

Representative Profile:
A/Oe, A/C—0 to 8 inches; silt loam, high permeability
2C—8 to 60 inches; extremely cobbly loamy coarse sand, high permeability

Minor Components

Schleyer and similar soils: 0 to 5 percent of the map unit
Water, fresh: 0 to 5 percent of the map unit

FPB—Dackey-Tangoe-Riverwash complex

Elevation: 2,549 to 2,933 feet
Mean annual precipitation: 28 to 31 inches
Frost-free period: 60 to 80 days

Dackey and similar soils

Extent: 25 to 55 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: sandy and silty alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 15 to 60 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: negligible
Drainage class: somewhat poorly drained
Flooding: occasional
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none
Available water capacity (approximate): 4.0 inches
Climax plant community: Poplar-feltleaf willow scrub
Ecological site: Loamy flood plains
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
AC, ACb, Ab—1 to 5 inches; fine sandy loam, moderately high permeability
C1, Cg—5 to 28 inches; stratified sand to silt, moderately high permeability
2C2—28 to 60 inches; extremely gravelly coarse sand, high permeability

Tangoe and similar soils

Extent: 25 to 50 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 1 to 2 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: negligible
Drainage class: somewhat poorly drained
Flooding: frequent
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none

Available water capacity (approximate): 0.3 inches
Climax plant community: Feltleaf willow-mixed shrub/herbaceous scrub
Ecological site: Gravelly flood plains, cool
Representative Profile:
AC—0 to 2 inches; sandy loam, moderately high permeability
2CA, 2C—2 to 60 inches; extremely gravelly coarse sand, high permeability

Riverwash

Extent: 10 to 35 percent of the map unit
Landform: flood plains
Slope range: 0 to 1 percent

Minor Components

Swedna, very wet, and similar soils: 0 to 10 percent of the map unit
Swedna and similar soils: 0 to 10 percent of the map unit

FPC—Dackey-Tangoe-Riverwash, high elevation, complex (Figure 4)

Elevation: 2,661 to 2,923 feet
Mean annual precipitation: 32 to 35 inches
Frost-free period: 60 to 80 days

Dackey and similar soils

Extent: 25 to 55 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: sandy and silty alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 15 to 60 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: negligible
Drainage class: somewhat poorly drained
Flooding: occasional
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none
Available water capacity (approximate): 4.0 inches
Climax plant community: Poplar-feltleaf willow scrub
Ecological site: Loamy flood plains
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
AC, ACb, Ab—1 to 5 inches; fine sandy loam, moderately high permeability
C1, Cg—5 to 28 inches; stratified sand to silt, moderately high permeability
2C2—28 to 60 inches; extremely gravelly coarse sand, high permeability

Tangoe and similar soils

Extent: 25 to 50 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 1 percent

Parent material: loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 1 to 2 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: negligible
Drainage class: somewhat poorly drained
Flooding: frequent
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none
Available water capacity (approximate): 0.3 inches
Climax plant community: Feltleaf willow-mixed shrub/herbaceous scrub
Ecological site: Gravelly flood plains, cool
Representative Profile:
AC—0 to 2 inches; sandy loam, moderately high permeability
2CA, 2C—2 to 60 inches; extremely gravelly coarse sand, high permeability

Riverwash

Extent: 10 to 35 percent of the map unit
Landform: flood plains
Slope range: 0 to 1 percent

Minor Components

Swedna, very wet, and similar soils: 0 to 10 percent of the map unit
Swedna and similar soils: 0 to 10 percent of the map unit

FPD—Dackey-Swedna-Tangoe complex (Figure 5)

Elevation: 2,644 to 2,730 feet
Mean annual precipitation: 31 to 32 inches
Frost-free period: 60 to 80 days

Dackey and similar soils

Extent: 45 to 80 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: sandy and silty alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 15 to 60 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: negligible
Drainage class: somewhat poorly drained
Flooding: occasional
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none
Available water capacity (approximate): 4.0 inches
Climax plant community: Poplar-feltleaf willow scrub
Ecological site: Loamy flood plains
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
AC, ACb, Ab—1 to 5 inches; fine sandy loam, moderately high permeability
C1, Cg—5 to 28 inches; stratified sand to silt, moderately high permeability

2C2—28 to 60 inches; extremely gravelly coarse sand, high permeability

Swedna and similar soils

Extent: 10 to 45 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: sandy and silty alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 15 to 60 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: high
Drainage class: poorly drained
Flooding: frequent
Depth to high water table (approximate): April-May—0 to 8 inches; June-Sept.—0 to 4 inches
Ponding: none
Available water capacity (approximate): 4.2 inches
Climax plant community: Diamondleaf willow/horsetail-fragile sedge scrub
Ecological site: Loamy wet flood plains, high elevation
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
AC—1 to 5 inches; fine sandy loam, moderately high permeability
C1, Cg—5 to 29 inches; stratified sand to silt, moderately high permeability
2C2—29 to 60 inches; extremely gravelly coarse sand, high permeability

Tangoe and similar soils

Extent: 10 to 20 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 1 to 2 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: negligible
Drainage class: somewhat poorly drained
Flooding: frequent
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none
Available water capacity (approximate): 0.3 inches
Climax plant community: Feltleaf willow-mixed shrub/herbaceous scrub
Ecological site: Gravelly flood plains, cool
Representative Profile:
AC—0 to 2 inches; sandy loam, moderately high permeability
2CA, 2C—2 to 60 inches; extremely gravelly coarse sand, high permeability

Minor Components

Swedna, very wet, and similar soils: 0 to 10 percent of the map unit

FPF—Broxson-Nizina, cool, complex (Plate 17)

Elevation: 2,667 to 2,792 feet

Mean annual precipitation: 28 to 28 inches
Frost-free period: 50 to 70 days

Broxson and similar soils

Extent: 25 to 60 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 2 percent
Parent material: loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 1 to 9 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: low
Drainage class: somewhat poorly drained
Flooding: frequent
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none
Available water capacity (approximate): 1.5 inches
Climax plant community: Feltleaf willow scrub, cool
Ecological site: Gravelly low flood plains, high elevation
Representative Profile:
A/Oe, A/C—0 to 8 inches; silt loam, high permeability
2C—8 to 60 inches; extremely cobbly loamy coarse sand, high permeability

Nizina, cool, and similar soils

Extent: 20 to 60 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 2 percent
Parent material: loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 2 to 7 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: low
Drainage class: somewhat excessively drained
Flooding: occasional
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 0.9 inches
Climax plant community: Poplar-feltleaf willow scrub
Ecological site: Loamy flood plains
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A, AC—2 to 3 inches; sandy loam, moderately high permeability
2C—3 to 60 inches; extremely gravelly coarse sand, high permeability

Minor Components

Schleyer and similar soils: 5 to 15 percent of the map unit
Riverwash: 0 to 10 percent of the map unit

FPG—Tangoe-Nizina, dry, complex (Figure 6)

Elevation: 2,251 to 2,516 feet
Mean annual precipitation: 28 to 52 inches
Frost-free period: 60 to 80 days

Tangoe and similar soils

Extent: 65 to 80 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 2 percent
Parent material: loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 1 to 2 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: low
Drainage class: somewhat poorly drained
Flooding: frequent
Depth to high water table (approximate): April-May—20 to 47 inches; June-Sept.—28 inches
Ponding: none
Available water capacity (approximate): 0.3 inches
Climax plant community: Feltleaf willow-mixed shrub/herbaceous scrub
Ecological site: Gravelly flood plains, cool
Representative Profile:
AC—0 to 2 inches; sandy loam, moderately high permeability
2CA, 2C—2 to 60 inches; extremely gravelly coarse sand, high permeability

Nizina, dry, and similar soils

Extent: 15 to 30 percent of the map unit
Landform: flood plains

Slope shape: linear
Slope range: 0 to 2 percent
Parent material: loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 1 to 2 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—moderate
Runoff: low
Drainage class: excessively drained
Flooding: occasional
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 0.3 inches
Climax plant community: Feltleaf willow-mixed shrub/herbaceous scrub
Ecological site: Gravelly flood plains, cool
Representative Profile:
AC—0 to 2 inches; sandy loam, moderately high permeability
2C—2 to 60 inches; extremely gravelly coarse sand, high permeability

Minor Components

Riverwash: 5 to 20 percent of the map unit

GO1—Schleyer-Geist complex, 0 to 30 percent slopes (Plate 18, Figure 7)

Elevation: 2,789 to 3,097 feet
Mean annual precipitation: 22 to 28 inches
Frost-free period: 50 to 70 days

Schleyer and similar soils

Extent: 55 to 85 percent of the map unit
Landform: hills, outwash plains
Slope shape: linear
Slope range: 0 to 30 percent
Parent material: silty eolian deposits over gravelly outwash
Depth to strongly contrasting textural stratification: 2 to 11 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.4 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly slopes, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
E/A, Bs1—2 to 6 inches; silt loam, moderately high permeability
2Bs2, 2BC—6 to 21 inches; extremely cobbly coarse sand, high permeability
2C—21 to 60 inches; extremely cobbly coarse sand, high permeability

Geist and similar soils

Extent: 10 to 40 percent of the map unit
Landform: hills, outwash plains
Slope shape: linear
Slope range: 0 to 30 percent
Parent material: silty eolian deposits over sandy outwash
Depth to strongly contrasting textural stratification: 3 to 5 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.4 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly slopes, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A—2 to 5 inches; silt loam, moderately high permeability
2Bs—5 to 16 inches; sandy loam, high permeability
2BC, 2C—16 to 60 inches; sand, high permeability

Minor Components

Turbellina and similar soils: 0 to 10 percent of the map unit
Terric Cryohemists and similar soils: 0 to 5 percent of the map unit

GO2—Schleyer-Slana-Geist complex, 0 to 70 percent slopes (Plate 19)

Elevation: 2,789 to 3,107 feet
Mean annual precipitation: 23 to 28 inches
Frost-free period: 50 to 70 days

Schleyer and similar soils

Extent: 45 to 70 percent of the map unit
Landform: outwash plains, hills
Slope shape: linear
Slope range: 0 to 30 percent
Parent material: silty eolian deposits over gravelly outwash
Depth to strongly contrasting textural stratification: 2 to 11 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.4 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly slopes, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
E/A, Bs1—2 to 6 inches; silt loam, moderately high permeability
2Bs2, 2BC—6 to 21 inches; extremely cobbly coarse sand, high permeability
2C—21 to 60 inches; extremely cobbly coarse sand, high permeability

Slana and similar soils

Extent: 15 to 35 percent of the map unit
Landform: hills
Position on slope: backslopes
Slope shape: linear
Slope range: 40 to 70 percent
Parent material: silty eolian deposits over gravelly colluvium
Depth to strongly contrasting textural stratification: 2 to 6 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: high
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.4 inches
Climax plant community: Shrub birch-bog blueberry scrub
Ecological site: Gravelly slopes
Representative Profile:

Oi—0 to 3 inches; slightly decomposed plant material, high permeability
A—3 to 5 inches; silt loam, moderately high permeability
2Bs, 2BC—5 to 17 inches; very gravelly sandy loam, moderately high permeability
2C—17 to 60 inches; very cobbly sandy loam, moderately high permeability

Geist and similar soils

Extent: 10 to 25 percent of the map unit
Landform: outwash plains, hills
Slope shape: linear
Slope range: 0 to 30 percent
Parent material: silty eolian deposits over sandy outwash
Depth to strongly contrasting textural stratification: 3 to 5 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.4 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly slopes, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A—2 to 5 inches; silt loam, moderately high permeability
2Bs—5 to 16 inches; sandy loam, high permeability
2BC, 2C—16 to 60 inches; sand, high permeability

Minor Components

Phelanna and similar soils: 0 to 10 percent of the map unit
Turbellina and similar soils: 0 to 5 percent of the map unit

GO3—Turbellina-Schleyer complex, 0 to 30 percent slopes

Elevation: 2,792 to 3,012 feet
Mean annual precipitation: 22 to 25 inches
Frost-free period: 50 to 70 days

Schleyer and similar soils

Extent: 20 to 50 percent of the map unit
Landform: outwash plains, hills
Slope shape: linear
Slope range: 0 to 30 percent
Parent material: silty eolian deposits over gravelly outwash
Depth to strongly contrasting textural stratification: 2 to 11 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches

Ponding: none
Available water capacity (approximate): 1.4 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly slopes, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
E/A, Bs1—2 to 6 inches; silt loam, moderately high permeability
2Bs2, 2BC—6 to 21 inches; extremely cobbly coarse sand, high permeability
2C—21 to 60 inches; extremely cobbly coarse sand, high permeability

Turbellina and similar soils

Extent: 15 to 55 percent of the map unit
Landform: turf hummocks on outwash plains
Slope shape: concave
Slope range: 0 to 12 percent
Parent material: silty outwash
Depth to permafrost: 14 to 25 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—slight
Runoff: negligible
Drainage class: very poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—0 to 8 inches
Ponding: frequent
Available water capacity (approximate): 5.0 inches
Climax plant community: Tussock cottongrass/mixed ericaceous shrub meadow
Ecological site: Loamy frozen wet terraces, high elevation
Representative Profile:
Oi—0 to 9 inches; peat, high permeability
Cg/Oejj—9 to 14 inches; silt loam, moderately high permeability
Cg/Oejj—9 to 14 inches; mucky peat, moderately high permeability
Cf—14 to 60 inches; permanently frozen silt loam, impermeable

Minor Components

Fels and similar soils: 0 to 40 percent of the map unit
Terric Cryohemists and similar soils: 0 to 10 percent of the map unit
Shand and similar soils: 0 to 15 percent of the map unit

GO4—Kuswash-Turbellina-Schleyer complex, 0 to 30 percent slopes (Plate 18)

Elevation: 2,546 to 2,982 feet
Mean annual precipitation: 23 to 31 inches
Frost-free period: 50 to 70 days

Kuswash and similar soils

Extent: 30 to 50 percent of the map unit
Landform: outwash plains
Slope shape: linear
Slope range: 0 to 5 percent
Parent material: silty eolian deposits over sandy and silty outwash
Depth to permafrost: 20 to 31 inches

Hazard of erosion (organic mat removed): by water—slight; by wind—slight
Runoff: very high
Drainage class: poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—0 to 8 inches
Ponding: none
Available water capacity (approximate): 5.5 inches
Climax plant community: Shrub birch-mixed ericaceous shrub/sedge scrub
Ecological site: Gravelly frozen slopes
Representative Profile:
Oi—0 to 10 inches; peat, high permeability
A—10 to 13 inches; silt loam, high permeability
2C—13 to 25 inches; stratified sand to silt, high permeability
2Cf—25 to 60 inches; permanently frozen stratified fine sand to silt, impermeable

Turbellina and similar soils

Extent: 30 to 45 percent of the map unit
Landform: turf hummocks on outwash plains
Slope shape: concave
Slope range: 0 to 12 percent
Parent material: silty outwash
Depth to permafrost: 14 to 25 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—slight
Runoff: negligible
Drainage class: very poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—0 to 8 inches
Ponding: frequent
Available water capacity (approximate): 5.0 inches
Climax plant community: Tussock cottongrass/mixed ericaceous shrub meadow
Ecological site: Loamy frozen wet terraces, high elevation
Representative Profile:
Oi—0 to 9 inches; peat, high permeability
Cg/Oejj—9 to 14 inches; mucky peat, moderately high permeability
Cg/Oejj—9 to 14 inches; silt loam, moderately high permeability
Cf—14 to 60 inches; permanently frozen silt loam, impermeable

Schleyer and similar soils

Extent: 15 to 25 percent of the map unit
Landform: outwash plains, hills
Slope shape: linear
Slope range: 0 to 30 percent
Parent material: silty eolian deposits over gravelly outwash
Depth to strongly contrasting textural stratification: 2 to 11 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: somewhat excessively drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.4 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic

Ecological site: Gravelly slopes, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
E/A, Bs1—2 to 6 inches; silt loam, moderately high permeability
2Bs2, 2BC—6 to 21 inches; extremely cobbly coarse sand, high permeability
2C—21 to 60 inches; extremely cobbly coarse sand, high permeability

IM—Shand-Bonot-Fels complex, 0 to 60 percent slopes (Figure 6)

Elevation: 2,848 to 2,999 feet
Mean annual precipitation: 22 to 24 inches
Frost-free period: 50 to 70 days

Shand and similar soils

Extent: 20 to 60 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 1 percent
Parent material: grassy organic material over gravelly alluvium
Depth to strongly contrasting textural stratification: 38 to 52 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—slight
Runoff: high
Drainage class: very poorly drained
Flooding: occasional
Depth to high water table (approximate): April-Sept.—0 inches
Ponding: none
Available water capacity (approximate): 13.0 inches
Climax plant community: Diamondleaf willow/sedge scrub
Ecological site: Depressions, flooded
Representative Profile:
Oi, Oa—0 to 38 inches; peat, high permeability
Cg—38 to 60 inches; very cobbly sandy loam, moderately high permeability

Bonot and similar soils

Extent: 5 to 50 percent of the map unit
Landform: turf hummocks on outwash plains
Slope shape: concave
Slope range: 0 to 3 percent
Parent material: grassy organic material
Depth to permafrost: 6 to 13 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—slight
Runoff: negligible
Drainage class: very poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—0 to 8 inches
Ponding: frequent
Available water capacity (approximate): 2.3 inches
Climax plant community: Tussock cottongrass/mixed ericaceous shrub meadow
Ecological site: Loamy frozen wet terraces, high elevation
Representative Profile:
Oi—0 to 7 inches; peat, high permeability

Oef1—7 to 22 inches; permanently frozen mucky peat, impermeable
Cf—22 to 24 inches; permanently frozen silt loam, impermeable
Oef2—24 to 60 inches; permanently frozen mucky peat, impermeable

Fels and similar soils

Extent: 15 to 35 percent of the map unit
Landform: hills
Slope shape: convex
Slope range: 6 to 60 percent
Parent material: mossy organic material and/or woody organic material
Depth to permafrost: 16 to 20 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—slight
Runoff: very high
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—31 inches
Ponding: none
Available water capacity (approximate): 6.2 inches
Climax plant community: Shrub birch-mixed ericaceous shrub/cloubderry scrub
Ecological site: Peat mounds, low elevation
Representative Profile:
Oi, Oe—0 to 18 inches; slightly decomposed plant material, high permeability
Oef—18 to 41 inches; permanently frozen moderately decomposed plant material, impermeable
ICE—41 to 60 inches; permanently frozen water, impermeable

Minor Components

Kuswash and similar soils: 10 to 35 percent of the map unit
Turbellina and similar soils: 0 to 40 percent of the map unit

L1—Owhat peat, 2 to 15 percent slopes

Elevation: 2,392 to 2,720 feet
Mean annual precipitation: 28 to 33 inches
Frost-free period: 60 to 80 days

Owhat and similar soils

Extent: 80 to 95 percent of the map unit
Landform: hills
Position on slope: summits, backslopes
Slope shape: linear
Slope range: 2 to 15 percent
Parent material: silty eolian deposits
Depth to permafrost: 11 to 14 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—slight
Runoff: very high
Drainage class: poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—0 to 8 inches
Ponding: none

Available water capacity (approximate): 4.2 inches
Climax plant community: Shrub birch-mixed ericaceous shrub/sedge scrub
Ecological site: Gravelly frozen slopes
Representative Profile:
Oi, Oe—0 to 10 inches; peat, high permeability
A—10 to 14 inches; silt loam, moderately high permeability
Af—14 to 60 inches; permanently frozen silt loam, impermeable

Minor Components

Fields and similar soils: 5 to 20 percent of the map unit

MSB—Fields-Minya-Frostcircle association, 0 to 75 percent slopes (Plate 20)

Elevation: 2,546 to 5,295 feet
Mean annual precipitation: 28 to 52 inches
Frost-free period: 50 to 70 days

Fields and similar soils

Extent: 30 to 75 percent of the map unit
Landform: mountains
Position on slope: backslopes
Slope shape: linear
Slope range: 20 to 75 percent
Parent material: silty eolian deposits over gravelly colluvium and/or till
Depth to strongly contrasting textural stratification: 4 to 11 inches
Depth to bedrock (lithic): 22 to 39 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: high
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.9 inches
Climax plant community: Green alder/red current/bluejoint scrub
Ecological site: Gravelly mountains, acid
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
A1—1 to 9 inches; silt loam, moderately high permeability
2A2—9 to 18 inches; loam, moderately high permeability
2Bw, 2C—18 to 36 inches; very cobbly loam, moderately high permeability
2R—36 to 60 inches; unweathered bedrock, impermeable

Minya, cool, and similar soils

Extent: 15 to 40 percent of the map unit
Landform: mountains
Position on slope: summits, backslopes
Slope shape: convex
Slope range: 2 to 28 percent
Parent material: silty eolian deposits over colluvium and/or gravelly till
Depth to strongly contrasting textural stratification: 2 to 3 inches

Depth to bedrock (lithic): 10 to 19 inches
Hazard of erosion (organic mat removed): by water—moderate; by wind—severe
Runoff: medium
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 0.8 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly mountains, high elevation
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
A, E—1 to 3 inches; silt loam, moderately high permeability
2Bs, 2BC—3 to 17 inches; very cobbly loam, moderately high permeability
3R—17 to 60 inches; unweathered bedrock, impermeable

Frostcircle and similar soils

Extent: 5 to 20 percent of the map unit
Landform: circles on mountains
Position on slope: summits
Slope shape: convex
Slope range: 0 to 16 percent
Parent material: silty eolian deposits over gravelly cryoturbate
Depth to permafrost: 8 to 60 inches
Hazard of erosion (organic mat removed): by water—moderate; by wind—severe
Runoff: very high
Drainage class: somewhat poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—39 inches
Ponding: none
Available water capacity (approximate): 2.9 inches
Climax plant community: Shrub birch/sedge scrub mosaic
Ecological site: Gravelly frozen slopes, ruptic
Representative Profile:
Oi—0 to 5 inches; slightly decomposed plant material, high permeability
A—5 to 11 inches; mucky silt loam, moderately high permeability
2Cg/Ajjf—11 to 60 inches; permanently frozen gravelly loam, impermeable

Minor Components

Ogive and similar soils: 3 to 15 percent of the map unit
Rock outcrop: 2 to 10 percent of the map unit

MSD—Frostcircle-Minya-Minya, cool, complex, 0 to 28 percent slopes

Elevation: 2,815 to 3,209 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 50 to 70 days

Frostcircle and similar soils

Extent: 20 to 70 percent of the map unit
Landform: stripes on mountains, circles on mountains
Position on slope: summits, backslopes
Slope shape: convex
Slope range: 0 to 16 percent
Parent material: silty eolian deposits over gravelly cryoturbate
Depth to permafrost: 8 to 60 inches
Hazard of erosion (organic mat removed): by water—moderate; by wind—severe
Runoff: very high
Drainage class: somewhat poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—39 inches
Ponding: none
Available water capacity (approximate): 2.9 inches
Climax plant community: Shrub birch/sedge scrub mosaic
Ecological site: Gravelly frozen slopes, ruptic
Representative Profile:
Oi—0 to 5 inches; slightly decomposed plant material, high permeability
A—5 to 11 inches; mucky silt loam, moderately high permeability
2Cg/Ajjf—11 to 60 inches; permanently frozen gravelly loam, impermeable

Minya and similar soils

Extent: 20 to 50 percent of the map unit
Landform: mountains
Position on slope: backslopes
Slope shape: linear
Slope range: 2 to 28 percent
Parent material: silty eolian deposits over colluvium and/or gravelly till
Depth to strongly contrasting textural stratification: 2 to 3 inches
Depth to bedrock (lithic): 10 to 19 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 0.8 inches
Climax plant community: Shrub birch-bog blueberry scrub
Ecological site: Gravelly slopes
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
A, E—1 to 3 inches; silt loam, moderately high permeability
2Bs, 2BC—3 to 17 inches; very cobbly loam, moderately high permeability
3R—17 to 60 inches; unweathered bedrock, impermeable

Minya, cool, and similar soils

Extent: 5 to 20 percent of the map unit
Landform: mountains
Position on slope: summits

Slope shape: convex
Slope range: 2 to 28 percent
Parent material: silty eolian deposits over colluvium and/or gravelly till
Depth to strongly contrasting textural stratification: 2 to 3 inches
Depth to bedrock (lithic): 10 to 19 inches
Hazard of erosion (organic mat removed): by water—moderate; by wind—severe
Runoff: medium
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 0.8 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly mountains, high elevation
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
A, E—1 to 3 inches; silt loam, moderately high permeability
2Bs, 2BC—3 to 17 inches; very cobbly loam, moderately high permeability
3R—17 to 60 inches; unweathered bedrock, impermeable

Minor Components

Rock outcrop: 5 to 15 percent of the map unit

MSF—Elting-Basaltlake-Sonderna complex, 2 to 48 percent slopes

Elevation: 2,244 to 3,294 feet
Mean annual precipitation: 28 to 35 inches
Frost-free period: 60 to 80 days

Elting and similar soils

Extent: 40 to 85 percent of the map unit
Landform: mountains
Position on slope: backslopes, footslopes
Slope shape: linear
Slope range: 2 to 48 percent
Parent material: silty eolian deposits over gravelly outwash
Depth to strongly contrasting textural stratification: 11 to 23 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 2.6 inches
Climax plant community: White spruce/green alder forest
Ecological site: Gravelly mountains, warm
Representative Profile:
Oi—0 to 3 inches; slightly decomposed plant material, high permeability
A—3 to 11 inches; silt loam, moderately high permeability
2Bw—11 to 16 inches; extremely cobbly coarse sand, high permeability

2C—16 to 60 inches; extremely cobbly coarse sand, high permeability

Basaltlake and similar soils

Extent: 10 to 25 percent of the map unit
Landform: mountains
Position on slope: backslopes
Slope shape: linear
Slope range: 6 to 22 percent
Parent material: silty eolian deposits over gravelly colluvium
Depth to strongly contrasting textural stratification: 2 to 10 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.7 inches
Climax plant community: Green alder/red current/bluejoint scrub
Ecological site: Gravelly mountains, acid
Representative Profile:
Oi—0 to 4 inches; slightly decomposed plant material, high permeability
A, Bw1—4 to 6 inches; silt loam, moderately high permeability
2Bw2—6 to 9 inches; very cobbly sandy loam, moderately high permeability
2C—9 to 60 inches; very cobbly sandy loam, moderately high permeability

Sonderna and similar soils

Extent: 10 to 40 percent of the map unit
Landform: fan terraces on alluvial fans
Slope shape: linear
Slope range: 6 to 22 percent
Parent material: loamy eolian deposits over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 5 to 14 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: medium
Drainage class: well drained
Flooding: rare
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 3.2 inches
Climax plant community: White spruce/green alder forest
Ecological site: Gravelly mountains, warm
Representative Profile:
Oi—0 to 3 inches; slightly decomposed plant material, high permeability
A, Bw1—3 to 14 inches; very fine sandy loam, moderately high permeability
2Bw2—14 to 21 inches; extremely gravelly coarse sand, high permeability
2C—21 to 60 inches; extremely gravelly coarse sand, high permeability

Minor Components

Castnot and similar soils: 0 to 10 percent of the map unit

MSHP—Steps-Basaltlake association, 14 to 75 percent slopes

Elevation: 2,533 to 3,487 feet
Mean annual precipitation: 28 to 33 inches
Frost-free period: 60 to 80 days

Steps and similar soils

Extent: 35 to 85 percent of the map unit
Landform: earth hummocks on mountains
Position on slope: backslopes, footslopes
Slope shape: convex
Slope range: 14 to 65 percent
Parent material: silty eolian deposits over gravelly cryoturbate
Depth to permafrost: 2 to 17 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—slight
Runoff: very high
Drainage class: poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—0 to 8 inches
Ponding: none
Available water capacity (approximate): 2.8 inches
Climax plant community: Shrub birch-mixed ericaceous shrub/sedge scrub
Ecological site: Gravelly frozen slopes
Representative Profile:
Oi—0 to 5 inches; peat, high permeability
A/Oajj—5 to 8 inches; mixed muck, moderately high permeability
A/Oajj—5 to 8 inches; mucky silt loam, moderately high permeability
2A/Cjjf, 2Cf—8 to 60 inches; permanently frozen very cobbly loam, impermeable

Basaltlake and similar soils

Extent: 10 to 50 percent of the map unit
Landform: mountains
Position on slope: backslopes
Slope shape: linear
Slope range: 20 to 75 percent
Parent material: silty eolian deposits over gravelly colluvium
Depth to strongly contrasting textural stratification: 2 to 10 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: high
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.7 inches
Climax plant community: Green alder/red current/bluejoint scrub
Ecological site: Gravelly mountains, acid
Representative Profile:
Oi—0 to 4 inches; slightly decomposed plant material, high permeability
A, Bw1—4 to 6 inches; silt loam, moderately high permeability
2Bw2—6 to 9 inches; very cobbly sandy loam, moderately high permeability
2C—9 to 60 inches; very cobbly sandy loam, moderately high permeability

Minor Components

Petrokov and similar soils: 5 to 20 percent of the map unit
Ogive and similar soils: 0 to 20 percent of the map unit
Nizina, cool, and similar soils: 0 to 5 percent of the map unit
Schleyer, cool, and similar soils: 0 to 5 percent of the map unit

MSS—Frostcircle peat, 0 to 25 percent slopes

Elevation: 2,490 to 3,304 feet
Mean annual precipitation: 23 to 33 inches
Frost-free period: 60 to 80 days

Frostcircle and similar soils

Extent: 85 to 95 percent of the map unit
Landform: circles on mountains
Position on slope: summits
Slope shape: convex
Slope range: 0 to 25 percent
Parent material: silty eolian deposits over gravelly cryoturbate
Depth to permafrost: 8 to 60 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: very high
Drainage class: somewhat poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—39 inches
Ponding: none
Available water capacity (approximate): 2.9 inches
Climax plant community: Shrub birch/sedge scrub mosaic
Ecological site: Gravelly frozen slopes, ruptic
Representative Profile:
Oi—0 to 5 inches; slightly decomposed plant material, high permeability
A—5 to 11 inches; mucky silt loam, moderately high permeability
2Cg/Ajjf—11 to 60 inches; permanently frozen gravelly loam, impermeable

Minor Components

Basaltlake and similar soils: 5 to 15 percent of the map unit

MST—Frostcircle-Ogive association, 0 to 25 percent slopes

Elevation: 2,365 to 3,773 feet
Mean annual precipitation: 23 to 37 inches
Frost-free period: 50 to 70 days

Frostcircle and similar soils

Extent: 40 to 80 percent of the map unit
Landform: circles on mountains

Position on slope: summits
Slope shape: convex
Slope range: 0 to 25 percent
Parent material: silty eolian deposits over gravelly cryoturbate
Depth to permafrost: 8 to 60 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: very high
Drainage class: somewhat poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—39 inches
Ponding: none
Available water capacity (approximate): 2.9 inches
Climax plant community: Shrub birch/sedge scrub mosaic
Ecological site: Gravelly frozen slopes, ruptic
Representative Profile:
Oi—0 to 5 inches; slightly decomposed plant material, high permeability
A—5 to 11 inches; mucky silt loam, moderately high permeability
2Cg/Ajjf—11 to 60 inches; permanently frozen gravelly loam, impermeable

Ogive and similar soils

Extent: 10 to 25 percent of the map unit
Landform: swales on mountains
Position on slope: footslopes
Slope shape: concave
Slope range: 8 to 20 percent
Parent material: silty eolian deposits over gravelly till
Depth to strongly contrasting textural stratification: 6 to 17 inches
Hazard of erosion (organic mat removed): by water—severe; by wind—severe
Runoff: very high
Drainage class: somewhat poorly drained
Flooding: none
Depth to high water table (approximate): April-Sept.—0 to more than 60 inches
Ponding: none
Available water capacity (approximate): 2.2 inches
Climax plant community: Diamondleaf willow-mixed willow scrub mosaic
Ecological site: Swales, high elevation
Representative Profile:
Oi—0 to 2 inches; slightly decomposed plant material, high permeability
A—2 to 10 inches; silt loam, moderately high permeability
2Bw, 2C—10 to 60 inches; very cobbly loam, moderately high permeability

Minor Components

Fields and similar soils: 0 to 20 percent of the map unit
Minya, cool, and similar soils: 0 to 20 percent of the map unit
Rock outcrop: 2 to 10 percent of the map unit

OPB—Phalarope silt loam, 0 to 5 percent slopes

Elevation: 2,674 to 3,018 feet
Mean annual precipitation: 28 to 35 inches

Frost-free period: 50 to 70 days

Phalarope and similar soils

Extent: 80 to 95 percent of the map unit
Landform: earth hummocks on outwash plains
Slope shape: linear, convex
Slope range: 0 to 5 percent
Parent material: silty eolian deposits over gravelly outwash
Depth to strongly contrasting textural stratification: 12 to 36 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—severe
Runoff: low
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 5.4 inches
Climax plant community: Shrub birch-bog blueberry scrub
Ecological site: Gravelly slopes
Representative Profile:
Oi—0 to 4 inches; slightly decomposed plant material, high permeability
A/E, Bs, BC—4 to 25 inches; silt loam, moderately high permeability
2C—25 to 60 inches; very gravelly loamy coarse sand, high permeability

Minor Components

Waitabit and similar soils: 5 to 10 percent of the map unit

RO—Rock Outcrop, 35 to 90 percent slopes (Plate 21)

Elevation: 2,900 to 5,131 feet
Mean annual precipitation: 28 to 57 inches
Frost-free period: 50 to 70 days

Rock outcrop

Extent: 90 to 100 percent of the map unit
Landform: mountains
Slope range: 35 to 90 percent

Minor Components

Minya, cool, and similar soils: 0 to 5 percent of the map unit
Fields and similar soils: 0 to 5 percent of the map unit

STA—Nizina-Nizina, rarely flooded, complex (Figure 6)

Elevation: 2,365 to 2,723 feet
Mean annual precipitation: 28 to 33 inches
Frost-free period: 60 to 80 days

Nizina and similar soils

Extent: 50 to 80 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 2 percent
Parent material: silty eolian deposits over loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 3 to 11 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—severe
Runoff: low
Drainage class: somewhat excessively drained
Flooding: occasional
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 1.7 inches
Climax plant community: White spruce/bog blueberry/feathermoss forest
Ecological site: Loamy high flood plains
Representative Profile:
Oi—0 to 4 inches; slightly decomposed plant material, high permeability
A—4 to 6 inches; silt loam, moderately high permeability
2CA, 2C—6 to 60 inches; extremely gravelly coarse sand, high permeability

Nizina, rarely flooded, and similar soils

Extent: 15 to 35 percent of the map unit
Landform: flood plains
Slope shape: linear
Slope range: 0 to 3 percent
Parent material: silty eolian deposits over loamy alluvium over sandy and gravelly alluvium
Depth to strongly contrasting textural stratification: 2 to 6 inches
Hazard of erosion (organic mat removed): by water—slight; by wind—severe
Runoff: low
Drainage class: somewhat excessively drained
Flooding: rare
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 0.6 inches
Climax plant community: White spruce-poplar/soapberry forest
Ecological site: Gravelly flood plains
Representative Profile:
Oi—0 to 1 inch; slightly decomposed plant material, high permeability
A—1 to 2 inches; silt loam, moderately high permeability
2C—2 to 60 inches; extremely gravelly coarse sand, high permeability

Minor Components

Klute and similar soils: 2 to 10 percent of the map unit
Nizina, cool, and similar soils: 0 to 15 percent of the map unit
Nizina, dry, and similar soils: 3 to 15 percent of the map unit

TPA—McCumberson-Phelanna complex, 2 to 12 percent slopes

Elevation: 2,782 to 3,442 feet
Mean annual precipitation: 28 to 35 inches
Frost-free period: 50 to 70 days

McCumberson and similar soils

Extent: 60 to 90 percent of the map unit
Landform: earth hummocks on till plains
Slope shape: linear, convex
Slope range: 2 to 12 percent
Parent material: silty eolian deposits over gravelly till
Depth to strongly contrasting textural stratification: 9 to 19 inches
Hazard of erosion (organic mat removed): by water—moderate; by wind—severe
Runoff: medium
Drainage class: well drained
Flooding: none
Depth to high water table (approximate): April-Sept.—more than 60 inches
Ponding: none
Available water capacity (approximate): 4.1 inches
Climax plant community: Shrub birch-dwarf ericaceous scrub mosaic
Ecological site: Gravelly slopes, high elevation
Representative Profile:

Oi, Oe—0 to 7 inches; slightly decomposed plant material, high permeability
A, E—7 to 12 inches; silt loam, moderately high permeability
Bs, Eb—12 to 16 inches; silt loam, moderately high permeability
2Bs, 2BC, 2C—16 to 60 inches; very cobbly sandy loam, moderately high permeability

Phelanna and similar soils

Extent: 10 to 30 percent of the map unit
Landform: swales on till plains
Slope shape: concave
Slope range: 2 to 12 percent
Parent material: silty eolian deposits over gravelly alluvium
Depth to strongly contrasting textural stratification: 13 to 23 inches
Hazard of erosion (organic mat removed): by water—moderate; by wind—severe
Runoff: very high
Drainage class: poorly drained
Flooding: none
Depth to high water table (approximate): April-May—0 to 30 inches; June-Sept.—0 to 10 inches
Ponding: none
Available water capacity (approximate): 3.9 inches
Climax plant community: Diamondleaf willow scrub, moist
Ecological site: Loamy slopes, high elevation
Representative Profile:

Oe—0 to 2 inches; moderately decomposed plant material, high permeability
A—2 to 19 inches; mucky silt loam, moderately high permeability
2C—19 to 60 inches; gravelly loam, moderately high permeability

Minor Components

Basaltlake and similar soils: 0 to 25 percent of the map unit
Frostcircle and similar soils: 0 to 10 percent of the map unit

W—Water

Elevation: 2,644 to 3,113 feet
Mean annual precipitation: 22 to 31 inches
Frost-free period: 50 to 80 days

Water, fresh

Extent: 80 to 100 percent of the map unit
Landform: channels, lakes

Minor Components

Swedna, very wet, and similar soils: 0 to 10 percent of the map unit
Terric Cryohemists and similar soils: 0 to 10 percent of the map unit

Part 3—Use and Management

This section provides soil interpretations for recreational uses, and suitability ratings of major vegetation cover types for selected wildlife species and habitat elements. Soil properties and interpretive soil groups that may be useful in developing additional land use interpretations also are included.

Recreational Development

The soils of the survey area are rated in table 5 according to limitations that affect their suitability for recreation. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicates the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00). If the soil is *not limited* (value = 0.00), no entry appears for the numerical value.
The ratings in the table are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality and vegetation.

Primitive camp areas are recreational areas that are used for tent camping by small groups of people. These areas are typically in undeveloped or minimally developed, remote locations off the road system. Primitive camp areas are subject to intermittent light to heavy foot traffic. The soils are rated as *not limited*, *somewhat limited*, and *very limited* to indicate the extent to which soil and site properties limit the use and performance for the intended use. The critical properties are slope, the texture of the soil surface, the amount of small and large stones on the soil surface, permeability, and flooding and ponding hazards. Ratings for primitive camp areas can help land management agencies direct use to soils favorable for remote camping and thereby increase user satisfaction and minimize site damage. *Not limited* indicates that the soil has few features that limits its use as a primitive camp site. Intermittent use should not cause significant site degradation. *Somewhat limited* indicates that the soil has moderate limitations. Some moderate limitations are seasonal, such as wet ground, flooding, and dustiness during dry conditions. *Very limited* indicates that the soil has one or more features that are unfavorable during all seasons, such as steep slopes or poor soil drainage and a shallow water table.

Foot and ATV trails for hiking, horseback riding, and ATV use should require little or no slope modification and site preparation through cutting and filling. These trails are not covered with surfacing material or vegetation. The ratings are based on the soil properties that affect trafficability, erodibility, dustiness, and the ease of revegetation. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Soil Properties and Interpretive Groups

Data relating to soil properties are collected during the course of the soil survey. Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, laboratory tests of samples from the survey area, and laboratory tests of samples of similar soils in nearby areas. Tests verify field observations and verify properties that cannot be estimated accurately by field observation. Tests also help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Tables 6 and 7 give the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the USDA. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If 15 percent or more of the particles are coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches (75 mm) in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches (75 mm) in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Rock fragments larger than 10 inches (250 mm) in diameter and 3 to 10 inches (75 to 250 mm) in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches (75 mm) in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In table 7, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. The stimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 8 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and

swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. The estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss, in tons per acre per year, by sheet and rill erosion. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. Soils are grouped according to the amount of stable aggregates more than 0.84 millimeter in size. Soils containing rock fragments can occur in any group. The groups are as follows:

1 to 9 percent dry soil aggregates. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

10 to 24 percent dry soil aggregates. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

25 to 39 percent dry soil aggregates. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

25 to 39 percent dry soil aggregates with greater than 35 percent clay or greater than 5 percent calcium carbonate. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

40 to 44 percent dry soil aggregates. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

45 to 49 percent dry soil aggregates. These soils are very slightly erodible. Crops can easily be grown.

50 percent or more dry soil aggregates. These soils are very slightly erodible. Crops can easily be grown.

Stony, gravelly, or wet soils and other soils not subject to wind erosion.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 9 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Soil Features

Table 10 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness of the restrictive layer, which significantly affects the ease of excavation.

Depth to top is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures. Potential for frost action is expressed as *low, moderate,* or *high*.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 11 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as *none, very rare, rare, occasional, frequent*, and *very frequent*. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods is also considered. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 11 indicates surface water *depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Moisture status indicates the water content in the soil at a specified depth. The *Status* is expressed as *wet*, *moist*, or *dry. Wet* refers to soil in which most of the pore space is filled with water and the water is retained at less than 0.00001-bar suction. *Moist* refers to soil in which some of the pore space is filled with water and the water is retained at between 0.00001- and 15-bar suction. *Dry* refers to soil with little to no water in the pore spaces. Any water is retained at greater than 15-bar suction, which is generally near or above the wilting point of common agricultural crops. *Frozen* is used to indicate that the temperature of the soil layer is below the freezing point of water.

Hydric Soils

In this section, hydric soils are defined and described and the hydric soils in the survey area are listed. Table 12 lists the hydric soils in this survey area.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others 1979; U.S. Army Corps of Engineers 1987; National Research Council 1995; Tiner 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or non-hydric soil, however, more specific information such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register 1995). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in *Soil Taxonomy* (Soil Survey Staff 1999), *Keys to Soil Taxonomy* (Soil Survey Staff 2003), and in the *Soil Survey Manual* (Soil Survey Division Staff 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in *Field Indicators of Hydric Soils in the United States* (Hurt and others 1998).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Those soils that meet the definition of hydric soils and, in addition, have at least one of the hydric soil indicators, are listed in the table. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council 1995; Hurt and others 1998).

Some map units consist almost entirely of hydric soils. Other map units consist primarily of non-hydric soils. Hydric soils may occur as minor inclusions even in map units listed without any hydric soils in the table.

Table 12 also lists the local landform on which each soil occurs, the hydric criteria code, and whether or not each soil meets the saturation, flooding, or ponding criteria for hydric soils. Codes for hydric soil criteria are explained in the following key:

Key To Hydric Soil Criteria

1. All Histosols except Folists, or
2. Soils in Aquic suborders, Aquic subgroups, Albolls suborder, Salorthids great group, Pell great groups of Vertisols, Pachic subgroups, or cumulic subgroups that are:
    a. somewhat poorly drained and have a frequently occurring water table at less than 0.5 foot from the surface for a significant period (usually more than 2 weeks) during the growing season, or
    b. poorly drained or very poorly drained and have either:
        (1) a frequently occurring water table at less than 0.5 foot from the surface for a significant period (usually more than 2 weeks) during the growing season if textures are coarse sand, sand, or fine sand in all layers within a depth of 20 inches, or for other soils

(2) a frequently occurring water table at less than 1.0 foot from the surface for a significant period (usually more than 2 weeks) during the growing season if permeability is equal to or greater than 6.0 inches/hour in all layers within a depth of 20 inches, or

(3) a frequently occurring water table at less than 1.5 feet from the surface for a significant period (usually more than 2 weeks) during the growing season if permeability is less than 6.0 inches/hour in any layer within a depth of 20 inches, or

3. Soils that are frequently ponded for a long duration or a very long duration during the growing season, or

4. Soils frequently flooded for a long duration or a very long duration during the growing season.

Part 4—References and Glossary

References

American Association of State Highway and Transportation Officials (AASHTO). 2000. Standard specifications for transportation materials and methods of sampling and testing. 20th edition, 2 volumes.

American Society for Testing and Materials (ASTM). 2001. Standard classification of soils for engineering purposes. ASTM Standard D 2487-00.

Agriculture Canada Expert Committee on Soil Survey. 1987. *The Canadian system of soil classification*. 2nd ed. Agriculture Canada, Ottawa, ON. Publication 1646.

Albin, D.P. 1977. *The fisheries and fish habitat of the Gulkana River, Alaska*. Western Interstate Commission for Higher Education, October 1977.

Armstrong, R.H. 1995. *A guide to birds of Alaska*. Anchorage, AK; Alaska Northwest Books.

Bailey, R. G. 1980. Descriptions of the ecoregions of the United States. Washington DC: U.S. Department of Agriculture, Forest Service. Miscellaneous Publication 1391. 77 p.

Bailey, R. G.; P. E. Avers; T. King; and W. H. McNab, eds. 1994. Ecoregions and subregions of the United States (map). Washington, DC: USDA Forest Service. 1:7,500,000. With supplementary table of map unit descriptions, compiled and edited by W. H. McNab and R. G. Bailey.

Bailey, R. G.; S. C. Zoltai; and E. B. Wiken. 1985. Ecological Regionalization in Canada and the United States. Geoforum 16 (3):265–275.

Clark, M. and M. Duffy. 2005. Soil Survey of Denali National Park, Alaska. U.S. Department of Agriculture, Natural Resources Conservation Service and U.S. Department of the Interior, National Park Service.

Cleland D. T.; P. E. Avers; W. H. McNab; M. E. Jensen; R. G. Bailey; T. K ing; and W. E. Russell. 1997. National Hierarchical Framework of Ecological Units. Published in *Ecosystem Management: Applications for Sustainable Forest and Wildlife Resources*. Boyce, M.S., and Haney, A. editors. Yale University Press, New Haven & London. 181–200 pp.

Cowardin, L. M.; V. Carter; F. C. Golet; and E. T. LaRoe. 1979. *Classification of wetlands and deep-water habits of the United States*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 131 pp.

Crocker, R. L. and J. Major. 1955. Soil development in relation to vegetation and surface age at Glacier Bay, Alaska. *J. Ecol*. 43:427–448.

Ebert, D. J.; T. A. Nelson; and J. L. Kershner. 1991. A soil-based assessment of stream fish habitats in coastal plains streams. Proceedings of warmwater fisheries symposium. 1991 June 4–8; Phoenix, AZ.

ECOMAP. 1993. *National hierarchical framework of ecological units*. United States Department of Agriculture, Forest Service. Washington, D.C.

Embleton, C. and C. A. M. King. 1968. *Glacial and periglacial geomorphology*. New York, NY: St. Martins Press.

Federal Register. February 24, 1995. *Hydric soils of the United States.*

Federal Register. July 13, 1994. *Changes in hydric soils of the United States*.

Forman, R. T. T. and M. Godron. 1986. *Landscape Ecology*. New York: Wiley and sons.

Gebhardt, K.; S. Leonard; G. Staidl; and D. Prichard. 1990. *Riparian area management: Riparian and wetland classification review*. U.S. Department of Interior, Bureau of Land Management. Technical Reference BLM/YA/PT-87/021 +1737, Service Center, CO. 56 pp.

Glazovskaya, M. A. 1950. The effects of micro-organisms on processes of weathering primary minerals. Izv. Akad. Nauk. SSSR, Ser. Pochv., 6:79–100 (Transl. from Russian).

Hansen, P. 1989. *Inventory, classification, and management of riparian sites along the upper Missouri National Wild and Scenic River*. Missoula, MT: University of Montana, School of Forestry, Montana Riparian Association.

Herrington, R. B. and D. K. Dunham. 1967. A technique for sampling general fish habitat characteristics of streams. Ogden, UT: U.S. Department of Agriculture, Forest Service. Research Paper INT-41. Intermountain Forest and Range Experiment Station. 12 p.

Hurt, G. W.; P. M. Whited; and R. F. Pringle, eds. 1998. *Field indicators of hydric soils in the United States*. U.S. Department of Agriculture, Natural Resources Conservation Service.

Jury, W. A.; W. R. Gardner; and W. H. Gardner. 1991. *Soil physics*. New York, NY: John Wiley and Sons, Inc.

Keane, R. E.; M. E. Jensen; and W.J. Hann. 1990. Ecodata and Ecopac: analytical tools for integrated resource management. *The Compiler*. 8(3): 24–37.

Koppen, J. M. 1931. Grundriss der Klimakunde. Berlin: Walter de Grayter. 388 p.

Kuchler, A. W. 1964. Potential natural vegetation of the conterminous United States. American Geographic Society Special Publication 36. 116 p.

Longwell, C. R.; R. F. Flint; and J. E. Sanders. 1969. *Physical Geology*. New York, NY: John Wiley and Sons, Inc.

McNab, H. W. and P. E. Avers. 1994. *Ecological subregions of the United States: section descriptions*. U.S. Department of Agriculture, Forest Service. Publication WO-WSA-5.

National Research Council of Canada. 1988. *Glossary of permafrost and related ground ice terms*. Associate Committee Geotechnical Research. Technical Memorandum 142:156.

National Research Council. 1994. *Rangeland health. New methods to classify, inventory, and monitor rangelands*. Washington, D.C.: National Academy Press.

National Research Council. 1995. *Wetlands: characteristics and boundaries*. Washington, D.C.: National Academy Press.

Nowacki, G. and T. Brock. 1995. ALASKA ECOMAP version 2.0. United States Department of Agriculture, Forest Service.

Péwé, T.L. 1975. Quaternary geology of Alaska. Geologic Survey Professional Paper 835. Washington, DC: U.S. Govt. Printing Office.

Platts, W. S. 1979. *Including the fishery system in land planning*. Ogden, UT: U.S. Department of Agriculture, Forest Service. Gen. Tech. Rep. INT-60. Intermountain Forest and Range Experiment Station. 37 p.

Rucks, J. 1977. An inventory of wildlife and wildlife habitat of the Gulkana River, Alaska. Western Interstate Commission for Higher Education, 1977. Boulder, CO.

Sigafoos, R. S. and D. M. Hopkins. 1951. Frost-heaved tussocks in Massachusetts. *American Journal of Science* 252:55–59.

Soil Survey Division Staff. 1993. *Soil survey manual*. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. *Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys*. 2nd ed. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2003. *Keys to soil taxonomy*. 9th ed. U.S. Department of Agriculture, Natural Resources Conservation Service.

Swanson, D. K.; C. L. Ping and G. J. Michaelson. 1999. Diapirism in soils due to thaw of ice-rich materials near the permafrost table. *Permafrost and Periglacial Processes*. 10:349–367.

Tiner, R. W., Jr. 1985. *Wetlands of Delaware*. Cooperative Publication. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

Tueller, P.T. 1973. Secondary succession, disclimax, and range condition standards in desert shrub vegetation. In *Proceedings of the Third Workshop of U.S./Australia Rangelands Panel, Tucson, AZ,* ed. D.N. Hyder, 57-65. Denver, CO: Society for Range Management.

Trewartha, G. T. 1968. *An Introduction to Climate*, 4th ed, New York, NY: McGraw-Hill. 408 p.

United States Army Corp of Engineers, Environmental Laboratory. 1987. *Corps of Engineers wetlands delineation manual*. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture (USDA), Natural Resources Conservation Service. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov).

United States Department of Interior (USDI), Bureau of Land Management. 1983. River Management Plan for the Delta National Wild and Scenic River. Anchorage District, Alaska (http://www.ak.blm.gov/gdo/delta/index.html).

Van Cleve, K.; L. A. Viereck; and G. M. Marion. 1993. Introduction and overview of a study dealing with the role of salt-affected soils in primary succession on the Tanana River flood plain, Interior Alaska. *Canadian Journal of Forest Research* 23 (5):879–888.

Wahrhaftig, C. 1965. Physiographic Divisions of Alaska: U.S. Geological Survey Professional Paper 482. p. 8–16.

Wilding, L.P.; N. E. Smeck; and G. F. Hall, eds. 1984. *Pedogenesis and Soil Taxonomy I. Concepts and Interactions.* New York, NY: Elsevier Science Publishing Company Inc.

Williams, P. J. and M. W. Smith. 1989. *The frozen earth fundamentals of geocryology*. Cambridge: Cambridge University Press.

Glossary

Acidification (process). A subprocess of Braunification in which excess basic metal cations are removed from the soil profile by leaching or plant use. Acidification is normally accompanied by a lowering in soil reaction (pH).

Active layer. The top layer of ground subject to annual thawing and freezing in areas underlain by permafrost.

Aerobic. A condition in which molecular oxygen is present in the soils.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates down slope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hill slopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpine. Land and related resources occurring above the upper elevation limit of trees (treeline).

Anaerobic. A condition in which molecular oxygen is absent from the soil.

Aspect. 1) The direction in which a slope faces. 2) The general physical appearance of a vegetation cover type.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Basal area. For trees, the area of the cross section of a single tree or of all trees in a stand, usually measured at breast height (see breast height), expressed in ft^2/acre or m^2/ha. For herbs and shrubs, the area or proportion of the ground surface covered by the stem or stems of plants at about ground level, expressed in ft^2/acre, m^2/ha., or percent.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Biome. A continental scale ecosystem characterized by similarities in plant life-form and environment, e.g., boreal, subalpine and alpine.

Bog. A peat-forming ecosystem influenced solely by water, which falls directly on to it as rain or snow. Bog vegetation is predominately herbs, shrubs, and stunted trees. *Sphagnum* spp. usually dominates the moss layer.

Boreal. The biome of North America that stretches from Alaska and the Rocky Mountains eastward to the Atlantic Ocean. To the north it is bounded by the treeline and in the south it is bounded by aspen parklands, a transition zone to the prairie grasslands. The boreal biome is dominated by forest vegetation types.

Braunification (process). Release of iron from primary mineral in soil by hydration or oxidation giving the soil a yellowish, brownish, or reddish brown color.

Breast height. A standard height for measurement of tree diameter and age; 1.5 meters above the average ground level.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The cover of leaves and branches formed by the tops or crowns of plants as viewed from above.

Canopy cover. The proportion of the ground area covered by the vertical projections of the canopy, express as a percent.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 7.6 to 25 centimeters in diameter.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

Colluviation (processes). Processes associated with transportation and/or deposition by mass movement (direct gravitational action) and local, unconcentrated runoff on sideslopes and/or at the base of slopes.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose—Noncoherent when dry or moist; does not hold together in a mass.

Friable—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft—When dry, breaks into powder or individual grains under very slight pressure.

Cemented—hard; little affected by moistening

Cover type. A unit of vegetation essentially similar in composition and development throughout its extent. Synonyms: community type, vegetation type.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cryic. Soil temperature regime where the mean annual soil temperature is between 0 and 8 °C.

Cryoturbation (frost churning). The churning of soil materials by frost action, resulting in disrupted or broken horizons, incorporation of material from other horizons, organic matter accumulation on the permafrost table, and oriented rock fragments.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diffusion. Movement from a zone of high concentration to one of lower concentration.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Effervescence. A bubbling reaction upon addition of dilute hydrochloric acid.

Enrichment (process). A fluvial subprocess including the accumulation of bases such as calcium carbonate in the soil. The process includes fluvial deposits of base rich materials and concentration in surface soil layers due to evaporation.

Ericaceous. Refers primarily to the Heath family, Ericaceae—for example, Labrador-tea, but usually includes the Crowberry family, Empetraceae.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains—synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature—for example, fire that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. The term is more often applied to cliffs resulting from differential erosion.

Esker. A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Evapotranspiration. The combined loss of water from a given area and during a specific period of time by evaporation from the soil surface and by transpiration from plants

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured soil. Sandy clay, silty clay, or clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Fluvial (process). Processes including erosion, transportation, deposition, and enrichment of alluvium by water.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hill slope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transition zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A unit of forest vegetation essentially similar in composition and development throughout its extent.

Frost boil. A small mound of fresh soil material formed by frost action. A type of non-sorted circle commonly found in fine-grained sediment underlain by permafrost.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Geomorphic processes. Natural processes that form the landscape and surficial sediments i.e. colluvial processes, deposition, and erosion.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Gravel. Rounded or angular fragments of rock as much as 3 inches in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 7.6 centimeters in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Herb. Grasses, sedges, forbs, and any other non-woody herbaceous plants.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons of mineral soil are as follows:

O horizon—An organic layer of fresh and decaying plant residue.

A horizon—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

E horizon—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

C horizon—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

Cr horizon—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Hummock. A rounded or conical mound or other small elevation. Also, a slight rise of ground above a level surface.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. Group A soils have a high infiltration rate when thoroughly wet and have a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. Group D soils, at the other extreme, have a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Hydromorphism (process). Soil processes associated with saturated conditions including accumulation of organic material and formation of redoximorphic features (gray and red soil mottles caused by saturation or alternating saturated and unsaturated conditions in soils).

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in centimeters per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interior (Alaska). Physiographic area lying north of the summit of the Alaska Range and south of the Brooks Range summit with a dominantly continental climate.

Interstitial (ice cyrstals). Ice formation in voids between soil particles.
Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.
Leaching. The removal of soluble material from soil or other material by percolating water.
Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.
Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.
Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.
Maritime-continental (climate). A blend of these two climate types where either the maritime or continental climate may dominate the local weather for extended periods of time.
Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.
Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.
Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.
Minor components. A component of limited extent that may not be present.
Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.
Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.
Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance--*few, common,* and *many;* size--*fine, medium,* and *coarse;* and contrast--*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 in); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 in); and *coarse,* more than 15 millimeters (about 0.6 in).
Mountain. A natural elevation of the land surface, rising more 305 meters above surrounding lowlands, commonly of limited summit area and generally having steep sides (slopes greater than 25 percent) and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are primarily formed by deep-seated earth movements or volcanic action and secondarily by differential erosion.
Muck. Dark, finely divided, well decomposed organic soil material. (See sapric soil material.)
Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.
Neutral soil. A soil having a pH value between 6.6 and 7.3. (See reaction, soil.)
Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil; and carbon, hydrogen, and oxygen obtained from the air and water.
Observed rooting depth. Depth to which roots have been observed to penetrate.
Organic matter. Plant and animal residue in the soil in various stages of decomposition.
Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.
Overstory. The trees in a forest that form the upper canopy layer or layers.
Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.
Oxidation. Combination with oxygen; addition of oxygen or other atom or group; removal of hydrogen or other atom or group.
Parent material. The unconsolidated organic and mineral material in which soil forms.
Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See fibric soil material.)
Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet, depending on the variability of the soil.
Pergelic. Soil temperature regime where the mean annual soil temperature is below freezing or lower.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for two or more years.

Permafrost extent or distribution. The percentage of a map unit consisting of soils with permafrost.
Continuous-more than 80 percent of the composition of a map unit consists of soils with permafrost.
Discontinuous-20 to 80 percent of a map unit consists of soils with permafrost.
Sporadic-more than 5 percent but less than 20 percent of a map unit consists of soils with permafrost.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the *Soil Survey Manual*. In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See reaction, soil.)

Physiochemical. Related to physical and chemical soil properties.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Podzolization (process). Includes the removal and translocation of iron and aluminum from surface layers into underlying soil materials. Surface soils typically have a gray leached surface mineral layer a few centimeters thick underlain by a dark red layer of accumulated iron, aluminum and organic compounds.

Ponding. Standing water on soils in closed depressions. Only percolation or evapotranspiration can remove the water.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential natural community. The assemblage of plants that most nearly achieves a long-term steady state of productivity, structure, and composition on a site. Synonyms: potential plant community, climax plant community, and plant association.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	Below 3.5
Extremely acid	3.5 to 4.5
Very strongly acid	4.6 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redox concentrations. Bodies of apparent accumulation of iron-manganese oxides.

Redox depletions. Bodies of low chroma (≤ 1) having values of 4 or more where iron-manganese oxides alone have been stripped out or where both iron-manganese oxides and clay have been stripped out.

Redoximorphic features. Patches of contrasting colors and low chroma colors formed by the processes of reduction, translocation, and oxidation of iron and manganese oxides.

Regeneration. The new growth of a natural plant community, developing from seed.

Relief. The elevations or inequalities of a land surface, considered collectively.

Riparian or Riparian zone. Land in close proximity to a water course, lake, or spring and influenced by surface and ground water during all or part of the year.

Riverine. Associated with a river system; active river channel, and land adjacent to the river that is inundated when stream discharge exceeds channel capacity.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

RV. (Representative Value). Used in the map unit descriptions to designate a representative value of the composition of each major component within a map unit. This value is expressed as a percentage.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scrub type. A unit of scrub vegetation essentially similar in composition and development throughout its extent.

Shoulder slope. The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	More than 45 percent

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil group. A collection of soils that form under the influence of similar soil and geomorphic processes and share similar chemical and physical properties.

Soil process. A physical or chemical change in soil brought about by exterior influences.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand……	2.0 to 1.0
Coarse sand……	1.0 to 0.5
Medium sand……....	0.5 to 0.25
Fine sand……	0.25 to 0.10
Very fine sand……	0.10 to 0.05
Silt……	0.05 to 0.002
Clay……..	Less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches in diameter if rounded or 15 to 24 inches in length if flat.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are: *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subalpine. The biome found between the boreal and alpine biomes and consists of alder scrub.

Subarctic continental. The climate of interior Alaska dominated by long cold winters and short warm summers.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any soil horizon (A, E, AB, or EB) below the surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches. Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taiga. A Russian term meaning “land of little sticks,” and applied to the dwarf or stunted open conifer woodlands and forests that are typically underlain by permafrost.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt*

loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thermal conductivity. A measure of heat transfer through soil.

Thermokarst. Subsidence of the ground surface due to melting of ice masses.

Till plain. An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till, and that has a slope of 0 to 8 percent.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Tussock. A pedestal or rounded mound or other small elevation consisting of sedge and sedge detritus.

Understory. Any plants in a forest or scrub community that grow below and are partially shaded by the tree or shrub overstory.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Part 5—Figures, Plates, and Tables

Figure 4. Cross section of potential natural communities, soils, and ecological sites within map unit FPD.

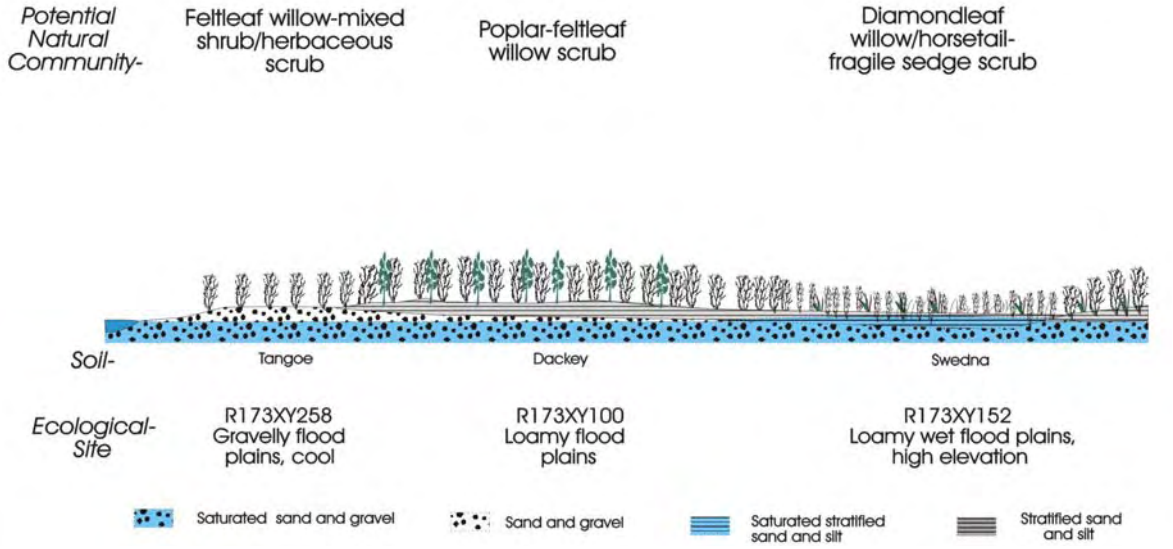


Figure 5. Cross section of potential natural communities, soils, and ecological sites within map unit FPC.

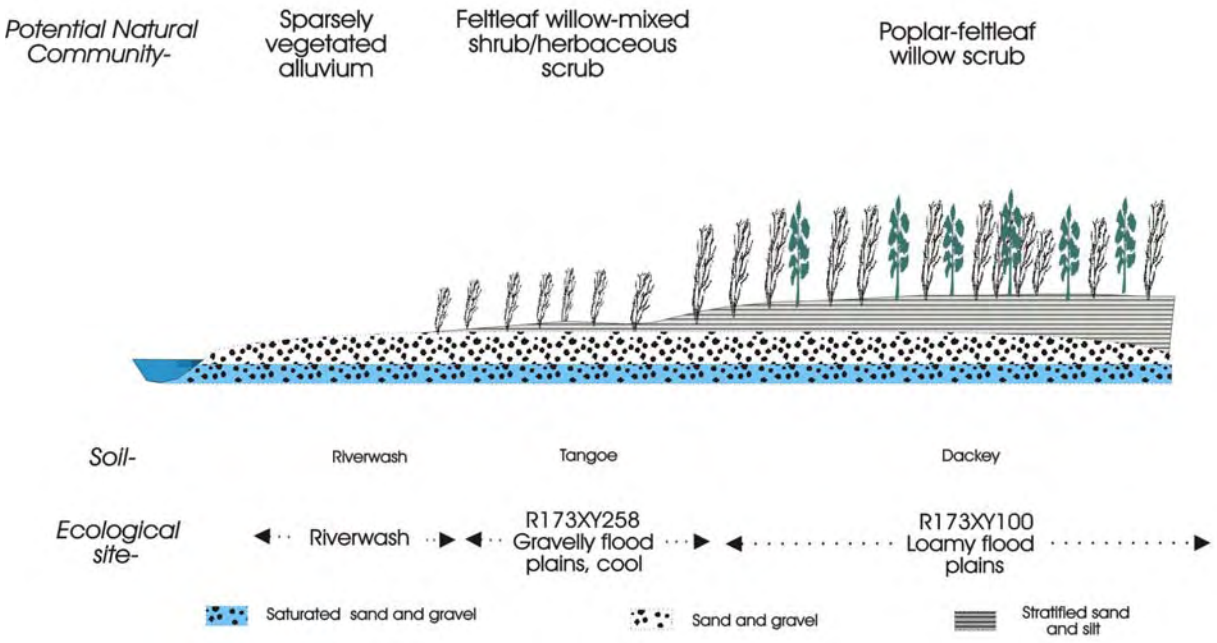


Figure 6. Cross section of map units, soils, ecological sites, and potential natural communities in the Alaska Mountains.Lowland Flood Plains, Terraces and Fans Subsection (M135A.V1L) along the lower Delta River.

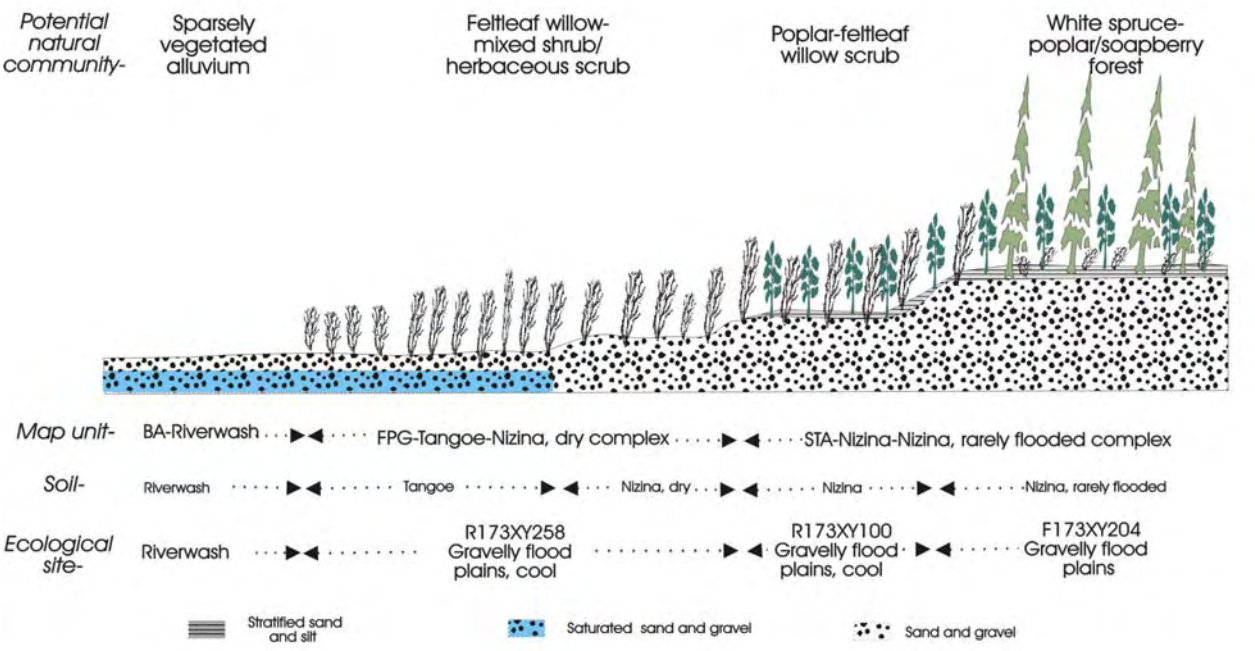


Figure 7. Cross section of map units, soils, ecological sites, and potential natural communities in the Alaska Mountains.Interior Glaciated Uplands Subsection (M135A.G1).

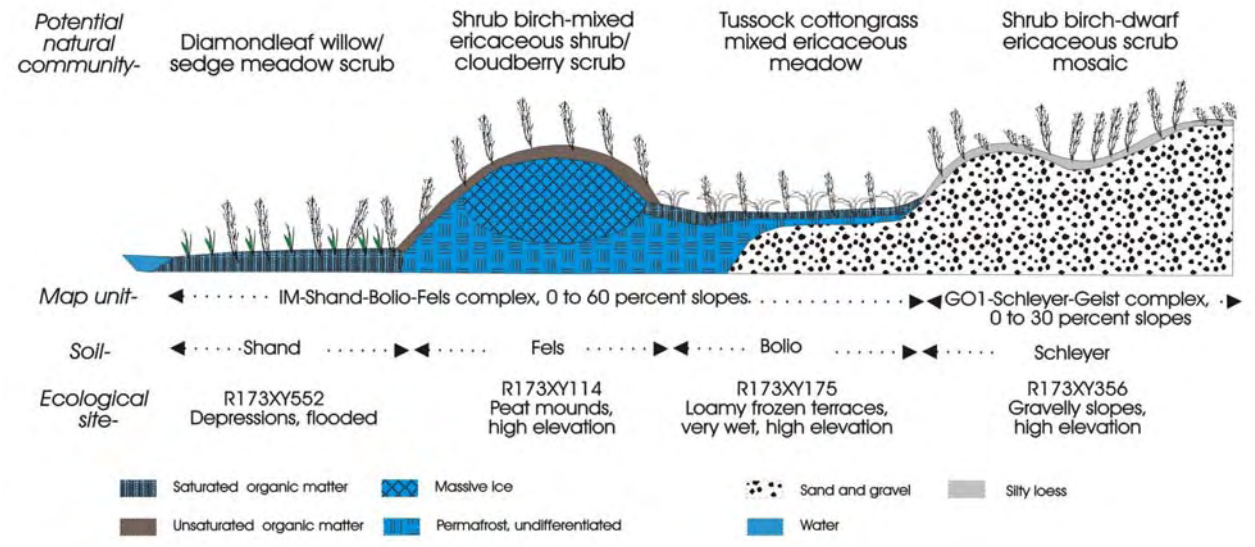


Figure 8. Distribution of Soil and Geomorphic Processes in the Delta River Area.

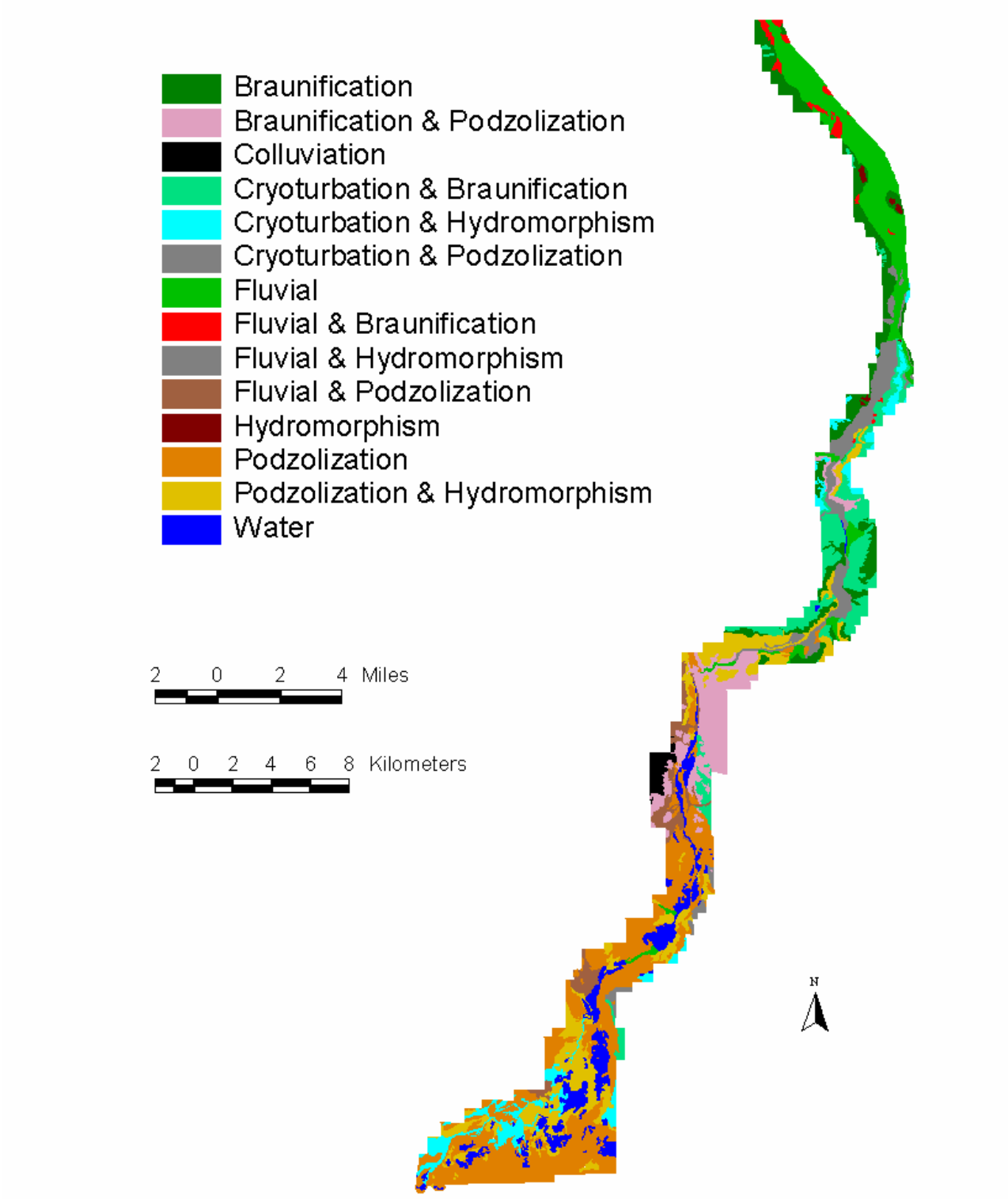


Figure 9. Distribution of Permafrost in the Delta River Area.

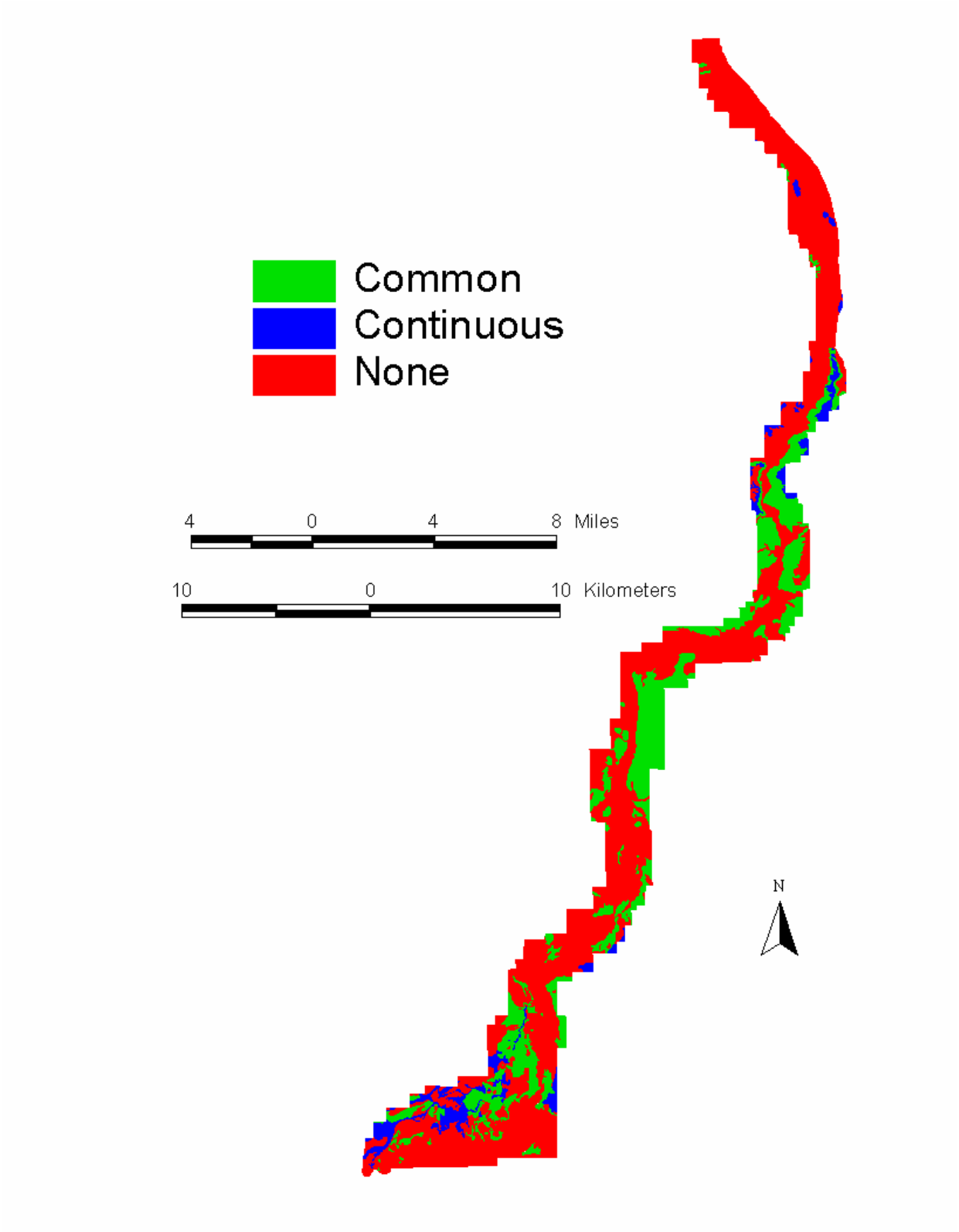


Plate 1. Pitted outwash plains and hills in the Tangle Lakes portion of the area. Vegetation consists of a mosaic of lichen in the light tonal areas and shrub birch scrub in the intervening darker areas. The major soil represented is Schleyer, a component of map unit GO1—Schleyer-Geist complex, 0 to 30 percent slopes.

Plate 2. The source of the Delta River at the northern end of Long Tangle Lake.

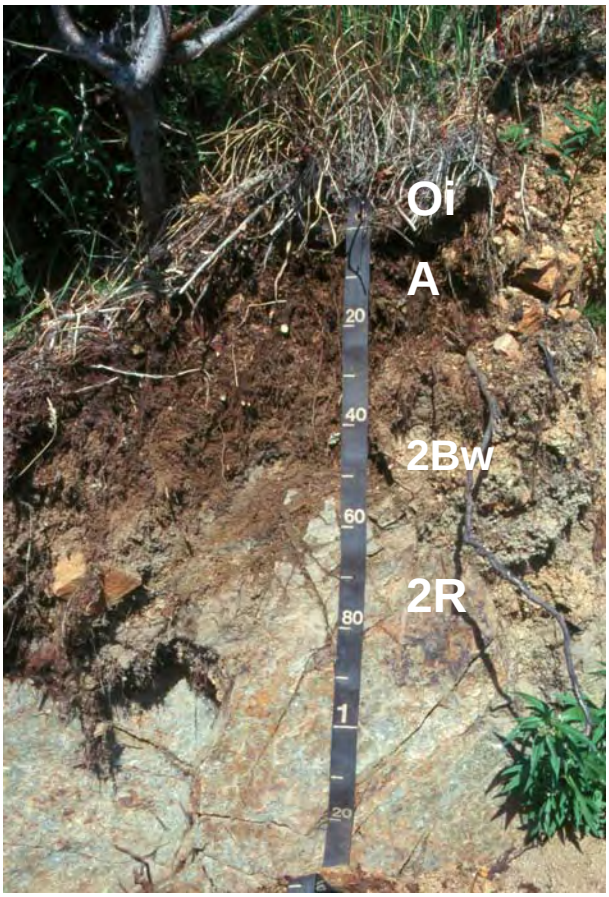
Plate 3. Clear water section of the Delta River with the braided flood plain portion represented by map unit FPC—Dackey-Tangoe-Riverwash, high elevation complex. Bedrock rims the river canyon in the mid-ground. Shrub birch scrub till plains extending from the canyon rim to the distant mountains represented by map unit TPA—McCumberson-Phelanna complex, 2 to 12 percent slopes.

Plate 4. Clear water portion of the Delta River. The forested uplands include map units ESA—Waitabit-Ogive complex, 22 to 60 percent slopes on escarpments and AFM—Osar-Klute complex, 6 to 18 percent slopes on alluvial fans.

Plate 5. Rock outcrops and dwarf scrub vegetation in map unit MSD—Frostcircle-Minya-Minya, cool complex, 0 to 28 percent slopes near Upper Tangle Lake.

Plate 6. Large colluvial fans along the lower Delta River. Map unit AFP—Basaltlake, 12 to 25 percent slopes.

Plate 7. Persistent summer ice along the Delta River near Eurea Creek in map unit BA—Riverwash. Steeper slopes in the mid-ground are representative of map unit MSHP—Steps-Basaltlake complex, 14 to 75 percent slopes. Map unit MSS—Frostcircle peat, 0 to 25 percent slopes is found on more gently sloping landscapes in the background. Soils of the latter two map units are underlain by permafrost and are also considered as intermediate in age as described in Appendix B—Discussion of Soil and Geomorphic Processes.



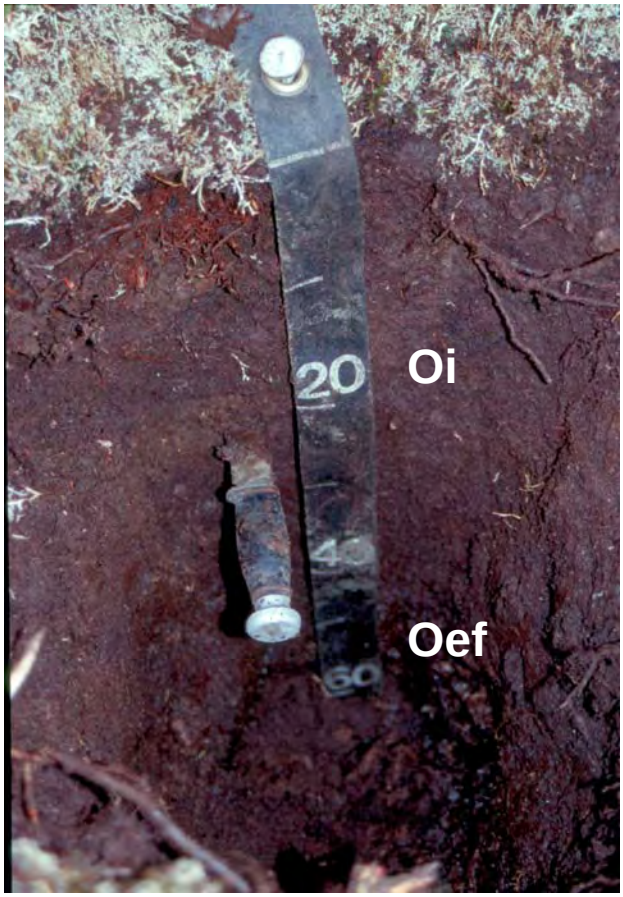


Plate 8 (left). The Fields soil is formed in a thin loess mantle over gravelly colluvium underlain by consolidated bedrock. This soil is a major component of map unit MSB—Fields-Minya-Frostcircle complex, 0 to 75 percent slopes.

Plate 9 (right). The Bonot soil on the right illustrates the thick accumulation of organic material under acid, saturated conditions. The top of the permafrost table is located at 24 inches (60 cm).

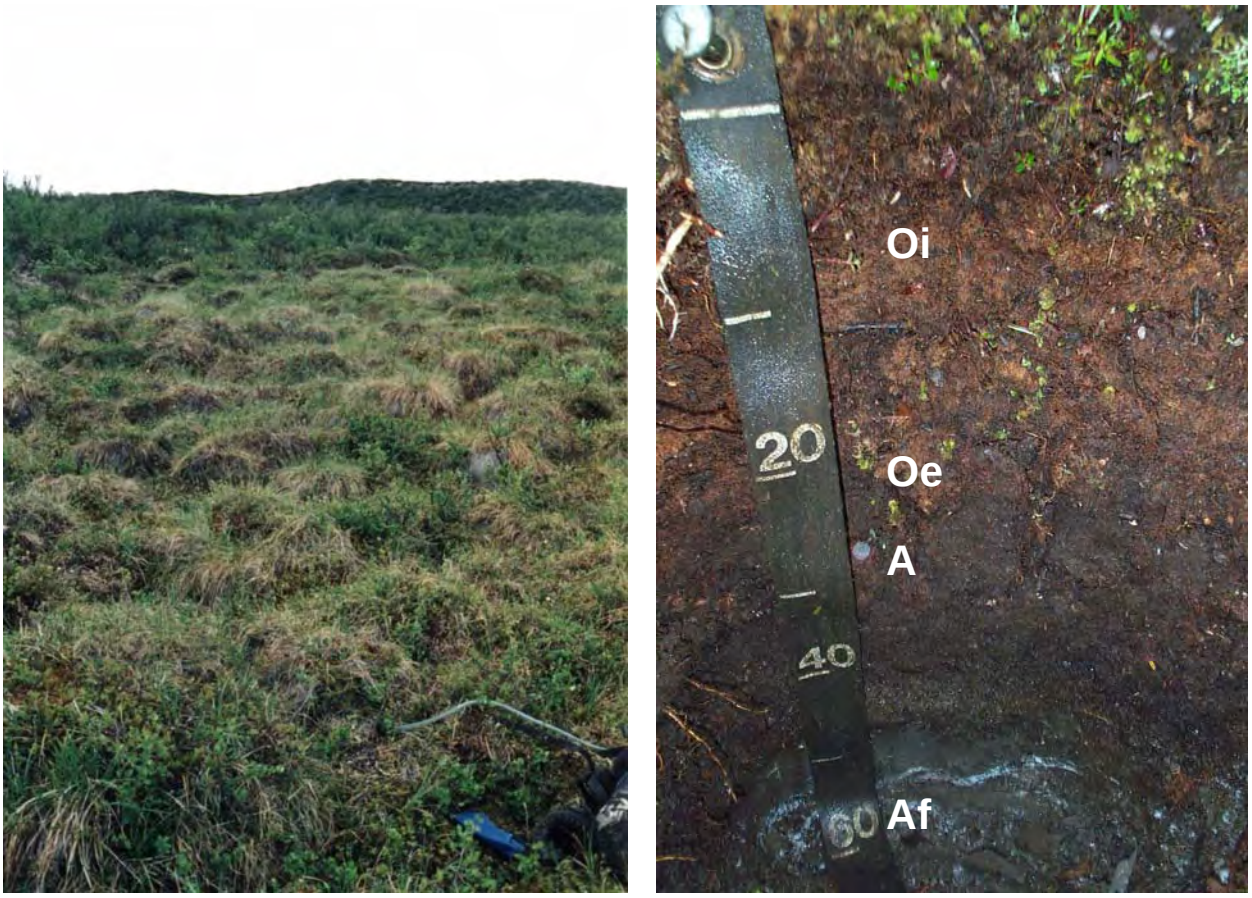


Plate 10. Turf hummocks also known as tussocks formed by cottongrass on Turbellina soils, a component of map unit GO3—Turbellina-Schleyer complex, 0 to 30 percent slopes. These micro-relief features are underlain by permafrost and indicative of cryoturbation or frost churning in soils.

Plate 11. Ice seams and lenses at about 22 inches (55 cm) depth, near the top of the permafrost table in Owhat soil, the principle component in map unit L1—Owhat peat, 2 to 15 percent slopes.

Plate 12. One of few suitable camping spots along the upper Delta River. Impacts in these moderately trafficked areas include fire rings, a general lack of suitable firewood, local compaction of soils, and trampling of vegetation.

Plate 13. Flooded and sparsely vegetated river bars suitable for camping are more abundant along the lower reaches of the Delta River. Mapunit BA-Riverwash.

Plate 14. Map unit AFE—Nizina silt loam, 6 to 18 percent slopes on the alluvial fan in the mid-ground. The principle component of this map unit is the occasionally flooded and gravelly Nizina soils, which have white spruce/bog blueberry/feathermoss forest. The Nizina, cool soils with poplar/feltleaf willow scrub are also represented in the map unit.

Plate 15. An alpine alluvial fan typical of map unit AFL—Schleyer-Broxson-Riverwash complex.

Plate 16. White spruce forest and scrub vegetation on slopes on the left are typical of map unit ESA—Waitabit-Ogive complex, 22 to 60 percent slopes.

Plate 17. Flood plain of the upper Delta River. Map unit FPF—Broxson-Nizina, cool complex

Plate 18. The Denali Highway crosses the survey area near Round Tangle Lake. Map unit GO4—Kuswash-Turbellina-Schleyer complex, 0 to 30 percent slopes is found in the dark green foreground along the right and left sides of the photo. Map unit GO1—Schleyer-Geist complex, 0 to 30 percent slopes is in the foreground in the light tonal areas.

Plate 19. Steep glacial hills near Round Tangle Lake. The dark green areas are mixed shrub birch-bog blueberry scrub vegetation on Slana soils, a component of map unit GO2—Schleyer-Slana-Geist complex, 0 to 70 percent slopes. Slana soils are on steep slopes and have soil profiles mixed by downslope movement of materials, a process called colluviation.

Plate 20. A view of the Alaska Range and Long Tangle Lake. The foreground includes Minya soils, a component of map unit MSB—Fields-Minya-Frostcircle complex, 0 to 70 percent slopes.

Plate 21. Barren mountain slopes of talus and scree in the background are a common feature above about 900 meters elevation within the survey area. Map unit RO—Rock Outcrop, 35 to 90 percent slopes. This map unit illustrates the continual downslope movement of materials, a process described as collviation. This process prevents the establishment of vegetation on steeper slopes.

Plate 22. Nonsorted circles represented by the mosaic of white and green in mid-ground. These features are typical of the soil component Frostcircle, a major component of map unit MSB—Fields-Minya-Frostcircle complex, 0 to 75 percent slopes.

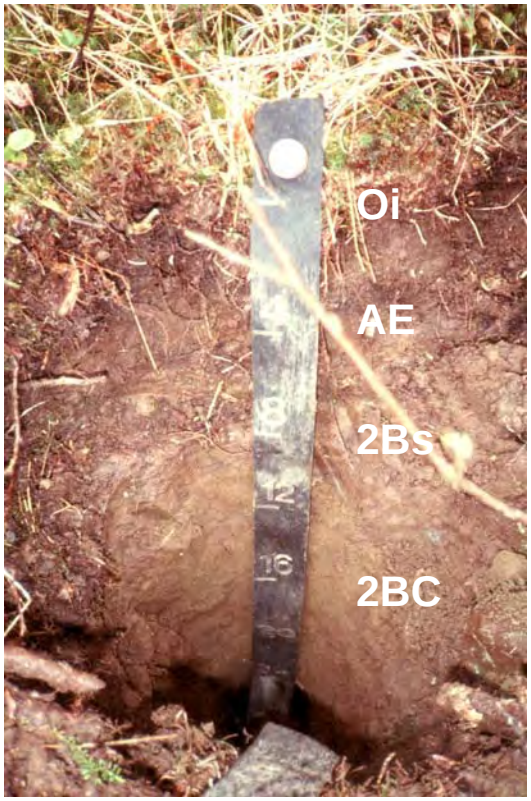
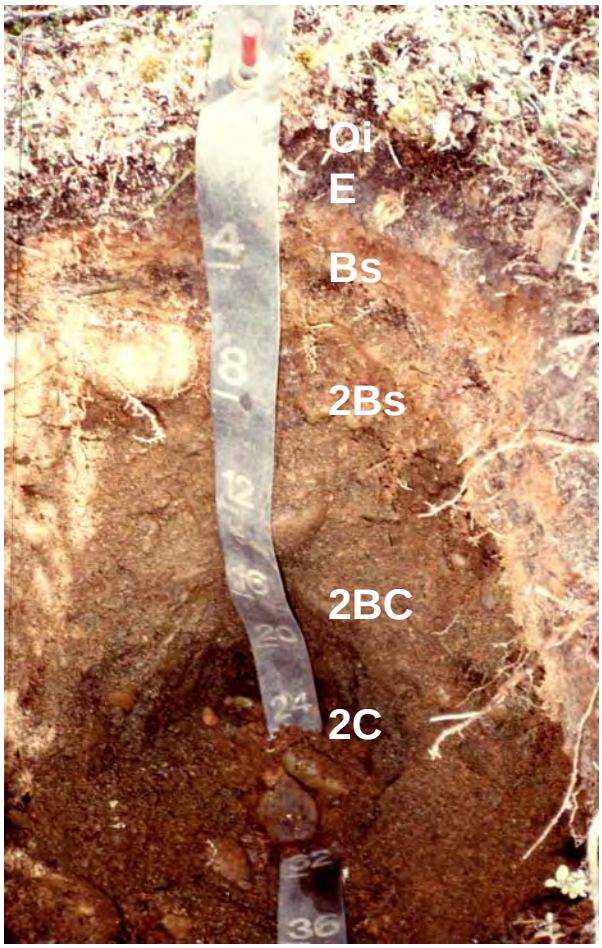


Plate 23. The Castnot soils exhibit a moderate degree of horizon development including a thin organic surface “Oi” horizon, a dark “AE” horizon and a yellowish brown “2Bs” horizon. These features are indicative of the braunification process (scale is in inches).



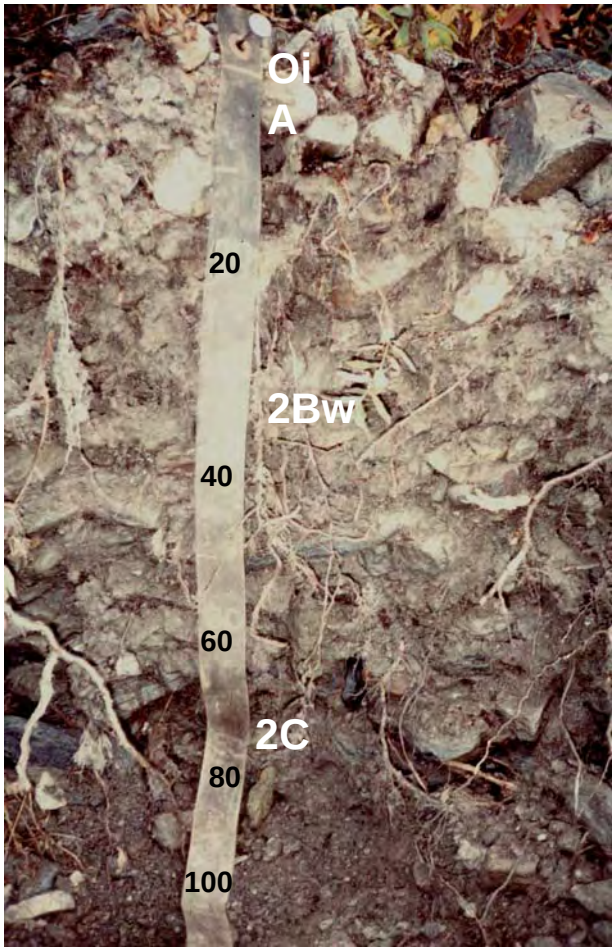


Plate 24 (left). Schleyer soils have relatively well developed soil horizons including a thin organic “Oi” layer over a gray leached “E” underlain by a reddish brown “2Bs” horizon of iron and aluminum accumulation. This horizon sequence is indicative of the podzolization process. Thess are considered relatively old soils (scale is in inches).

Plate 25 (right). Typical soil profile illustrating colluvial processes on a steep slope. Note the high content of angular rock fragments. The soil is Basaltlake, a major component of mapunit MSHP—Steps-Basaltlake complex, 14 to 75 percent slopes.

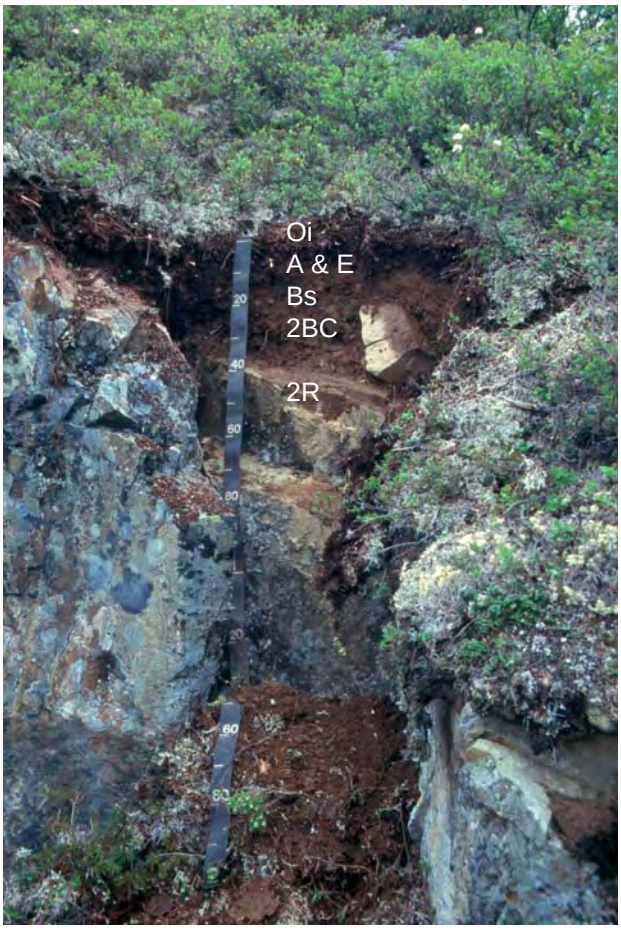
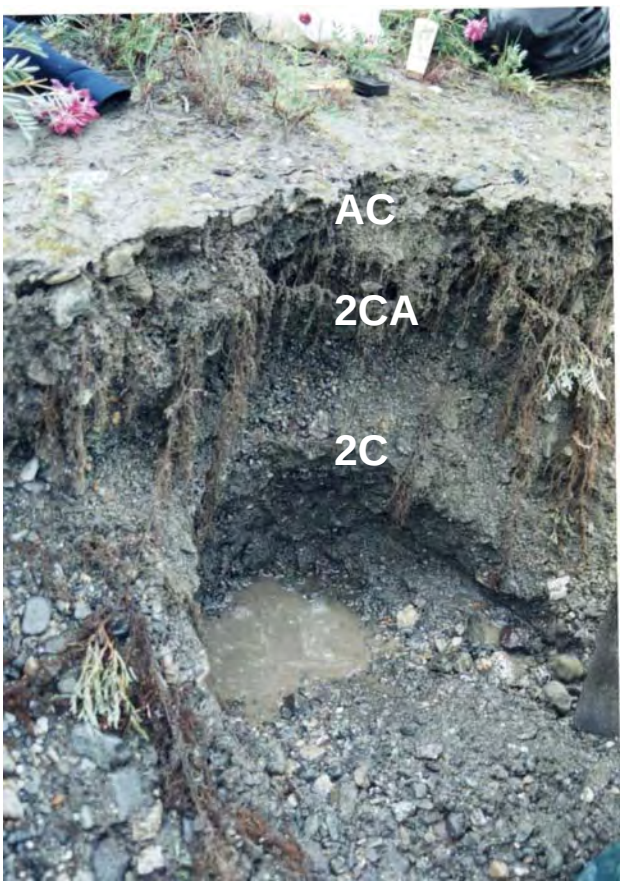


Plate 26 (left). The Minya soils are moderately deep over bedrock with moderately well developed horizons including a dark “A” over a yellowish brown “Bw”. This horizon sequence is indicative of the process of braunification. Rock fragments in the lower soil are the product of colluvial processes (scale is in centimeters).

Plate 27 (right). Rock outcrop, a component of map unit ESB—Castnot-Minya-Rock Outcrop complex, 12 to 90 percent slopes.



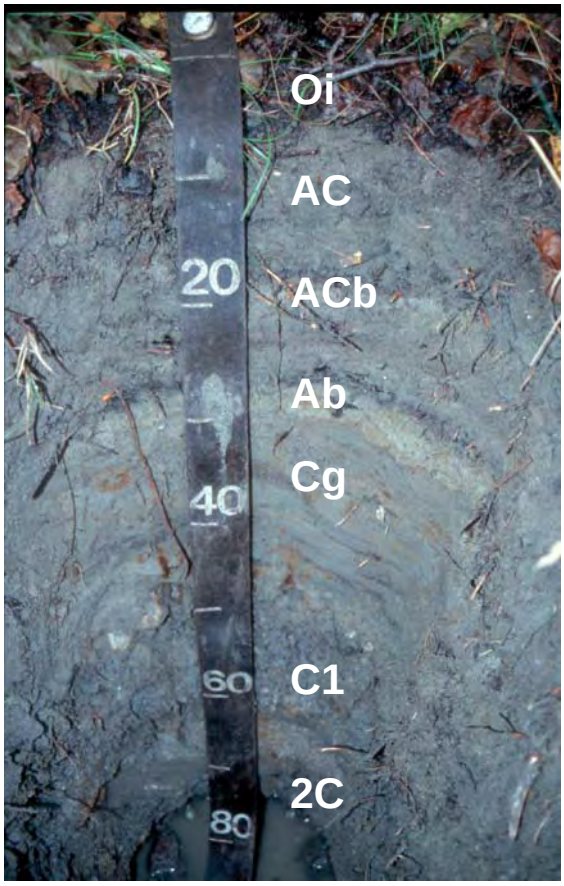


Plate 28 (left). The Tangoe soils are flooded and have a moderately deep water table. This is a major component of map unit FPG—Tangoe-Nizina, dry complex.

Plate 29 (right). The flooded, poorly drained Dacky soils consist of stratified sandy and silty alluvium over sand and gravel. Note the water table at 80 cm and the mottled bluish-gray and orange colors below 12 inches (scale is in centimeters).

Plate 30. The brown area is a swale where a snow drift has recently melted. Drifts persist into late spring and delay green-up, temporarily saturate soils, and favor herbaceous vegetation. The soil is Ogive a component of map unit ESA—Waitabit-Ogive complex, 22 to 60 percent slopes.

Plate 31. The turbid, glacially influenced Eureka Creek (center) marks the end of the clear water portion of the Delta River. Light tonal areas on the mountains are underlain by permafrost and include map units MSHP—Steps-Butch Lake, cool complex, 14 to 75 percent slopes and MST—Frostcircle-Ogive complex, 0 to 25 percent slopes.

Plate 32. Litter from shrub birch acidifies of soils, contributes significantly to the mobilization of iron and aluminum compounds and promotes podzolization.

Plate 33. Tall alder scrub on Basaltlake soils, a major component of map unit AFP—Basaltlake, 12 to 25 percent slopes. Litter from alder vegetation is a known acidifier of soils.

Plate 34. The poorly drained Osar soil is a major component of mapunit AFM—Osar-Klute complex, 6 to 18 percent slopes. The water table is the result of snowmelt and precipitation perching over the slowly permeable gravelly and loamy alluvium substratum.

Plate 35. River wash consists of nearly barren, frequently flooded, gravelly channel deposits. Riverwash, the principle component of map unit BA—Riverwash.

Plate 36. A large alluvial fan typical of map unit AFN—Sonderna very fine sandy loam, 0 to 4 percent slopes. These soils are exposed to infrequent flooding and are considered as intermediate in age.

Plate 37. Flood plain along the upper Delta River. Map Unit FPD—Dackey-Swedna-Tangoe complex.

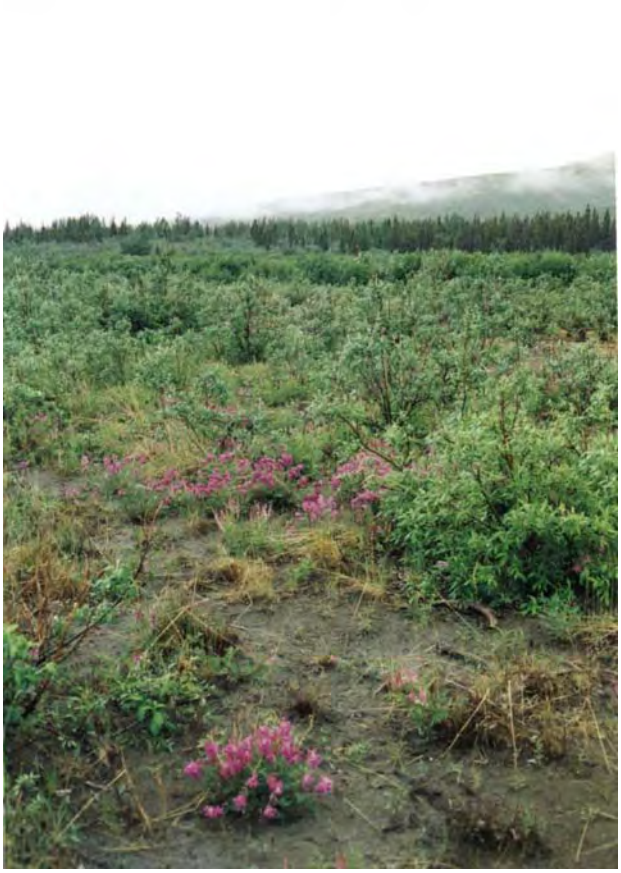
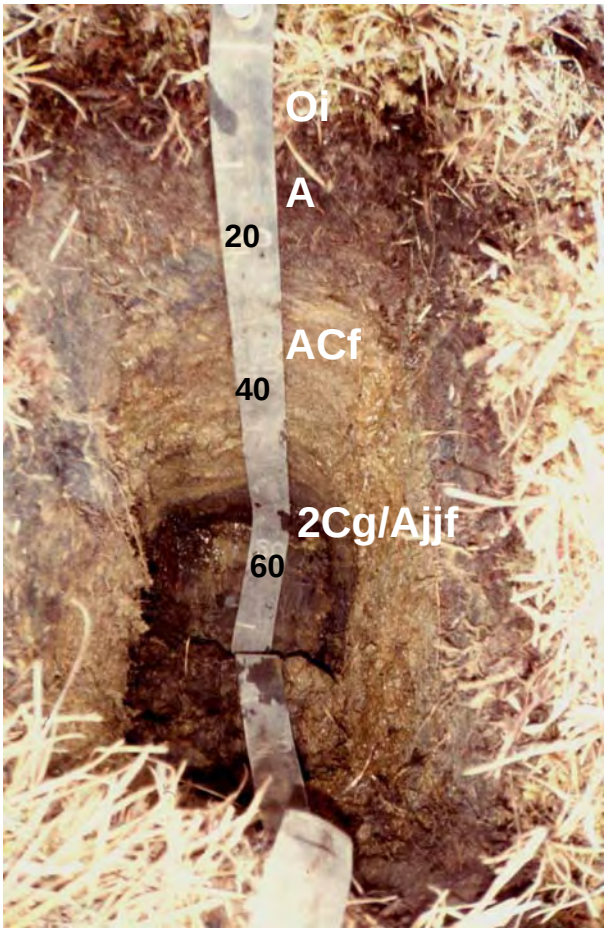


Plate 38. (left). A young stand of feltleaf willow and herbaceous vegetation indicative of fluvial processes.

Plate 39. (right). The poorly drained and flooded Swedna soil, is a major component of map unit FPD—Dackey-Swedna-Tangoe complex. The water table is at about 18 inches and underlies the entire valley bottom.

Plate 40. A sedge-wet meadow typical of Swedna, very poorly drained soils, a minor component in map unit FPD—Dackey-Swedna-Tangoe complex. The presence of sedge-wet meadow and willow/sedge scrub types are indicative of wet soils on flood plains in the Delta River area.

Plate 41. Circles in the foreground are mounded features formed by intense freezing and are typically underlain by permafrost. These represent soils in which a shallow water table is perched over permafrost. The component is Frostcircle, a major component in map unit MSD—Frostcircle-Minya-Minya, cool complex, 0 to 28 percent slopes.



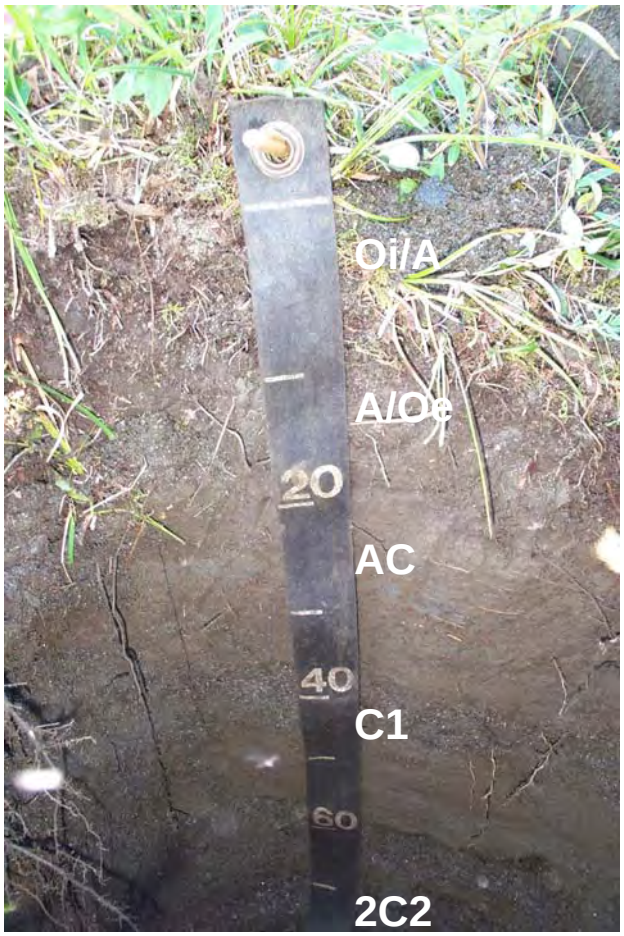


Plate 42. (left). Frostcircle soils have a thick saturated organic “Oi” layer over a thin dark “A” horizon underlain by a frost-churned gravelly “2Cg/Ajjf” horizon (scale is in centimeters).

Plate 43. (right). The flooded, well drained Klute soils consist of stratified sandy and silty alluvium over sand and gravel. This component is part of map unit AFM—Osar-Klute complex, 6 to 18 percent slopes (scale i s in centimeters).

Table 1. Temperature and Precipitation for Paxson, Alaska

(For period 1975-1987; Source: *AEIDC 1989*)

Month	Temperature			Precipitation	Snow
	Mean daily maximum	Mean daily minimum	Monthly mean	Mean monthly total	Mean monthly total
	°F	°F	°F	inches	inches
January	10.9	-8.4	1.3	0.92	13.7
February	15.1	-6.5	4.3	0.62	9.5
March	27.6	2.0	14.9	0.84	12.1
April	35.4	11.4	23.5	0.48	7.3
May	50.6	28.1	39.3	0.85	1.2
June	61.5	37.0	49.3	2.91	1.5
July	64.3	42.1	53.2	3.83	0.0
August	60.4	37.5	49.0	3.19	0.0
September	49.5	29.6	39.6	2.76	4.8
October	33.5	16.9	25.2	2.50	19.3
November	17.2	-0.8	8.6	1.07	15.9
December	9.5	-8.3	1.1	1.20	17.0
Yearly mean	36.3	15.1	25.8	--	--
Yearly total	--	--	--	21.17	102.3
Extreme	83.0	-46.0	--	--	--
Month/Year	06/83	01/84			

Table 2. Hierarchy of Ecological Units

Domain: 100—Polar
Division: 130—Subarctic
Province: 135—Alaska Range Taiga
Section: M135A—Alaska Mountains

Subsection: M135A.B1—Alaska Mountains.Nonvegetated Alpine Mountains
Landtype Association: M135A.B1.1—Nonvegetated Mountains
RO—Rock Outcrop, 35 to 90 percent slopes

Subsection: M135A.G1—Alaska Mountains.Glaciated Uplands
Landtype Association: M135A.G1.1—Alpine Gravelly and Sandy Glaciofluvial Uplands
GO1—Schleyer-Geist complex, 0 to 30 percent slopes
GO2—Schleyer-Slana-Geist complex, 0 to 70 percent slopes
OPB—Phalarope silt loam, 0 to 5 percent slopes
Landtype Association: M135A.G1.2—Alpine Glaciofluvial Uplands with Discontinuous Permafrost
GO3—Turbellina-Schleyer complex, 0 to 30 percent slopes
GO4—Kuswash-Turbellina-Schleyer complex, 0 to 30 percent slopes
IM—Shand-Bonot-Fels complex, 0 to 60 percent slopes
Landtype Association: M135A.G1.3—Alpine Till Plains
TPA-McCumberson-Phelanna complex, 2 to 12 percent slopes

Subsection: M135A.M2—Alaska Mountains.Alpine Mountains
Landtype Association: M135A.M2.1—Subalpine Mountains
AFP-Basaltlake, 12 to 25 percent slopes
BRA-Fields silt loam, 18 to 65 percent slopes
MSB-Fields-Minya-Frostcircle complex, 0 to 75 percent slopes
Landtype Association: M135A.M2.2—Alpine Mountains
ESB-Castnot-Minya-Rock Outcrop complex, 12 to 90 percent slopes
EST-Petrokov-Basaltlake-Castnot Complex, 6 to 65 percent slopes
Landtype Association: M135A.M2.3—Alpine Mountains with Discontinuous Permafrost
L1-Owhat peat, 2 to 15 percent slopes
MSD-Frostcircle-Minya-Minya, cool complex, 0 to 28 percent slopes
MSHP-Steps-Basaltlake complex, 14 to 75 percent slopes
MSS-Frostcircle peat, 0 to 25 percent slopes
MST-Frostcircle-Ogive complex, 0 to 25 percent

Subsection: M135A.M2L—Alaska Mountains.Boreal Mountains
Landtype Association: M135A.M2L.1—Boreal Riparian Forested and Woodland Fans
AFM-Osar-Klute complex, 6 to 18 percent
Landtype Association: M135A.M2L.2—Boreal-Forested and Woodland Mountains
ESA-Waitabit-Ogive complex, 22 to 60 percent slopes
MSF-Elting-Basaltlake-Sonderna complex, 2 to 48 percent slopes

Subsection: M135A.V1—Alaska Mountains.Alpine Flood Plains, Terraces and Fans
Landtype Association: M135A.V1.1—Alpine Alluvial Fans
AFF-Schleyer silt loam, 0 to 5 percent slopes
AFK-Skarland-Schleyer complex, 8 to 20 percent slopes
AFL-Schleyer-Broxson-Riverwash complex
Landtype Association: M135A.V1.2—Alpine Flood Plains
FPA1-Broxson sandy loam
FPF-Broxson-Nizina, cool complex

Subsection: M135A.V1L—Alaska Mountains.Lowland Flood Plains, Terraces and Fans
Landtype Association: M135A.V1L.1—Boreal Flood Plains and Alluvial Fans
AFA-Nizina-Sinona-Riverwash complex
AFN-Sonderna very fine sandy loam, 0 to 4 percent slopes
BA-Riverwash
STA-Nizina-Nizina, rarely flooded complex
FPG-Tangoe-Nizina, dry complex
Landtype Association: M135A.V1L.2—Boreal Flood Plains, High Elevation
FPA-Swedna-Riverwash-Dackey complex
FPB-Dackey-Tangoe-Riverwash complex
Landtype Association: M135A.V1L.3—Boreal Alluvial Fans
AFE-Nizina silt loam, 6 to 18 percent
Landtype Association: M135A.V1L.4—Boreal Riparian Scrub Flood Plains
FPC-Dackey-Tangoe-Riverwash complex
FPD-Dackey-Swedna-Tangoe complex

Table 3. Soils-Ecological Site Correlation

Map symbol and soil name	Ecological site name (climax plant community)
AFA:	
Nizina, cool	Loamy Flood Plains (Poplar-feltleaf willow scrub)
Sinona	Gravelly Mountains, Warm (White spruce/green alder forest)
Klute (minor)	Loamy High Flood Plains (White spruce/bog blueberry/feathermoss forest)
Nizina, dry (minor)	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
AFE:	
Nizina	Loamy High Flood Plains (White spruce/bog blueberry/feathermoss forest)
Nizina, cool (minor)	Loamy Flood Plains (Poplar-feltleaf willow scrub)
Tangoe (minor)	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
AFF:	
Schleyer	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Broxson (minor)	Gravelly Low Flood Plains, High Elevation (Feltleaf willow scrub, cool)
AFK:	
Skarland	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
Schleyer	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Nizina, cool (minor)	Loamy Flood Plains (Poplar-feltleaf willow scrub)
AFL:	
Schleyer	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Broxson	Gravelly Low Flood Plains, High Elevation (Feltleaf willow scrub, cool)
AFM:	
Osar	Loamy Slopes, Wet (White spruce/willow woodland, wet)
Klute	Loamy High Flood Plains (White spruce/bog blueberry/feathermoss forest)
Sonderna (minor)	Gravelly Mountains, Warm (White spruce/green alder forest)
AFN:	
Sonderna	Gravelly Mountains, Warm (White spruce/green alder forest)
Klute (minor)	Loamy High Flood Plains (White spruce/bog blueberry/feathermoss forest)
AFP:	
Basaltlake	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
Nizina, cool (minor)	Loamy Flood Plains (Poplar-feltleaf willow scrub)
Steps (minor)	Gravelly Frozen Slopes (Shrub birch-mixed ericaceous shrub/sedge scrub)
Fields (minor)	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
BA:	
Nizina, dry (minor)	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
Tangoe (minor)	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
BRA:	
Fields	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
Steps (minor)	Gravelly Frozen Slopes (Shrub birch-mixed ericaceous shrub/sedge scrub)
ESA:	
Waitabit	Gravelly Mountains, Warm (White spruce/green alder forest)
Ogive	Swales, High Elevation (Diamondleaf willow-mixed willow scrub mosaic)
Castnot (minor)	Gravelly Slopes (Shrub birch-bog blueberry scrub)
Osar (minor)	Loamy Slopes, Wet (White spruce/willow woodland, wet)
ESB:	
Castnot	Gravelly Slopes (Shrub birch-bog blueberry scrub)
Minya	Gravelly Slopes (Shrub birch-bog blueberry scrub)
Schleyer, cool (minor)	Gravelly Mountains, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)

Table 3. Soils-Ecological Site Correlation—Continued

Map symbol and soil name	Ecological site name (climax plant community)
EST:	
Petrokov	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Basaltlake	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
Castnot	Gravelly Slopes (Shrub birch-bog blueberry scrub)
Ogive (minor)	Swales, High Elevation (Diamondleaf willow-mixed willow scrub mosaic)
FPA:	
Swedna	Loamy Wet Flood Plains, High Elevation (Diamondleaf willow/horsetail-fragile sedge scrub)
Dackey	Loamy Flood Plains (Poplar-feltleaf willow scrub)
Tangoe (minor)	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
FPA1:	
Broxson	Gravelly Low Flood Plains, High Elevation (Feltleaf willow scrub, cool)
Schleyer (minor)	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
FPB:	
Dackey	Loamy Flood Plains (Poplar-feltleaf willow scrub)
Tangoe	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
Swedna, very wet (minor)	Depressions, Frequently Flooded (Sedge wet meadow 2)
Swedna (minor)	Loamy Wet Flood Plains, High Elevation (Diamondleaf willow/horsetail-fragile sedge scrub)
FPC:	
Dackey	Loamy Flood Plains (Poplar-feltleaf willow scrub)
Tangoe	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
Swedna, very wet (minor)	Depressions, Frequently Flooded (Sedge wet meadow 2)
Swedna (minor)	Loamy Wet Flood Plains, High Elevation (Diamondleaf willow/horsetail-fragile sedge scrub)
FPD:	
Dackey	Loamy Flood Plains (Poplar-feltleaf willow scrub)
Swedna	Loamy Wet Flood Plains, High Elevation (Diamondleaf willow/horsetail-fragile sedge scrub)
Tangoe	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
Swedna, very wet (minor)	Depressions, Frequently Flooded (Sedge wet meadow 2)
FPF:	
Broxson	Gravelly Low Flood Plains, High Elevation (Feltleaf willow scrub, cool)
Nizina, cool	Loamy Flood Plains (Poplar-feltleaf willow scrub)
Schleyer (minor)	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
FPG:	
Tangoe	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
Nizina, dry	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
GO1:	
Schleyer	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Geist	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Turbellina (minor)	Loamy Frozen Wet Terraces, High Elevation (Tussock cottongrass/mixed ericaceous shrub meadow)
Terric Cryohemists (minor)	Pond Margins (Sedge wet meadow)
GO2:	
Schleyer	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Slana	Gravelly Slopes (Shrub birch-bog blueberry scrub)
Geist	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Phelanna (minor)	Loamy Slopes, High Elevation (Diamondleaf willow scrub, moist)
Turbellina (minor)	Loamy Frozen Wet Terraces, High Elevation (Tussock cottongrass/mixed ericaceous shrub meadow)

Table 3. Soils-Ecological Site Correlation—Continued

Map symbol and soil name	Ecological site name (climax plant community)
GO3:	
Turbellina	Loamy Frozen Wet Terraces, High Elevation (Tussock cottongrass/mixed ericaceous shrub meadow)
Schleyer	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Fels (minor)	Peat Mounds, Low Elevation (Shrub birch-mixed ericaceous shrub/cloubderry scrub)
Terric Cryohemists (minor)	Pond Margins (Sedge wet meadow)
Shand (minor)	Depressions, Flooded (Diamondleaf willow/sedge scrub)
GO4:	
Kuswash	Gravelly Frozen Slopes (Shrub birch-mixed ericaceous shrub/sedge scrub)
Turbellina	Loamy Frozen Wet Terraces, High Elevation (Tussock cottongrass/mixed ericaceous shrub meadow)
Schleyer	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
IM:	
Shand	Depressions, Flooded (Diamondleaf willow/sedge scrub)
Bonot	Loamy Frozen Wet Terraces, High Elevation (Tussock cottongrass/mixed ericaceous shrub meadow)
Fels	Peat Mounds, Low Elevation (Shrub birch-mixed ericaceous shrub/cloubderry scrub)
Kuswash (minor)	Gravelly Frozen Slopes (Shrub birch-mixed ericaceous shrub/sedge scrub)
Turbellina (minor)	Loamy Frozen Wet Terraces, High Elevation (Tussock cottongrass/mixed ericaceous shrub meadow)
L1:	
Owhat	Gravelly Frozen Slopes (Shrub birch-mixed ericaceous shrub/sedge scrub)
Fields (minor)	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
MSB:	
Fields	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
Minya, cool	Gravelly Mountains, High Elevation (White mountain avens-mixed ericaceous shrub dwarf alpine scrub)
Frostcircle	Gravelly Frozen Slopes, Ruptic (Shrub birch/sedge scrub mosaic)
Ogive (minor)	Swales, High Elevation (Diamondleaf willow-mixed willow scrub mosaic)
MSD:	
Frostcircle	Gravelly Frozen Slopes, Ruptic (Shrub birch/sedge scrub mosaic)
Minya	Gravelly Slopes (Shrub birch-bog blueberry scrub)
Minya, cool	Gravelly Mountains, High Elevation (White mountain avens-mixed ericaceous shrub dwarf alpine scrub)
MSF:	
Elting	Gravelly Mountains, Warm (White spruce/green alder forest)
Basaltlake	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
Sonderna	Gravelly Mountains, Warm (White spruce/green alder forest)
Castnot (minor)	Gravelly Slopes (Shrub birch-bog blueberry scrub)
MSHP:	
Steps	Gravelly Frozen Slopes (Shrub birch-mixed ericaceous shrub/sedge scrub)
Basaltlake	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
Petrokov (minor)	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Ogive (minor)	Swales, High Elevation (Diamondleaf willow-mixed willow scrub mosaic)
Nizina, cool (minor)	Loamy Flood Plains (Poplar-feltleaf willow scrub)
Schleyer, cool (minor)	Gravelly Mountains, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
MSS:	
Frostcircle	Gravelly Frozen Slopes, Ruptic (Shrub birch/sedge scrub mosaic)
Basaltlake (minor)	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)

Table 3. Soils-Ecological Site Correlation—Continued

Map symbol and soil name	Ecological site name (climax plant community)
MST:	
Frostcircle	Gravelly Frozen Slopes, Ruptic (Shrub birch/sedge scrub mosaic)
Ogive	Swales, High Elevation (Diamondleaf willow-mixed willow scrub mosaic)
Fields (minor)	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
Minya, cool (minor)	Gravelly Mountains, High Elevation (White mountain avens-mixed ericaceous shrub dwarf alpine scrub)
OPB:	
Phalarope	Gravelly Slopes (Shrub birch-bog blueberry scrub)
Waitabit (minor)	Gravelly Mountains, Warm (White spruce/green alder forest)
RO:	
Minya, cool (minor)	Gravelly Mountains, High Elevation (White mountain avens-mixed ericaceous shrub dwarf alpine scrub)
Fields (minor)	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
STA:	
Nizina	Loamy High Flood Plains (White spruce/bog blueberry/feathermoss forest)
Nizina, rarely flooded	Gravelly Flood Plains (White spruce-poplar/soapberry forest)
Klute (minor)	Loamy High Flood Plains (White spruce/bog blueberry/feathermoss forest)
Nizina, cool (minor)	Loamy Flood Plains (Poplar-feltleaf willow scrub)
Nizina, dry (minor)	Gravelly Flood Plains, Cool (Feltleaf willow-mixed shrub/herbaceous scrub)
TPA:	
McCumberson	Gravelly Slopes, High Elevation (Shrub birch-dwarf ericaceous scrub mosaic)
Phelanna	Loamy Slopes, High Elevation (Diamondleaf willow scrub, moist)
Basaltlake (minor)	Gravelly Mountains, Acid (Green alder/red current/bluejoint scrub)
Frostcircle (minor)	Gravelly Frozen Slopes, Ruptic (Shrub birch/sedge scrub mosaic)
W:	
Terric Cryohemists (minor)	Pond Margins (Sedge wet meadow)
Swedna, very wet (minor)	Depressions, Frequently Flooded (Sedge wet meadow 2)

Table 4. Acreage and Proportionate Extent of the Soils

Map symbol	Map unit name	Acres	Percent
AFA	Nizina-Sinona-Riverwash complex, 0 to 12 percent slopes	516	1.1
AFE	Nizina silt loam, 6 to 18 percent slopes	414	0.9
AFF	Schleyer silt loam, 0 to 5 percent slopes	198	0.4
AFK	Skarland-Schleyer complex, 8 to 20 percent slopes	1,010	2.1
AFL	Schleyer-Broxson-Riverwash complex	527	1.1
AFM	Osar-Klute complex, 6 to 18 percent slopes	318	0.7
AFN	Sonderna very fine sandy loam, 0 to 4 percent slopes	403	0.8
AFP	Basaltlake, 12 to 25 percent slopes	499	1.0
BA	Riverwash	3,033	6.3
BRA	Fields silt loam, 18 to 65 percent slopes	1,374	2.8
ESA	Waitabit-Ogive complex, 22 to 60 percent slopes	868	1.8
ESB	Castnot-Minya-Rock Outcrop complex, 12 to 90 percent slopes	327	0.7
EST	Petrokov-Basaltlake-Castnot complex, 6 to 65 percent slopes	1,329	2.8
FPA	Swedna-Riverwash-Dackey complex	1,107	2.3
FPA1	Broxson sandy loam	141	0.3
FPB	Dackey-Tangoe-Riverwash complex	851	1.8
FPC	Dackey-Tangoe-Riverwash, high elevation, complex	851	1.8
FPD	Dackey-Swedna-Tangoe complex	538	1.1
FPF	Broxson-Nizina, cool, complex	72	0.1
FPG	Tangoe-Nizina, dry, complex	843	1.7
GO1	Schleyer-Geist complex, 0 to 30 percent slopes	9,255	19.2
GO2	Schleyer-Slana-Geist complex, 0 to 70 percent slopes	1,912	4.0
GO3	Turbellina-Schleyer complex, 0 to 30 percent slopes	3,020	6.3
GO4	Kuswash-Turbellina-Schleyer complex, 0 to 30 percent slopes	1,048	2.2
IM	Shand-Bonot-Fels complex, 0 to 60 percent slopes	1,504	3.1
L1	Owhat peat, 2 to 15 percent slopes	145	0.3
MSB	Fields-Minya-Frostcircle association, 0 to 75 percent slopes	3,272	6.8
MSD	Frostcircle-Minya-Minya, cool, complex, 0 to 28 percent slopes	323	0.7
MSF	Elting-Basaltlake-Sonderna complex, 2 to 48 percent slopes	493	1.0
MSHP	Steps-Basaltlake, association, 14 to 75 percent slopes	2,280	4.7
MSS	Frostcircle peat, 0 to 25 percent slopes	1,121	2.3
MST	Frostcircle-Ogive association, 0 to 25 percent slopes	2,139	4.4
OPB	Phalarope silt loam, 0 to 5 percent slopes	325	0.7
RO	Rock Outcrop, 35 to 90 percent slopes	523	1.1
STA	Nizina-Nizina, rarely flooded, complex	883	1.8
TPA	McCumberson-Phelanna complex, 2 to 12 percent slopes	1,125	2.3
W	Water	3,656	7.6
	Total	48,243	100.0

Table 5. Recreation: Camp Areas and Foot and ATV Trail

(This table gives soil limitation ratings and the primary limiting factors associated with the ratings. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for further explanation of ratings in this table.)

Map symbol And soil name	Percent of map unit	Camp Areas (primitive) (Alaska criteria)		Foot and ATV Trails (Alaska criteria)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AFA:					
Nizina, cool	55	Not limited		Somewhat limited:	
				Sandy surface layer easily displaced	0.50
Sinona	25	Somewhat limited:		Very limited:	
		Slope	0.63	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Riverwash	15	Not rated		Not rated	
AFE:					
Nizina	85	Somewhat limited:		Very limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Water erosion hazard	1.00
				Silty surface layer dusty when dry and slippery when wet	0.50
		Slope	0.04		
AFF:					
Schleyer	90	Somewhat limited:		Somewhat limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
AFK:					
Skarland	60	Somewhat limited:		Somewhat limited:	
		Slope	0.63	Sandy surface layer easily displaced	0.50
		Silty surface layer dusty when dry and slippery when wet	0.50	Clayey surface layer slippery when wet	0.50
				Silty surface layer dusty when dry and slippery when wet	0.50
Schleyer	30	Somewhat limited:		Very limited:	
		Slope	0.63	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
AFL:					
Schleyer	40	Somewhat limited:		Somewhat limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Broxson	35	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Sandy surface layer easily displaced	0.50
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
				Flooding	0.40
				Depth to saturated zone	0.22
Riverwash	25	Not rated		Not rated	

Table 5. Recreation: Camp Areas and Foot and ATV Trails—Continued

Map symbol And soil name	Percent of map unit	Camp Areas (primitive) (Alaska criteria)		Foot and ATV Trails (Alaska criteria)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AFM:					
Osar	55	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Klute	40	Somewhat limited:		Very limited:	
		Slope	0.63	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
AFN:					
Sonderna	90	Somewhat limited:		Somewhat limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
AFP:					
Basaltlake	90	Somewhat limited:		Very limited:	
		Slope	0.96	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
BA:					
Riverwash	95	Not rated		Not rated	
BRA:					
Fields	85	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
ESA:					
Waitabit	45	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Ogive	35	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
ESB:					
Castnot	50	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Minya	25	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Rock outcrop	20	Not rated		Not rated	

Table 5. Recreation: Camp Areas and Foot and ATV Trails—Continued

Map symbol And soil name	Percent of map unit	Camp Areas (primitive) (Alaska criteria)		Foot and ATV Trails (Alaska criteria)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
EST:					
Petrokov	35	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Basaltlake	30	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Castnot	30	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
FPA:					
Swedna	50	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Flooding	0.40
Riverwash	30	Not rated		Not rated	
Dackey	15	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Depth to saturated zone	0.22
FPA1:					
Broxson	90	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Sandy surface layer easily displaced	0.50
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
				Flooding	0.40
				Depth to saturated zone	0.22
FPB:					
Dackey	40	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Depth to saturated zone	0.22
Tangoe	35	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Sandy surface layer easily displaced	0.50
				Flooding	0.40
				Depth to saturated zone	0.22
Riverwash	20	Not rated		Not rated	
FPC:					
Dackey	40	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Depth to saturated zone	0.22
Tangoe	35	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Sandy surface layer easily displaced	0.50
				Flooding	0.40
				Depth to saturated zone	0.22
Riverwash	20	Not rated		Not rated	

Table 5. Recreation: Camp Areas and Foot and ATV Trails—Continued

Map symbol And soil name	Percent of map unit	Camp Areas (primitive) (Alaska criteria)		Foot and ATV Trails (Alaska criteria)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
FPD:					
Dackey	60	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Depth to saturated zone	0.22
Swedna	20	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Flooding	0.40
Tangoe	15	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Sandy surface layer easily displaced	0.50
				Flooding	0.40
				Depth to saturated zone	0.22
FPF:					
Broxson	45	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Sandy surface layer easily displaced	0.50
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
				Flooding	0.40
				Depth to saturated zone	0.22
Nizina, cool	40	Not limited		Somewhat limited:	
				Sandy surface layer easily displaced	0.50
FPG:					
Tangoe	70	Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	0.90	Sandy surface layer easily displaced	0.50
				Flooding	0.40
				Depth to saturated zone	0.22
Nizina, dry	20	Not limited		Somewhat limited:	
				Sandy surface layer easily displaced	0.50
GO1:					
Schleyer	75	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Geist	20	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
GO2:					
Schleyer	55	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Slana	25	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Geist	15	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50

Table 5. Recreation: Camp Areas and Foot and ATV Trails—Continued

Map symbol And soil name	Percent of map unit	Camp Areas (primitive) (Alaska criteria)		Foot and ATV Trails (Alaska criteria)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
GO3:					
Schleyer	40	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Turbellina	35	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to permafrost	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Excess surface organic matter	1.00
				Ponding	1.00
				Sandy surface layer easily displaced	0.50
GO4:					
Kuswash	40	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Excess surface organic matter	1.00
				Depth to permafrost	0.84
				Silty surface layer dusty when dry and slippery when wet	0.50
Turbellina	40	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to permafrost	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Excess surface organic matter	1.00
				Ponding	1.00
				Sandy surface layer easily displaced	0.50
Schleyer	20	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
IM:					
Shand	35	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Excess surface organic matter	1.00
				Sandy surface layer easily displaced	0.50
Bonot	25	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to permafrost	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Excess surface organic matter	1.00
				Ponding	1.00
				Silty surface layer dusty when dry and slippery when wet	0.50
Fels	25	Very limited:		Very limited:	
		Slope	1.00	Depth to permafrost	1.00
				Excess surface organic matter	1.00
				Water erosion hazard	1.00
L1:					
Owhat	90	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to permafrost	1.00
		Slope	0.63	Depth to saturated zone	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Excess surface organic matter	1.00
				Water erosion hazard	1.00
				Silty surface layer dusty when dry and slippery when wet	0.50

Table 5. Recreation: Camp Areas and Foot and ATV Trails—Continued

Map symbol And soil name	Percent of map unit	Camp Areas (primitive) (Alaska criteria)		Foot and ATV Trails (Alaska criteria)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
MSB:					
Fields	45	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Minya, cool	30	Somewhat limited:		Somewhat limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Frostcircle	15	Somewhat limited:		Very limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Depth to permafrost	1.00
				Excess surface organic matter	1.00
				Silty surface layer dusty when dry and slippery when wet	0.50
MSD:					
Frostcircle	40	Somewhat limited:		Very limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Depth to permafrost	1.00
				Excess surface organic matter	1.00
				Silty surface layer dusty when dry and slippery when wet	0.50
Minya	35	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Minya, cool	15	Somewhat limited:		Somewhat limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
MSF:					
Elting	65	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Basaltlake	15	Somewhat limited:		Very limited:	
		Slope	0.63	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Sonderna	15	Somewhat limited:		Very limited:	
		Slope	0.63	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
MSHP:					
Steps	60	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to permafrost	1.00
		Slope	1.00	Depth to saturated zone	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Excess surface organic matter	1.00
				Water erosion hazard	1.00
				Sandy surface layer easily displaced	0.50
Basaltlake	25	Very limited:		Very limited:	
		Slope	1.00	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50

Table 5. Recreation: Camp Areas and Foot and ATV Trails—Continued

Map symbol And soil name	Percent of map unit	Camp Areas (primitive) (Alaska criteria)		Foot and ATV Trails (Alaska criteria)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
MSS:					
Frostcircle	90	Very limited:		Very limited:	
		Slope	1.00	Depth to permafrost	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Excess surface organic matter	1.00
				Water erosion hazard	1.00
				Silty surface layer dusty when dry and slippery when wet	0.50
MST:					
Frostcircle	70	Somewhat limited:		Very limited:	
		Slope	0.63	Depth to permafrost	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Excess surface organic matter	1.00
				Water erosion hazard	1.00
				Silty surface layer dusty when dry and slippery when wet	0.50
Ogive	15	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Water erosion hazard	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
OPB:					
Phalarope	95	Somewhat limited:		Somewhat limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
RO:					
Rock outcrop	95	Not rated		Not rated	
STA:					
Nizina	60	Somewhat limited:		Somewhat limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Nizina, rarely flooded	25	Somewhat limited:		Somewhat limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
TPA:					
McCumberson	70	Somewhat limited:		Somewhat limited:	
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
Phelanna	20	Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Silty surface layer dusty when dry and slippery when wet	0.50	Silty surface layer dusty when dry and slippery when wet	0.50
W:					
Water, fresh	90	Not rated		Not rated	

Table 6. Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification		Liquid limit	Plasticity index
			Unified	AASHTO		
	In.				Pct.	
AFA:						
Nizina, cool---	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-3	Sandy loam	SC-SM, SM	A-4, A-2	5-15	NP-5
	3-60	Extremely gravelly coarse sand, extremely cobbly coarse sand, very cobbly loamy sand	GP, SP-SM, SP	A-1	0-0	NP
Sinona---	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-6	Silt loam	ML, OL	A-4	25-30	NP-5
	6-15	Very gravelly sandy loam, very cobbly sandy loam	SC-SM, SM	A-1, A-2, A-4	5-15	NP-5
	15-60	Extremely gravelly coarse sand, extremely cobbly coarse sand, very gravelly loamy sand	SP-SM, GP, SP	A-1	0-0	NP
Riverwash---	---	---	---	---	---	---
AFE:						
Nizina---	0-4	Slightly decomposed plant material	PT	A-8	---	---
	4-6	Silt loam	ML	A-4	25-30	NP-5
	6-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	GP, SP-SM, SP	A-1	0-0	NP
AFF:						
Schleyer---	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-6	Silt loam	ML	A-4	25-30	NP-5
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
AFK:						
Skarland---	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-5	Moderately decomposed plant material, stratified sand to silt	SC-SM, SM	A-4, A-2	5-15	NP-5
	5-60	Extremely gravelly coarse sand, extremely cobbly coarse sand, very gravelly loamy sand	GP, SP-SM, SP	A-1	0-0	NP
Schleyer---	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-6	Silt loam	ML	A-4	25-30	NP-5
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
AFL:						
Schleyer---	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-6	Silt loam	ML	A-4	25-30	NP-5
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
Broxson---	0-8	Stratified sand to silt, silt loam	ML	A-4	25-30	NP-5
	8-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly loamy coarse sand	GP, SP-SM	A-1	0-0	NP
Riverwash---	---	---	---	---	---	---

Table 6. Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Liquid limit	Plasticity index
			Unified	AASHTO		
	In.				Pct.	
AFM:						
Osar	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-10	Mucky silt loam, silt loam	ML, OL	A-4	25-30	NP-5
	10-21	Loam, gravelly loam, gravelly sandy loam	CL-ML, SC-SM. SM	A-4, A-1	5-15	NP-5
	21-60	Loam, gravelly loam, gravelly sandy loam	CL-ML, SC-SM. SM	A-4, A-1	5-15	NP-5
Klute	0-4	Slightly decomposed plant material	PT	A-8	---	---
	4-8	Fine sandy loam, silt loam	ML	A-4	25-30	NP-5
	8-21	Stratified sand to silt	SC-SM, SM	A-2, A-4	10-15	NP-5
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	GP, SP, SP-SM	A-1	0-0	NP
AFN:						
Sonderna	0-3	Slightly decomposed plant material	PT	A-8	---	---
	3-14	Very fine sandy loam, silt loam	OL, ML	A-4	25-30	NP-5
	14-21	Extremely cobbly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand	SP, GP, SP-SM	A-1	0-0	NP
	21-60	Extremely cobbly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand	SP, GP, SP-SM	A-1	0-0	NP
AFP:						
Basaltlake	0-4	Slightly decomposed plant material	PT	A-8	---	---
	4-6	Silt loam	OL, ML	A-4	25-30	NP-5
	6-9	Very gravelly sandy loam, very cobbly sandy loam	SC-SM, SM	A-4, A-2, A-1	5-15	NP-5
	9-60	Very gravelly sandy loam, very cobbly sandy loam	SC-SM, SM	A-4, A-2, A-1	5-15	NP-5
BA:						
Riverwash	---	---	---	---	---	---
BRA:						
Fields	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-9	Mucky silt loam, silt loam	ML, OL	A-4	25-30	NP-5
	9-18	Gravelly loam, gravelly sandy loam, loam	CL-ML, SM, SC-SM	A-2, A-1, A-4	5-15	NP-5
	18-36	Very gravelly sandy loam, very cobbly sandy loam, very cobbly loam	SC-SM, SM	A-1, A-2, A-4	5-15	NP-5
	36-60	Unweathered bedrock			---	---
ESA:						
Waitabit	0-3	Slightly decomposed plant material	PT	A-8	---	---
	3-6	Silt loam	ML	A-4	25-30	NP-5
	6-15	Gravelly loam, gravelly sandy loam, mixed loam	CL-ML, SM, SC-SM	A-2, A-1, A-4	5-15	NP-5
	15-60	Very cobbly sandy loam, very gravelly sandy loam, very gravelly loam	GP-GM, GC-GM	A-1, A-4	5-15	NP-5
Ogive	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-10	Mucky silt loam, silt loam	ML, OL	A-4	25-30	NP-5
	10-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam	GM, GC-GM	A-1, A-2	5-15	NP-5
ESB:						
Castnot	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-5	Silt loam	ML	A-4	25-30	NP-5
	5-18	Loam, gravelly loam, gravelly sandy loam, very cobbly sandy loam	CL-ML, SC-SM. SM	A-1, A-4	5-15	NP-5
	18-60	Very cobbly sandy loam, very gravelly loam, very gravelly sandy loam	GC-GM, GM	A-1, A-2	5-15	NP-5

Table 6. Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Liquid limit	Plasticity index
			Unified	AASHTO		
	In.				Pct.	
ESB:						
Minya	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-3	Mucky silt loam, silt loam	OL, ML	A-4	25-30	NP-5
	3-17	Very gravelly sandy loam, very cobbly loam	SC-SM, SM	A-1, A-2, A-4	5-15	NP-5
	17-60	Unweathered bedrock			---	---
Rock outcrop	---	---	---	---	---	---
EST:						
Petrokov	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-5	Silt loam	OL, ML	A-4	25-30	NP-5
	5-23	Cobbly sandy loam, extremely cobbly coarse sand, very gravelly coarse sand	GP, GP-GM	A-1	0-0	NP
	23-60	Extremely gravelly coarse sand, very gravelly loamy coarse sand, extremely cobbly loamy coarse sand	GP, GP-GM	A-1	0-0	NP
Basaltlake	0-4	Slightly decomposed plant material	PT	A-8	---	---
	4-6	Silt loam	OL, ML	A-4	25-30	NP-5
	6-9	Very gravelly sandy loam, very cobbly sandy loam	SC-SM, SM	A-4, A-2, A-1	5-15	NP-5
	9-60	Very gravelly sandy loam, very cobbly sandy loam	SC-SM, SM	A-4, A-2, A-1	5-15	NP-5
Castnot	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-5	Silt loam	ML	A-4	25-30	NP-5
	5-18	Loam, gravelly loam, gravelly sandy loam, very cobbly sandy loam	CL-ML, SC-SM. SM	A-1, A-4	5-15	NP-5
	18-60	Very cobbly sandy loam, very gravelly loam, very gravelly sandy loam	GC-GM, GM	A-1, A-2	5-15	NP-5
FPA:						
Swedna	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-5	Fine sandy loam	ML, CL-ML, SM	A-4	15-20	NP-5
	5-29	Stratified sand to silt	SC-SM, SM	A-2, A-4	10-15	NP-5
	29-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	GP, SP, SP-SM	A-1	0-0	NP
Riverwash	---	---	---	---	---	---
Dackey	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-5	Fine sandy loam	CL-ML, ML, SM	A-4	15-20	NP-5
	5-28	Stratified sand to silt, stratified fine sand to silt	SM, SC-SM	A-2, A-4	10-15	NP-5
	28-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	GP, SP, SP-SM	A-1	0-0	NP
FPA1:						
Broxson	0-8	Stratified sand to silt, silt loam	ML	A-4	25-30	NP-5
	8-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly loamy coarse sand	GP, SP-SM	A-1	0-0	NP
FPB:						
Dackey	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-5	Fine sandy loam	CL-ML, ML, SM	A-4	15-20	NP-5
	5-28	Stratified sand to silt, stratified fine sand to silt	SM, SC-SM	A-2, A-4	10-15	NP-5
	28-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	GP, SP, SP-SM	A-1	0-0	NP
Tangoe	0-2	Sandy loam	SM, SC-SM	A-2, A-4	5-15	NP-5
	2-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly coarse sand	GP, SP-SM, GP-GM	A-1	0-0	NP
Riverwash	---	---	---	---	---	---

Table 6. Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Liquid limit	Plasticity index
			Unified	AASHTO		
	In.				Pct.	
FPC:						
Dackey	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-5	Fine sandy loam	CL-ML, ML, SM	A-4	15-20	NP-5
	5-28	Stratified sand to silt, stratified fine sand to silt	SM, SC-SM	A-2, A-4	10-15	NP-5
	28-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	GP, SP, SP-SM	A-1	0-0	NP
Tangoe	0-2	Sandy loam	SM, SC-SM	A-2, A-4	5-15	NP-5
	2-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly coarse sand	GP, SP-SM, GP-GM	A-1	0-0	NP
Riverwash	---	---	---	---	---	---
FPD:						
Dackey	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-5	Fine sandy loam	CL-ML, ML, SM	A-4	15-20	NP-5
	5-28	Stratified sand to silt, stratified fine sand to silt	SM, SC-SM	A-2, A-4	10-15	NP-5
	28-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	GP, SP, SP-SM	A-1	0-0	NP
Swedna	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-5	Fine sandy loam	ML, CL-ML, SM	A-4	15-20	NP-5
	5-29	Stratified sand to silt	SC-SM, SM	A-2, A-4	10-15	NP-5
	29-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	GP, SP, SP-SM	A-1	0-0	NP
Tangoe	0-2	Sandy loam	SM, SC-SM	A-2, A-4	5-15	NP-5
	2-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly coarse sand	GP, SP-SM, GP-GM	A-1	0-0	NP
FPF:						
Broxson	0-8	Stratified sand to silt, silt loam	ML	A-4	25-30	NP-5
	8-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly loamy coarse sand	GP, SP-SM	A-1	0-0	NP
Nizina, cool	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-3	Sandy loam	SC-SM, SM	A-4, A-2	5-15	NP-5
	3-60	Extremely gravelly coarse sand, extremely cobbly coarse sand, very cobbly loamy sand	GP, SP-SM, SP	A-1	0-0	NP
FPG:						
Tangoe	0-2	Sandy loam	SM, SC-SM	A-2, A-4	5-15	NP-5
	2-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly coarse sand	GP, SP-SM, GP-GM	A-1	0-0	NP
Nizina, dry	0-2	Sandy loam	SC-SM, SM	A-2, A-4	5-15	NP-5
	2-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly coarse sand	SP, GP, SP-SM	A-1	0-0	NP
GO1:						
Schleyer	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-6	Silt loam	ML	A-4	25-30	NP-5
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP

Table 6. Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Liquid limit	Plasticity index
			Unified	AASHTO		
	In.				Pct.	
GO1:						
Geist	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-5	Silt loam	ML	A-4	25-30	NP-5
	5-16	Fine sandy loam, sandy loam	CL-ML, SC-SM. SM	A-1, A-4	5-15	NP-5
	16-60	Loamy coarse sand, coarse sand, loamy fine sand, sand	SM	A-2	0-0	NP
GO2:						
Schleyer	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-6	Silt loam	ML	A-4	25-30	NP-5
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
Slana	0-3	Slightly decomposed plant material	PT	A-8	---	---
	3-5	Silt loam	ML	A-4	25-30	NP-5
	5-17	Extremely cobbly loamy coarse sand, very gravelly sandy loam, extremely cobbly sandy loam	GC-GM, GM	A-2	5-15	NP-5
	17-60	Extremely cobbly loamy coarse sand, very gravelly sandy loam, very cobbly sandy loam	GC-GM, GM	A-1, A-2	5-15	NP-5
Geist	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-5	Silt loam	ML	A-4	25-30	NP-5
	5-16	Fine sandy loam, sandy loam	CL-ML, SC-SM. SM	A-1, A-4	5-15	NP-5
	16-60	Loamy coarse sand, coarse sand, loamy fine sand, sand	SM	A-2	0-0	NP
GO3:						
Schleyer	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-6	Silt loam	ML	A-4	25-30	NP-5
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
Turbellina	0-9	Peat	PT	A-8	---	---
	9-14	Silt loam, mucky peat, mucky silt loam	ML, OL	A-4	25-30	NP-5
	14-60	Permanently frozen silt loam			---	---
GO4:						
Kuswash	0-10	Peat	PT	A-8	---	---
	10-13	Silt loam	ML	A-4	25-30	NP-5
	13-25	Stratified sand to silt	SM, SC-SM	A-2, A-4	10-15	NP-5
	25-60	Permanently frozen stratified fine sand to silt			---	---
Turbellina	0-9	Peat	PT	A-8	---	---
	9-14	Silt loam, mucky peat, mucky silt loam	ML, OL	A-4	25-30	NP-5
	14-60	Permanently frozen silt loam			---	---
Schleyer	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-6	Silt loam	ML	A-4	25-30	NP-5
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP

Table 6. Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Liquid limit	Plasticity index
			Unified	AASHTO		
	In.				Pct.	
IM:						
Shand	0-38	Peat, muck	PT	A-8	---	---
	38-60	Very gravelly loam, very gravelly sandy loam, very cobbly sandy loam	GC-GM, GM	A-1, A-2	5-15	NP-5
Bonot	0-7	Peat	PT	A-8	---	---
	7-22	Permanently frozen mucky peat			---	---
	22-24	Permanently frozen silt loam			---	---
	24-60	Permanently frozen mucky peat			---	---
Fels	0-18	Slightly decomposed plant material, mucky peat	PT	A-8	---	---
	18-41	Permanently frozen moderately decomposed plant material			---	---
	41-60	Permanently frozen water			---	---
L1:						
Owhat	0-10	Peat, mucky peat	PT	A-8	---	---
	10-14	Silt loam	ML	A-4	25-30	NP-5
	14-60	Permanently frozen silt loam			---	---
MSB:						
Fields	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-9	Mucky silt loam, silt loam	ML, OL	A-4	25-30	NP-5
	9-18	Gravelly loam, gravelly sandy loam, loam	CL-ML, SM, SC-SM	A-2, A-1, A-4	5-15	NP-5
	18-36	Very gravelly sandy loam, very cobbly sandy loam, very cobbly loam	SC-SM, SM	A-1, A-2, A-4	5-15	NP-5
	36-60	Unweathered bedrock			---	---
Minya, cool	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-3	Mucky silt loam, silt loam	OL, ML	A-4	25-30	NP-5
	3-17	Very gravelly sandy loam, very cobbly loam	SC-SM, SM	A-1, A-2, A-4	5-15	NP-5
	17-60	Unweathered bedrock			---	---
Frostcircle	0-5	Slightly decomposed plant material	PT	A-8	---	---
	5-11	Mucky silt loam, silt loam	ML, OL	A-4	25-30	NP-5
	11-60	Permanently frozen, mixed loam, permanently frozen gravelly loam, permanently frozen cobbly sandy loam			---	---
MSD:						
Frostcircle	0-5	Slightly decomposed plant material	PT	A-8	---	---
	5-11	Mucky silt loam, silt loam	ML, OL	A-4	25-30	NP-5
	11-60	Permanently frozen, mixed loam, permanently frozen gravelly loam, permanently frozen cobbly sandy loam			---	---
Minya	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-3	Mucky silt loam, silt loam	OL, ML	A-4	25-30	NP-5
	3-17	Very gravelly sandy loam, very cobbly loam	SC-SM, SM	A-1, A-2, A-4	5-15	NP-5
	17-60	Unweathered bedrock			---	---
Minya, cool	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-3	Mucky silt loam, silt loam	OL, ML	A-4	25-30	NP-5
	3-17	Very gravelly sandy loam, very cobbly loam	SC-SM, SM	A-1, A-2, A-4	5-15	NP-5
	17-60	Unweathered bedrock			---	---

Table 6. Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Liquid limit	Plasticity index
			Unified	AASHTO		
	In.				Pct.	
MSF:						
Elting	0-3	Slightly decomposed plant material	PT	A-8	---	---
	3-11	Silt loam	ML	A-4	25-30	NP-5
	11-16	Very gravelly loamy coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
	16-60	Very gravelly loamy coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP
Basaltlake	0-4	Slightly decomposed plant material	PT	A-8	---	---
	4-6	Silt loam	OL, ML	A-4	25-30	NP-5
	6-9	Very gravelly sandy loam, very cobbly sandy loam	SC-SM, SM	A-4, A-2, A-1	5-15	NP-5
	9-60	Very gravelly sandy loam, very cobbly sandy loam	SC-SM, SM	A-4, A-2, A-1	5-15	NP-5
Sonderna	0-3	Slightly decomposed plant material	PT	A-8	---	---
	3-14	Very fine sandy loam, silt loam	OL, ML	A-4	25-30	NP-5
	14-21	Extremely cobbly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand	SP, GP, SP-SM	A-1	0-0	NP
	21-60	Extremely cobbly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand	SP, GP, SP-SM	A-1	0-0	NP
MSHP:						
Steps	0-5	Peat	PT	A-8	---	---
	5-8	Silt loam, mucky silt loam, mixed muck	OL	A-4	25-30	NP-5
	8-60	Permanently frozen very gravelly sandy loam, permanently frozen very gravelly loam, permanently frozen very cobbly loam			---	---
Basaltlake	0-4	Slightly decomposed plant material	PT	A-8	---	---
	4-6	Silt loam	OL, ML	A-4	25-30	NP-5
	6-9	Very gravelly sandy loam, very cobbly sandy loam	SC-SM, SM	A-4, A-2, A-1	5-15	NP-5
	9-60	Very gravelly sandy loam, very cobbly sandy loam	SC-SM, SM	A-4, A-2, A-1	5-15	NP-5
MSS:						
Frostcircle	0-5	Slightly decomposed plant material	PT	A-8	---	---
	5-11	Mucky silt loam, silt loam	ML, OL	A-4	25-30	NP-5
	11-60	Permanently frozen, mixed loam, permanently frozen gravelly loam, permanently frozen cobbly sandy loam			---	---
MST:						
Frostcircle	0-5	Slightly decomposed plant material	PT	A-8	---	---
	5-11	Mucky silt loam, silt loam	ML, OL	A-4	25-30	NP-5
	11-60	Permanently frozen, mixed loam, permanently frozen gravelly loam, permanently frozen cobbly sandy loam			---	---
Ogive	0-2	Slightly decomposed plant material	PT	A-8	---	---
	2-10	Mucky silt loam, silt loam	ML, OL	A-4	25-30	NP-5
	10-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam	GM, GC-GM	A-1, A-2	5-15	NP-5
OPB:						
Phalarope	0-4	Moderately decomposed plant material, slightly decomposed plant material	PT	A-8	---	---
	4-25	Very fine sandy loam, mucky silt loam, silt loam	ML	A-4	25-30	NP-5
	25-60	Very gravelly loamy coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	GP, GP-GM	A-1	0-0	NP

Table 6. Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Liquid limit	Plasticity index
			Unified	AASHTO		
	In.				Pct.	
RO:						
Rock outcrop-------	---	---	---	---	---	---
STA:						
Nizina----------	0-4	Slightly decomposed plant material	PT	A-8	---	---
	4-6	Silt loam	ML	A-4	25-30	NP-5
	6-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	GP, SP-SM, SP	A-1	0-0	NP
Nizina, rarely flooded----------	0-1	Slightly decomposed plant material	PT	A-8	---	---
	1-2	Silt loam	ML	A-4	25-30	NP-5
	2-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	GP, SP-SM, SP	A-1	0-0	NP
TPA:						
McCumberson-----	0-7	Slightly decomposed plant material, moderately decomposed plant material	PT	A-8	---	---
	7-12	Silt loam	ML	A-4	25-30	NP-5
	12-16	Loam, silt loam	ML	A-4	25-30	NP-5
	16-60	Very gravelly sandy loam, very gravelly loam, very cobbly sandy loam	GM, GC-GM	A-1, A-2	5-15	NP-5
Phelanna----------	0-2	Moderately decomposed plant material	PT	A-8	---	---
	2-19	Mucky silt loam, silt loam	OL, ML	A-4	25-30	NP-5
	19-60	Loam, gravelly loam, gravelly sandy loam	CL-ML, SC-SM. SM	A-1, A-4	5-15	NP-5
W:						
Water, fresh--------	---	---	---	---	---	---

Table 7. Engineering Sieve Data

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Fragments		Percentage passing sieve number--				Sand	Silt	Clay
			>10 inches	3-10 inches	4	10	40	200			
	In.		Pct.	Pct.					Pct.	Pct.	Pct.
AFA:											
Nizina, cool---------	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-3	Sandy loam	0	0	95-100	90-100	75-85	35-50	60-80	15-35	0-10
	3-60	Extremely gravelly coarse sand, extremely cobbly coarse sand, very cobbly loamy sand	0	0-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Sinona----------	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-6	Silt loam	0	0	100	100	95-100	70-90	15-35	55-75	0-10
	6-15	Very gravelly sandy loam, very cobbly sandy loam	0	0-35	65-95	20-50	20-45	15-45	55-80	10-35	0-15
	15-60	Extremely gravelly coarse sand, extremely cobbly coarse sand, very gravelly loamy sand	0	0-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Riverwash----------	---	---	---	---	---	---	---	---	---	---	
AFE:											
Nizina----------	0-4	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	4-6	Silt loam	0	0	95-100	95-100	80-95	55-75	15-35	55-75	0-10
	6-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	0	15-25	50-65	25-50	10-25	0-5	80-95	0-15	0-5
AFF:											
Schleyer----------	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-6	Silt loam	0	0-5	95-100	95-100	80-95	55-75	15-35	55-75	0-10
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
AFK:											
Skarland----------	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-5	Moderately decomposed plant material, stratified sand to silt	0	0	95-100	90-100	75-85	35-50	60-80	15-35	0-10
	5-60	Extremely gravelly coarse sand, extremely cobbly coarse sand, very gravelly loamy sand	0	0-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Schleyer----------	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-6	Silt loam	0	0-5	95-100	95-100	80-95	55-75	15-35	55-75	0-10
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5

Table 7. Engineering Sieve Data—Continued

Map symbol and soil name	Depth	USDA texture	Fragments		Percentage passing sieve number--				Sand	Silt	Clay
			>10 inches	3-10 inches	4	10	40	200			
	In.		Pct.	Pct.					Pct.	Pct.	Pct.
AFL:											
Schleyer	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-6	Silt loam	0	0-5	95-100	95-100	80-95	55-75	15-35	55-75	0-10
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
Broxson	0-8	Stratified sand to silt, silt loam	0	0	95-100	90-100	80-95	55-75	15-35	55-75	0-10
	8-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly loamy coarse sand	0	10-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Riverwash	---	---	---	---	---	---	---	---	---	---	
AFM:											
Osar	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-10	Mucky silt loam, silt loam	0	0	95-100	90-100	90-100	70-90	15-35	55-75	0-10
	10-21	Loam, gravelly loam, gravelly sandy loam	0	0-15	70-100	55-90	35-80	25-55	30-75	15-50	0-10
	21-60	Loam, gravelly loam, gravelly sandy loam	0	0-15	70-100	55-90	35-80	25-55	30-75	15-50	0-10
Klute	0-4	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	4-8	Fine sandy loam, silt loam	0	0	95-100	90-100	80-95	55-75	15-60	35-75	0-10
	8-21	Stratified sand to silt	0	0	95-100	90-100	80-90	30-50	60-85	15-35	0-10
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	0	10-25	50-65	25-50	10-25	0-5	80-95	0-15	0-5
AFN:											
Sonderna	0-3	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	3-14	Very fine sandy loam, silt loam	0	0	95-100	90-100	85-100	70-90	35-75	25-65	0-10
	14-21	Extremely cobbly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand	0	10-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
	21-60	Extremely cobbly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand	0	10-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
AFP:											
Basaltlake	0-4	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	4-6	Silt loam	0	0	95-100	95-100	95-100	70-90	15-45	55-75	0-10
	6-9	Very gravelly sandy loam, very cobbly sandy loam	0	10-60	65-95	20-50	20-45	15-45	50-80	10-40	0-15
	9-60	Very gravelly sandy loam, very cobbly sandy loam	0	10-60	65-95	20-50	20-45	15-45	50-80	10-40	0-15
BA:											
Riverwash	---	---	---	---	---	---	---	---	---	---	

Table 7. Engineering Sieve Data—Continued

Map symbol and soil name	Depth	USDA texture	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Sand	Silt	Clay
	In.		Pct.	Pct.					Pct.	Pct.	Pct.
BRA:											
Fields	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-9	Mucky silt loam, silt loam	0	0	100	100	95-100	70-90	15-35	55-75	0-10
	9-18	Gravelly loam, gravelly sandy loam, loam	0	0-15	60-100	60-95	35-75	15-55	40-75	20-50	0-20
	18-36	Very gravelly sandy loam, very cobbly sandy loam, very cobbly loam	0	0-30	65-95	20-50	20-45	15-45	45-75	15-45	5-15
	36-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---
ESA:											
Waitabit	0-3	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	3-6	Silt loam	0	0	98-100	95-100	90-100	70-90	15-45	55-75	0-10
	6-15	Gravelly loam, gravelly sandy loam, mixed loam	0	0-15	60-100	60-95	35-75	15-55	50-80	10-40	0-20
	15-60	Very cobbly sandy loam, very gravelly sandy loam, very gravelly loam	0	5-30	45-80	40-80	20-60	10-45	50-80	10-40	0-20
Ogive	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-10	Mucky silt loam, silt loam	0	0	90-100	90-100	90-100	70-90	15-35	55-75	0-10
	10-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam	0	10-30	50-70	35-60	20-45	15-35	45-75	15-50	0-10
ESB:											
Castnot	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-5	Silt loam	0	0	95-100	90-100	85-100	70-90	15-35	55-75	0-10
	5-18	Loam, gravelly loam, gravelly sandy loam, very cobbly sandy loam	0	0-15	70-95	55-90	35-80	25-55	50-80	10-40	0-20
	18-60	Very cobbly sandy loam, very gravelly loam, very gravelly sandy loam	0	5-50	50-70	35-60	20-45	15-35	45-80	10-40	0-20
Minya	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-3	Mucky silt loam, silt loam	0	0	95-100	95-100	90-100	70-90	15-35	55-75	0-10
	3-17	Very gravelly sandy loam, very cobbly loam	0-30	5-45	65-95	20-50	20-45	15-45	45-75	10-45	5-15
	17-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---	---	---	---	
EST:											
Petrokov	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-5	Silt loam	0	0-10	95-100	90-100	85-100	70-90	15-35	55-75	0-10
	5-23	Cobbly sandy loam, extremely cobbly coarse sand, very gravelly coarse sand	0	10-45	40-50	20-45	10-25	0-5	80-95	0-15	0-5
	23-60	Extremely gravelly coarse sand, very gravelly loamy coarse sand, extremely cobbly loamy coarse sand	0	10-45	40-50	20-45	10-25	0-5	80-95	0-15	0-5

Table 7. Engineering Sieve Data—Continued

Map symbol and soil name	Depth	USDA texture	Fragments		Percentage passing sieve number--				Sand	Silt	Clay
			>10 inches	3-10 inches	4	10	40	200			
	In.		Pct.	Pct.					Pct.	Pct.	Pct.
EST:											
Basaltlake	0-4	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	4-6	Silt loam	0	0	95-100	95-100	95-100	70-90	15-45	55-75	0-10
	6-9	Very gravelly sandy loam, very cobbly sandy loam	0	10-60	65-95	20-50	20-45	15-45	50-80	10-40	0-15
	9-60	Very gravelly sandy loam, very cobbly sandy loam	0	10-60	65-95	20-50	20-45	15-45	50-80	10-40	0-15
Castnot	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-5	Silt loam	0	0	95-100	90-100	85-100	70-90	15-35	55-75	0-10
	5-18	Loam, gravelly loam, gravelly sandy loam, very cobbly sandy loam	0	0-15	70-95	55-90	35-80	25-55	50-80	10-40	0-20
	18-60	Very cobbly sandy loam, very gravelly loam, very gravelly sandy loam	0	5-50	50-70	35-60	20-45	15-35	45-80	10-40	0-20
FPA:											
Swedna	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-5	Fine sandy loam	0	0	100	100	80-90	45-65	60-85	15-35	0-10
	5-29	Stratified sand to silt	0	0-10	95-100	90-100	80-90	30-50	60-85	15-35	0-10
	29-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	0-5	0-55	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Riverwash	---	---	---	---	---	---	---	---	---	---	
Dackey	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-5	Fine sandy loam	0	0	100	100	80-90	45-65	60-85	15-35	0-10
	5-28	Stratified sand to silt, stratified fine sand to silt	0	0-10	100	100	80-90	30-50	60-85	15-35	0-10
	28-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	0	0-55	50-65	25-50	10-25	0-5	80-95	0-15	0-5
FPA1:											
Broxson	0-8	Stratified sand to silt, silt loam	0	0	95-100	90-100	80-95	55-75	15-35	55-75	0-10
	8-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly loamy coarse sand	0	10-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
FPB:											
Dackey	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-5	Fine sandy loam	0	0	100	100	80-90	45-65	60-85	15-35	0-10
	5-28	Stratified sand to silt, stratified fine sand to silt	0	0-10	100	100	80-90	30-50	60-85	15-35	0-10
	28-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	0	0-55	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Tangoe	0-2	Sandy loam	0	0-5	95-100	90-100	75-85	35-50	60-85	15-35	0-10
	2-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly coarse sand	0	10-45	35-65	25-50	10-25	0-5	80-95	0-15	0-5

Table 7. Engineering Sieve Data—Continued

Map symbol and soil name	Depth	USDA texture	Fragments		Percentage passing sieve number--				Sand	Silt	Clay
			>10 inches	3-10 inches	4	10	40	200			
	In.		Pct.	Pct.					Pct.	Pct.	Pct.
FPB:											
Riverwash	---	---	---	---	---	---	---	---	---	---	
FPC:											
Dackey	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-5	Fine sandy loam	0	0	100	100	80-90	45-65	60-85	15-35	0-10
	5-28	Stratified sand to silt, stratified fine sand to silt	0	0-10	100	100	80-90	30-50	60-85	15-35	0-10
	28-60	Very gravelly coarse sand, extremely gravelly coarse sand,very cobbly loamy sand	0	0-55	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Tangoe	0-2	Sandy loam	0	0-5	95-100	90-100	75-85	35-50	60-85	15-35	0-10
	2-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly coarse sand	0	10-45	35-65	25-50	10-25	0-5	80-95	0-15	0-5
Riverwash	---	---	---	---	---	---	---	---	---	---	
FPD:											
Dackey	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-5	Fine sandy loam	0	0	100	100	80-90	45-65	60-85	15-35	0-10
	5-28	Stratified sand to silt, stratified fine sand to silt	0	0-10	100	100	80-90	30-50	60-85	15-35	0-10
	28-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	0	0-55	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Swedna	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-5	Fine sandy loam	0	0	100	100	80-90	45-65	60-85	15-35	0-10
	5-29	Stratified sand to silt	0	0-10	95-100	90-100	80-90	30-50	60-85	15-35	0-10
	29-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	0-5	0-55	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Tangoe	0-2	Sandy loam	0	0-5	95-100	90-100	75-85	35-50	60-85	15-35	0-10
	2-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly coarse sand	0	10-45	35-65	25-50	10-25	0-5	80-95	0-15	0-5
FPF:											
Broxson	0-8	Stratified sand to silt, silt loam	0	0	95-100	90-100	80-95	55-75	15-35	55-75	0-10
	8-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly loamy coarse sand	0	10-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Nizina, cool	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-3	Sandy loam	0	0	95-100	90-100	75-85	35-50	60-80	15-35	0-10
	3-60	Extremely gravelly coarse sand, extremely cobbly coarse sand, very cobbly loamy sand	0	0-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5

Table 7. Engineering Sieve Data—Continued

Map symbol and soil name	Depth	USDA texture	Fragments		Percentage passing sieve number--				Sand	Silt	Clay
			>10 inches	3-10 inches	4	10	40	200			
	In.		Pct.	Pct.					Pct.	Pct.	Pct.
FPG:											
Tangoe	0-2	Sandy loam	0	0-5	95-100	90-100	75-85	35-50	60-85	15-35	0-10
	2-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly coarse sand	0	10-45	35-65	25-50	10-25	0-5	80-95	0-15	0-5
Nizina, dry	0-2	Sandy loam	0	0-10	90-100	90-100	60-80	25-50	60-85	15-35	0-10
	2-60	Extremely gravelly coarse sand, very gravelly loamy sand, extremely cobbly coarse sand	0	10-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
GO1:											
Schleyer	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-6	Silt loam	0	0-5	95-100	95-100	80-95	55-75	15-35	55-75	0-10
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
Geist	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-5	Silt loam	0	0-5	95-100	90-100	85-100	70-85	15-35	55-75	0-10
	5-16	Fine sandy loam, sandy loam	0	0-15	90-100	85-100	50-80	25-55	60-80	15-35	0-10
	16-60	Loamy coarse sand, coarse sand, loamy fine sand, sand	0	0-15	90-100	85-100	60-80	15-25	80-95	0-15	0-5
GO2:											
Schleyer	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-6	Silt loam	0	0-5	95-100	95-100	80-95	55-75	15-35	55-75	0-10
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
Slana	0-3	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	3-5	Silt loam	0	0-10	95-100	90-100	85-100	70-90	15-35	55-75	0-10
	5-17	Extremely cobbly loamy coarse sand, very gravelly sandy loam, extremely cobbly sandy loam	0	10-55	50-70	35-60	20-45	15-35	55-80	10-40	0-10
	17-60	Extremely cobbly loamy coarse sand, very gravelly sandy loam, very cobbly sandy loam	0	15-55	50-70	35-60	20-45	15-35	55-80	10-40	0-10
Geist	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-5	Silt loam	0	0-5	95-100	90-100	85-100	70-85	15-35	55-75	0-10
	5-16	Fine sandy loam, sandy loam	0	0-15	90-100	85-100	50-80	25-55	60-80	15-35	0-10
	16-60	Loamy coarse sand, coarse sand, loamy fine sand, sand	0	0-15	90-100	85-100	60-80	15-25	80-95	0-15	0-5

Table 7. Engineering Sieve Data—Continued

Map symbol and soil name	Depth	USDA texture	Fragments		Percentage passing sieve number--				Sand	Silt	Clay
			>10 inches	3-10 inches	4	10	40	200			
	In.		Pct.	Pct.					Pct.	Pct.	Pct.
GO3:											
Schleyer	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-6	Silt loam	0	0-5	95-100	95-100	80-95	55-75	15-35	55-75	0-10
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
Turbellina	0-9	Peat	0	0	---	---	---	---	---	---	---
	9-14	Silt loam, mucky peat, mucky silt loam	0	0-5	95-100	90-100	80-95	55-75	15-35	55-75	0-10
	14-60	Permanently frozen silt loam	0	0-5	95-100	90-100	80-95	55-75	15-35	55-75	0-10
GO4:											
Kuswash	0-10	Peat	0	0	---	---	---	---	---	---	---
	10-13	Silt loam	0	0	100	95-100	80-95	55-75	15-35	55-75	0-10
	13-25	Stratified sand to silt	0	0-3	95-100	90-100	80-95	30-50	60-85	15-35	0-10
	25-60	Permanently frozen stratified fine sand to silt	0	0-3	95-100	90-100	80-95	55-75	60-85	15-35	0-10
Turbellina	0-9	Peat	0	0	---	---	---	---	---	---	---
	9-14	Silt loam, mucky peat, mucky silt loam	0	0-5	95-100	90-100	80-95	55-75	15-35	55-75	0-10
	14-60	Permanently frozen silt loam	0	0-5	95-100	90-100	80-95	55-75	15-35	55-75	0-10
Schleyer	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-6	Silt loam	0	0-5	95-100	95-100	80-95	55-75	15-35	55-75	0-10
	6-21	Very gravelly loamy sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
IM:											
Shand	0-38	Peat, muck	0	0	---	---	---	---	---	---	---
	38-60	Very gravelly loam, very gravelly sandy loam, very cobbly sandy loam	0	15-50	50-70	35-60	20-45	15-35	45-80	10-40	0-10
Bonot	0-7	Peat	0	0	---	---	---	---	---	---	---
	7-22	Permanently frozen mucky peat	0	0	---	---	---	---	---	---	---
	22-24	Permanently frozen silt loam	0	0-5	95-100	90-100	80-95	55-75	15-35	55-75	0-10
	24-60	Permanently frozen mucky peat	0	0	---	---	---	---	---	---	---
Fels	0-18	Slightly decomposed plant material, mucky peat	0	0	---	---	---	---	---	---	---
	18-41	Permanently frozen moderately decomposed plant material	---	---	---	---	---	---	---	---	---
	41-60	Permanently frozen water	---	---	---	---	---	---	---	---	---
L1:											
Owhat	0-10	Peat, mucky peat	0	0	---	---	---	---	---	---	---
	10-14	Silt loam	0	0-5	100	100	80-95	55-75	15-35	55-75	0-10
	14-60	Permanently frozen silt loam	0	0-5	100	100	80-95	55-75	15-35	55-75	0-10

Table 7. Engineering Sieve Data—Continued

Map symbol and soil name	Depth	USDA texture	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Sand	Silt	Clay
	In.		Pct.	Pct.					Pct.	Pct.	Pct.
MSB:											
Fields	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-9	Mucky silt loam, silt loam	0	0	100	100	95-100	70-90	15-35	55-75	0-10
	9-18	Gravelly loam, gravelly sandy loam, loam	0	0-15	60-100	60-95	35-75	15-55	40-75	20-50	0-20
	18-36	Very gravelly sandy loam, very cobbly sandy loam, very cobbly loam	0	0-30	65-95	20-50	20-45	15-45	45-75	15-45	5-15
	36-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---
Minya, cool	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-3	Mucky silt loam, silt loam	0	0	95-100	95-100	90-100	70-90	15-35	55-75	0-10
	3-17	Very gravelly sandy loam, very cobbly loam	0-30	5-45	65-95	20-50	20-45	15-45	45-75	10-45	5-15
	17-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---
Frostcircle	0-5	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	5-11	Mucky silt loam, silt loam	0	0-10	95-100	90-100	90-100	70-90	15-35	55-75	0-10
	11-60	Permanently frozen, mixed loam, permanently frozen gravelly loam, permanently frozen cobbly sandy loam	0	0-10	70-100	55-90	35-80	25-55	40-75	10-45	5-25
MSD:											
Frostcircle	0-5	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	5-11	Mucky silt loam, silt loam	0	0-10	95-100	90-100	90-100	70-90	15-35	55-75	0-10
	11-60	Permanently frozen, mixed loam,permanently frozen gravelly loam, permanently frozen cobbly sandy loam	0	0-10	70-100	55-90	35-80	25-55	40-75	10-45	5-25
Minya	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-3	Mucky silt loam, silt loam	0	0	95-100	95-100	90-100	70-90	15-35	55-75	0-10
	3-17	Very gravelly sandy loam, very cobbly loam	0-30	5-45	65-95	20-50	20-45	15-45	45-75	10-45	5-15
	17-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---
Minya, cool	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-3	Mucky silt loam, silt loam loam, very cobbly loam	0	0	95-100	95-100	90-100	70-90	15-35	55-75	0-10
	17-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---
MSF:											
Elting	0-3	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	3-11	Silt loam	0	0-5	100	95-100	80-95	55-75	15-35	55-75	0-10
	11-16	Very gravelly loamy coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5
	16-60	Very gravelly loamy coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-50	40-50	20-45	10-25	0-5	80-95	0-15	0-5

Table 7. Engineering Sieve Data—Continued

Map symbol and soil name	Depth	USDA texture	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Sand	Silt	Clay
	In.		Pct.	Pct.					Pct.	Pct.	Pct.
MSF:											
Basaltlake	0-4	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	4-6	Silt loam	0	0	95-100	95-100	95-100	70-90	15-45	55-75	0-10
	6-9	Very gravelly sandy loam, very cobbly sandy loam	0	10-60	65-95	20-50	20-45	15-45	50-80	10-40	0-15
	9-60	Very gravelly sandy loam, very cobbly sandy loam	0	10-60	65-95	20-50	20-45	15-45	50-80	10-40	0-15
Sonderna	0-3	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	3-14	Very fine sandy loam, silt loam	0	0	95-100	90-100	85-100	70-90	35-75	25-65	0-10
	14-21	Extremely cobbly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand	0	10-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
	21-60	Extremely cobbly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand	0	10-45	50-65	25-50	10-25	0-5	80-95	0-15	0-5
MSHP:											
Steps	0-5	Peat	0	0	---	---	---	---	---	---	---
	5-8	Silt loam, mucky silt loam, mixed muck	0	0	95-100	90-100	85-100	70-90	15-35	55-75	0-10
	8-60	Permanently frozen very gravelly sandy loam, permanently frozen very gravelly loam, permanently frozen very cobbly loam	0	10-30	50-70	35-60	20-45	15-35	45-75	15-50	0-10
Basaltlake	0-4	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	4-6	Silt loam	0	0	95-100	95-100	95-100	70-90	15-45	55-75	0-10
	6-9	Very gravelly sandy loam, very cobbly sandy loam	0	10-60	65-95	20-50	20-45	15-45	50-80	10-40	0-15
	9-60	Very gravelly sandy loam, very cobbly sandy loam	0	10-60	65-95	20-50	20-45	15-45	50-80	10-40	0-15
MSS:											
Frostcircle	0-5	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	5-11	Mucky silt loam, silt loam	0	0-10	95-100	90-100	90-100	70-90	15-35	55-75	0-10
	11-60	Permanently frozen, mixed loam, permanently frozen gravelly loam, permanently frozen cobbly sandy loam	0	0-10	70-100	55-90	35-80	25-55	40-75	10-45	5-25
MST:											
Frostcircle	0-5	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	5-11	Mucky silt loam, silt loam	0	0-10	95-100	90-100	90-100	70-90	15-35	55-75	0-10
	11-60	Permanently frozen, mixed loam, permanently frozen gravelly loam, permanently frozen cobbly sandy loam	0	0-10	70-100	55-90	35-80	25-55	40-75	10-45	5-25
Ogive	0-2	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	2-10	Mucky silt loam, silt loam	0	0	90-100	90-100	90-100	70-90	15-35	55-75	0-10
	10-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam	0	10-30	50-70	35-60	20-45	15-35	45-75	15-50	0-10

Table 7. Engineering Sieve Data—Continued

Map symbol and soil name	Depth	USDA texture	Fragments		Percentage passing sieve number--				Sand	Silt	Clay
			>10 inches	3-10 inches	4	10	40	200			
	In.		Pct.	Pct.					Pct.	Pct.	Pct.
OPB:											
Phalarope----------	0-4	Moderately decomposed plant material, slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	4-25	Very fine sandy loam, mucky silt loam, silt loam	0	0-5	100	95-100	80-95	55-75	15-65	35-75	0-10
	25-60	Very gravelly loamy coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand	0	15-45	40-50	20-45	10-25	0-5	80-95	0-15	0-5
RO:											
Rock outcrop-------	---	---	---	---	---	---	---	---	---	---	
STA:											
Nizina----------	0-4	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	4-6	Silt loam	0	0	95-100	95-100	80-95	55-75	15-35	55-75	0-10
	6-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	0	15-25	50-65	25-50	10-25	0-5	80-95	0-15	0-5
Nizina, rarely flooded----------	0-1	Slightly decomposed plant material	0	0	---	---	---	---	---	---	---
	1-2	Silt loam	0	0-5	100	90-100	80-95	55-75	15-35	55-75	0-10
	2-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly loamy sand	0	0-60	50-65	25-50	10-25	0-5	80-95	0-15	0-5
TPA:											
McCumberson-----	0-7	Slightly decomposed plant material, moderately decomposed plant material	0	0	---	---	---	---	---	---	---
	7-12	Silt loam	0	0	100	100	95-100	70-90	15-35	55-75	0-10
	12-16	Loam, silt loam	0	0-5	95-100	90-100	85-100	70-90	15-35	45-75	0-10
	16-60	Very gravelly sandy loam, very gravelly loam, very cobbly sandy loam	0	0-30	50-70	35-60	20-45	15-35	45-75	10-45	5-15
Phelanna----------	0-2	Moderately decomposed plant material	0	0	---	---	---	---	---	---	---
	2-19	Mucky silt loam, silt loam	0	0	95-100	90-100	85-100	70-90	15-35	55-75	0-10
	19-60	Loam, gravelly loam, gravelly sandy loam	0	0-15	70-100	55-90	35-80	25-55	40-75	10-45	5-20
W:											
Water, fresh--------	---	---	---	---	---	---	---	---	---	---	

Table 8. Physical Properties of the Soils

(See text for definitions of terms used in this table. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Moist bulk density	Permeability	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
							Kw	Kf	T		
	In.	g/cc	In/Hr	In/In	Pct.	Pct.					
AFA:											
Nizina, cool	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	3	86
	2-3	0.90-1.00	0.6-2	0.16-0.18	0.5-2.0	0.0-2.0	.32	.32			
	3-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-1.0	.02	.64			
Sinona	0-1	---	2-6	0.32-0.35	---	65-90	---	---	5	3	86
	1-6	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-10	.37	.37			
	6-15	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.4-4.0	.17	.32			
	15-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-1.0	.02	.64			
Riverwash	---	---	---	---	---	---	---	---	-	---	---
AFE:											
Nizina	0-4	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	4-6	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	6-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-1.0	.10	.64			
AFF:											
Schleyer	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-6	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	6-21	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.5-2.0	.02	.10			
	21-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.0	.02	.10			
AFK:											
Skarland	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	3	86
	2-5	0.90-1.00	0.6-2	0.16-0.18	0.5-2.0	0.0-2.0	.32	.32			
	5-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-1.0	.02	.64			
Schleyer	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-6	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	6-21	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.5-2.0	.02	.10			
	21-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.0	.02	.10			
AFL:											
Schleyer	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-6	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	6-21	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.5-2.0	.02	.10			
	21-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.0	.02	.10			
Broxson	0-8	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37	5	3	86
	8-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.5	.02	.64			
Riverwash	---	---	---	---	---	---	---	---	-	---	---
AFM:											
Osar	0-2	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	2-10	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	8.0-12	.37	.37			
	10-21	1.30-1.40	0.6-2	0.12-0.15	0.5-2.0	2.0-6.0	.28	.49			
	21-60	1.30-1.40	0.6-2	0.12-0.15	0.5-2.0	0.0-0.2	.28	.49			
Klute	0-4	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	4-8	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	8-21	1.10-1.30	0.6-2	0.10-0.15	0.5-2.0	1.0-3.0	.24	.24			
	21-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-1.0	.10	.64			

Table 8. Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Moist bulk density	Permeability	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
							Kw	Kf	T		
	In.	g/cc	In/Hr	In/In	Pct.	Pct.					
AFN:											
Sonderna	0-3	---	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	3-14	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-10	.37	.37			
	14-21	1.50-1.60	6-20	0.02-0.04	0.0-0.2	1.0-3.0	.10	.64			
	21-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-1.0	.10	.64			
AFP:											
Basaltlake	0-4	---	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	4-6	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-10	.37	.37			
	6-9	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.4-4.0	.17	.32			
	9-60	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.0-0.4	.17	.32			
BA:											
Riverwash	---	---	---	---	---	---	---	---	-	---	---
BRA:											
Fields	0-1	---	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	1-9	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-12	.37	.37			
	9-18	1.30-1.40	0.6-2	0.12-0.15	0.0-2.9	3.0-10	.28	.49			
	18-36	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.0-0.4	.17	.32			
	36-60	---	0.000-0.001	---	---	---	---	---			
ESA:											
Waitabit	0-3	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	3-6	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	3.0-6.0	.37	.37			
	6-15	1.30-1.40	0.6-2	0.12-0.15	0.0-2.9	0.2-1.0	.28	.49			
	15-60	1.50-1.70	0.6-2	0.09-0.12	0.5-2.0	0.0-1.0	.17	.49			
Ogive	0-2	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-10	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	6.0-12	.37	.37			
	10-60	1.50-1.70	0.6-2	0.09-0.12	0.5-2.0	0.2-1.0	.17	.49			
ESB:											
Castnot	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-5	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	3.0-6.0	.37	.37			
	5-18	1.30-1.40	0.6-2	0.12-0.15	0.5-2.0	0.5-2.0	.28	.49			
	18-60	1.50-1.70	0.6-2	0.09-0.12	0.5-2.0	0.0-0.0	.17	.49			
Minya	0-1	---	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	1-3	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-12	.37	.37			
	3-17	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.2-1.0	.17	.32			
	17-60	---	0.000-0.001	---	---	---	---	---			
Rock outcrop	---	---	---	---	---	---	---	---	-	---	---
EST:											
Petrokov	0-2	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	5	5	56
	2-5	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-10	.37	.37			
	5-23	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.5-2.0	.02	.10			
	23-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.0	.02	.10			
Basaltlake	0-4	---	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	4-6	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-10	.37	.37			
	6-9	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.4-4.0	.17	.32			
	9-60	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.0-0.4	.17	.32			
Castnot	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-5	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	3.0-6.0	.37	.37			
	5-18	1.30-1.40	0.6-2	0.12-0.15	0.5-2.0	0.5-2.0	.28	.49			
	18-60	1.50-1.70	0.6-2	0.09-0.12	0.5-2.0	0.0-0.0	.17	.49			

Table 8. Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Moist bulk density	Permeability	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
							Kw	Kf	T		
	In.	g/cc	In/Hr	In/In	Pct.	Pct.					
FPA:											
Swedna	0-1	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	3	86
	1-5	1.10-1.30	0.6-2	0.14-0.18	0.1-1.0	2.0-5.0	.32	.32			
	5-29	1.10-1.30	0.6-2	0.10-0.15	0.5-2.0	1.0-3.0	.24	.24			
	29-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.2	.10	.64			
Riverwash	---	---	---	---	---	---	---	---	-	---	---
Dackey	0-1	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	3	86
	1-5	1.10-1.30	0.6-2	0.14-0.18	0.1-1.0	2.0-5.0	.28	.28			
	5-28	1.10-1.30	0.6-2	0.10-0.15	0.5-2.0	1.0-3.0	.24	.24			
	28-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.2	.10	.64			
FPA1:											
Broxson	0-8	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37	5	3	86
	8-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.5	.02	.64			
FPB:											
Dackey	0-1	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	3	86
	1-5	1.10-1.30	0.6-2	0.14-0.18	0.1-1.0	2.0-5.0	.28	.28			
	5-28	1.10-1.30	0.6-2	0.10-0.15	0.5-2.0	1.0-3.0	.24	.24			
	28-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.2	.10	.64			
Tangoe	0-2	0.90-1.00	0.6-2	0.16-0.18	0.5-2.0	0.0-2.0	.28	.28	5	3	86
	2-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.5	.02	.64			
Riverwash	---	---	---	---	---	---	---	---	-	---	---
FPC:											
Dackey	0-1	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	3	86
	1-5	1.10-1.30	0.6-2	0.14-0.18	0.1-1.0	2.0-5.0	.28	.28			
	5-28	1.10-1.30	0.6-2	0.10-0.15	0.5-2.0	1.0-3.0	.24	.24			
	28-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.2	.10	.64			
Tangoe	0-2	0.90-1.00	0.6-2	0.16-0.18	0.5-2.0	0.0-2.0	.28	.28	5	3	86
	2-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.5	.02	.64			
Riverwash	---	---	---	---	---	---	---	---	-	---	---
FPD:											
Dackey	0-1	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	3	86
	1-5	1.10-1.30	0.6-2	0.14-0.18	0.1-1.0	2.0-5.0	.28	.28			
	5-28	1.10-1.30	0.6-2	0.10-0.15	0.5-2.0	1.0-3.0	.24	.24			
	28-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.2	.10	.64			
Swedna	0-1	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	3	86
	1-5	1.10-1.30	0.6-2	0.14-0.18	0.1-1.0	2.0-5.0	.32	.32			
	5-29	1.10-1.30	0.6-2	0.10-0.15	0.5-2.0	1.0-3.0	.24	.24			
	29-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.2	.10	.64			
Tangoe	0-2	0.90-1.00	0.6-2	0.16-0.18	0.5-2.0	0.0-2.0	.28	.28	5	3	86
	2-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.5	.02	.64			
FPF:											
Broxson	0-8	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37	5	3	86
	8-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.5	.02	.64			
Nizina, cool	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	3	86
	2-3	0.90-1.00	0.6-2	0.16-0.18	0.5-2.0	0.0-2.0	.32	.32			
	3-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-1.0	.02	.64			

Table 8. Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Moist bulk density	Permeability	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
							Kw	Kf	T		
	In.	g/cc	In/Hr	In/In	Pct.	Pct.					
FPG:											
Tangoe	0-2	0.90-1.00	0.6-2	0.16-0.18	0.5-2.0	0.0-2.0	.28	.28	5	3	86
	2-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.5	.02	.64			
Nizina, dry	0-2	0.90-1.00	0.6-2	0.16-0.18	0.5-2.0	0.0-2.0	.32	.32	5	3	86
	2-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.5	.02	.64			
GO1:											
Schleyer	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-6	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	6-21	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.5-2.0	.02	.10			
	21-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.0	.02	.10			
Geist	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-5	0.95-1.15	0.6-2	0.21-0.23	0.5-3.0	3.0-5.0	.37	.37			
	5-16	1.25-1.35	2-6	0.14-0.16	0.5-2.0	0.5-2.0	.24	.24			
	16-60	1.40-1.55	6-20	0.06-0.08	0.0-2.9	0.0-0.0	.10	.10			
GO2:											
Schleyer	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-6	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	6-21	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.5-2.0	.02	.10			
	21-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.0	.02	.10			
Slana	0-3	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	3-5	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	3.0-6.0	.37	.37			
	5-17	1.30-1.40	0.6-2	0.12-0.15	0.5-2.0	0.5-2.0	.28	.49			
	17-60	1.50-1.70	0.6-2	0.09-0.12	0.5-2.0	0.0-0.0	.17	.49			
Geist	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-5	0.95-1.15	0.6-2	0.21-0.23	0.5-3.0	3.0-5.0	.37	.37			
	5-16	1.25-1.35	2-6	0.14-0.16	0.5-2.0	0.5-2.0	.24	.24			
	16-60	1.40-1.55	6-20	0.06-0.08	0.0-2.9	0.0-0.0	.10	.10			
GO3:											
Schleyer	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-6	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	6-21	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.5-2.0	.02	.10			
	21-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.0	.02	.10			
Turbellina	0-9	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	1	8	0
	9-14	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	6.0-12	.37	.37			
	14-60	---	0.000-0.000	---	0.5-3.0	0.0-0.4	---	---			
GO4:											
Kuswash	0-10	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	1	8	0
	10-13	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-6.0	.37	.37			
	13-25	1.10-1.30	0.6-2	0.10-0.15	0.5-2.0	0.2-0.8	.24	.24			
	25-60	---	0.000-0.01	---	0.5-2.0	0.2-0.8	---	---			
Turbellina	0-9	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	1	8	0
	9-14	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	6.0-12	.37	.37			
	14-60	---	0.000-0.000	---	0.5-3.0	0.0-0.4	---	---			
Schleyer	0-2	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-6	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	6-21	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.5-2.0	.02	.10			
	21-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.0	.02	.10			

Table 8. Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Moist bulk density	Permeability	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
							Kw	Kf	T		
	In.	g/cc	In/Hr	In/In	Pct.	Pct.					
IM:											
Shand	0-38	0.08-0.14	2-6	0.32-0.35	---	65-90	---	---	5	8	0
	38-60	1.30-1.40	0.6-2	0.12-0.15	0.5-2.0	0.5-2.0	.28	.49			
Bonot	0-7	0.05-0.20	2-6	0.30-0.35	0.0-2.9	65-90	---	---	2	8	0
	7-22	---	0.000-0.000	---	---	65-90	---	---			
	22-24	---	0.000-0.000	---	0.5-3.0	2.0-4.0	.37	.37			
	24-60	---	0.000-0.000	---	---	65-90	---	---			
Fels	0-18	0.05-0.20	2-6	0.32-0.35	0.0-2.9	65-90	---	---	2	8	0
	18-41	---	0.000-0.001	---	---	65-90	---	---			
	41-60	---	0.000-0.001	---	---	---	---	---			
L1:											
Owhat	0-10	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	1	8	0
	10-14	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	14-60	---	0.000-0.000	---	0.5-3.0	2.0-4.0	.37	.37			
MSB:											
Fields	0-1	---	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	1-9	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-12	.37	.37			
	9-18	1.30-1.40	0.6-2	0.12-0.15	0.0-2.9	3.0-10	.28	.49			
	18-36	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.0-0.4	.17	.32			
	36-60	---	0.000-0.001	---	---	---	---	---			
Minya, cool	0-1	---	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	1-3	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-12	.37	.37			
	3-17	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.2-1.0	.17	.32			
	17-60	---	0.000-0.001	---	---	---	---	---			
Frostcircle	0-5	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	5-11	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	8.0-12	.37	.37			
	11-60	---	0.000-0.01	---	---	0.0-0.2	---	---			
MSD:											
Frostcircle	0-5	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	5-11	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	8.0-12	.37	.37			
	11-60	---	0.000-0.01	---	---	0.0-0.2	---	---			
Minya	0-1	---	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	1-3	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-12	.37	.37			
	3-17	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.2-1.0	.17	.32			
	17-60	---	0.000-0.001	---	---	---	---	---			
Minya, cool	0-1	---	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	1-3	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-12	.37	.37			
	3-17	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.2-1.0	.17	.32			
	17-60	---	0.000-0.001	---	---	---	---	---			
MSF:											
Elting	0-3	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	3-11	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	11-16	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.2-1.0	.02	.10			
	16-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.0	.02	.10			
Basaltlake	0-4	---	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	4-6	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-10	.37	.37			
	6-9	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.4-4.0	.17	.32			
	9-60	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.0-0.4	.17	.32			

Table 8. Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Moist bulk density	Permeability	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
							Kw	Kf	T		
	In.	g/cc	In/Hr	In/In	Pct.	Pct.					
MSF:											
Sonderna	0-3	---	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	3-14	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-10	.37	.37			
	14-21	1.50-1.60	6-20	0.02-0.04	0.0-0.2	1.0-3.0	.10	.64			
	21-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-1.0	.10	.64			
MSHP:											
Steps	0-5	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	1	8	0
	5-8	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	12-60	.37	.37			
	8-60	1.50-1.70	0.000-0.000	---	0.5-2.0	0.0-0.2	.17	.49			
Basaltlake	0-4	---	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	4-6	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-10	.37	.37			
	6-9	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.4-4.0	.17	.32			
	9-60	1.50-1.60	0.6-2	0.12-0.14	0.5-2.0	0.0-0.4	.17	.32			
MSS:											
Frostcircle	0-5	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	5-11	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	8.0-12	.37	.37			
	11-60	---	0.000-0.01	---	---	0.0-0.2	---	---			
MST:											
Frostcircle	0-5	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	5-11	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	8.0-12	.37	.37			
	11-60	---	0.000-0.01	---	---	0.0-0.2	---	---			
Ogive	0-2	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	2-10	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	6.0-12	.37	.37			
	10-60	1.50-1.70	0.6-2	0.09-0.12	0.5-2.0	0.2-1.0	.17	.49			
OPB:											
Phalarope	0-4	---	2-6	0.32-0.35	---	65-90	---	---	2	1	160
	4-25	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-12	.37	.37			
	25-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-0.0	.02	.10			
RO:											
Rock outcrop	---	---	---	---	---	---	---	---	-	---	---
STA:											
Nizina	0-4	---	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	4-6	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	6-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-1.0	.10	.64			
Nizina, rarely flooded	0-1	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	5	1	160
	1-2	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	2-60	1.50-1.60	6-20	0.02-0.04	0.0-0.2	0.0-1.0	.10	.64			
TPA:											
McCumberson	0-7	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	7-12	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	4.0-8.0	.37	.37			
	12-16	0.95-1.15	0.6-2	0.17-0.20	0.5-3.0	2.0-4.0	.37	.37			
	16-60	1.50-1.70	0.6-2	0.09-0.12	0.5-2.0	0.0-0.2	.17	.49			
Phelanna	0-2	0.05-0.15	2-6	0.32-0.35	---	65-90	---	---	1	1	160
	2-19	0.90-1.15	0.6-2	0.17-0.20	0.5-3.0	8.0-12	.37	.37			
	19-60	1.30-1.40	0.6-2	0.12-0.15	0.5-2.0	0.0-0.2	.28	.49			
W:											
Water, fresh	---	---	---	---	---	---	---	---	-	---	---

Table 9. Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction
	In.	meq/100 g	meq/100 g	pH
AFA:				
Nizina, cool	0-2	60-95	---	5.2-7.0
	2-3	12-20	---	5.2-7.4
	3-60	1-4	---	5.8-7.6
Sinona	0-1	---	60-95	4.2-6.2
	1-6	---	10-20	3.9-5.4
	6-15	---	4-10	4.8-6.1
	15-60	1-4	---	5.6-6.7
Riverwash	---	---	---	---
AFE:				
Nizina	0-4	---	20-40	4.5-5.6
	4-6	---	10-20	4.8-5.6
	6-60	1-4	---	5.8-6.6
AFF:				
Schleyer	0-2	---	20-40	3.4-4.6
	2-6	---	10-20	3.8-5.5
	6-21	---	1-3	4.6-5.8
	21-60	1-4	---	5.2-6.0
AFK:				
Skarland	0-2	---	20-40	4.5-6.2
	2-5	---	8-15	5.2-7.4
	5-60	1-4	---	5.8-7.6
Schleyer	0-2	---	20-40	3.4-4.6
	2-6	---	10-20	3.8-5.5
	6-21	---	1-3	4.6-5.8
	21-60	1-4	---	5.2-6.0
AFL:				
Schleyer	0-2	---	20-40	3.4-4.6
	2-6	---	10-20	3.8-5.5
	6-21	---	1-3	4.6-5.8
	21-60	1-4	---	5.2-6.0
Broxson	0-8	12-20	---	5.2-7.4
	8-60	1-4	---	5.8-7.6
Riverwash	---	---	---	---
AFM:				
Osar	0-2	---	20-40	4.8-5.2
	2-10	---	10-20	5.0-5.9
	10-21	---	4-12	5.3-6.0
	21-60	4-10	---	5.3-6.0
Klute	0-4	---	20-40	4.2-5.0
	4-8	---	10-20	4.8-5.4
	8-21	12-20	---	5.4-6.0
	21-60	1-4	---	5.8-7.0

Table 9. Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction
	In.	meq/100 g	meq/100 g	pH
AFN:				
Sonderna	0-3	---	20-40	3.8-5.3
	3-14	12-20	---	4.1-5.7
	14-21	6-12	---	5.2-6.8
	21-60	1-4	---	5.8-7.6
AFP:				
Basaltlake	0-4	---	60-80	4.2-4.7
	4-6	---	10-20	4.4-5.0
	6-9	4-10	---	5.4-6.1
	9-60	4-10	---	5.7-7.0
BA:				
Riverwash	---	---	---	---
BRA:				
Fields	0-1	---	20-40	3.4-4.6
	1-9	---	10-20	4.5-5.5
	9-18	---	4-8	5.1-6.5
	18-36	4-10	---	5.1-6.5
	36-60	---	---	---
ESA:				
Waitabit	0-3	---	20-40	4.6-5.2
	3-6	---	10-20	5.0-5.6
	6-15	4-10	---	5.0-6.0
	15-60	4-10	---	5.6-6.2
Ogive	0-2	---	20-40	4.7-6.0
	2-10	---	10-20	4.8-5.7
	10-60	1-4	---	5.2-6.2
ESB:				
Castnot	0-2	---	20-40	3.4-4.6
	2-5	---	10-20	3.5-5.5
	5-18	---	4-8	4.2-5.5
	18-60	---	4-8	4.5-5.5
Minya	0-1	---	20-40	3.6-4.4
	1-3	---	10-20	3.9-4.8
	3-17	---	4-12	5.0-5.6
	17-60	---	---	---
Rock outcrop	---	---	---	---
EST:				
Petrokov	0-2	---	20-40	4.5-5.0
	2-5	---	10-20	4.9-5.6
	5-23	---	1-3	4.6-5.8
	23-60	1-4	---	5.2-6.0
Basaltlake	0-4	---	60-80	4.2-4.7
	4-6	---	10-20	4.4-5.0
	6-9	4-10	---	5.4-6.1
	9-60	4-10	---	5.7-7.0
Castnot	0-2	---	20-40	3.4-4.6
	2-5	---	10-20	3.5-5.5
	5-18	---	4-8	4.2-5.5
	18-60	---	4-8	4.5-5.5

Table 9. Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction
	In.	meq/100 g	meq/100 g	pH
FPA:				
Swedna	0-1	60-95	---	5.7-6.8
	1-5	12-20	---	5.8-6.6
	5-29	8-14	---	6.0-6.2
	29-60	1-4	---	6.1-6.8
Riverwash	---	---	---	---
Dackey	0-1	60-95	---	5.7-6.8
	1-5	12-20	---	5.8-6.6
	5-28	12-20	---	6.0-6.2
	28-60	1-4	---	6.1-6.8
FPA1:				
Broxson	0-8	12-20	---	5.2-7.4
	8-60	1-4	---	5.8-7.6
FPB:				
Dackey	0-1	60-95	---	5.7-6.8
	1-5	12-20	---	5.8-6.6
	5-28	12-20	---	6.0-6.2
	28-60	1-4	---	6.1-6.8
Tangoe	0-2	12-20	---	5.2-7.4
	2-60	1-4	---	5.8-7.6
Riverwash	---	---	---	---
FPC:				
Dackey	0-1	60-95	---	5.7-6.8
	1-5	12-20	---	5.8-6.6
	5-28	12-20	---	6.0-6.2
	28-60	1-4	---	6.1-6.8
Tangoe	0-2	12-20	---	5.2-7.4
	2-60	1-4	---	5.8-7.6
Riverwash	---	---	---	---
FPD:				
Dackey	0-1	60-95	---	5.7-6.8
	1-5	12-20	---	5.8-6.6
	5-28	12-20	---	6.0-6.2
	28-60	1-4	---	6.1-6.8
Swedna	0-1	60-95	---	5.7-6.8
	1-5	12-20	---	5.8-6.6
	5-29	8-14	---	6.0-6.2
	29-60	1-4	---	6.1-6.8
Tangoe	0-2	12-20	---	5.2-7.4
	2-60	1-4	---	5.8-7.6
FPF:				
Broxson	0-8	12-20	---	5.2-7.4
	8-60	1-4	---	5.8-7.6
Nizina, cool	0-2	60-95	---	5.2-7.0
	2-3	12-20	---	5.2-7.4
	3-60	1-4	---	5.8-7.6

Table 9. Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction
	In.	meq/100 g	meq/100 g	pH
FPG:				
Tangoe	0-2	12-20	---	5.2-7.4
	2-60	1-4	---	5.8-7.6
Nizina, dry	0-2	12-20	---	6.6-7.6
	2-60	1-4	---	7.4-8.4
GO1:				
Schleyer	0-2	---	20-40	3.4-4.6
	2-6	---	10-20	3.8-5.5
	6-21	---	1-3	4.6-5.8
	21-60	1-4	---	5.2-6.0
Geist	0-2	---	20-40	3.4-4.6
	2-5	---	10-20	3.8-5.5
	5-16	1-4	---	4.8-5.8
	16-60	1-4	---	5.4-6.2
GO2:				
Schleyer	0-2	---	20-40	3.4-4.6
	2-6	---	10-20	3.8-5.5
	6-21	---	1-3	4.6-5.8
	21-60	1-4	---	5.2-6.0
Slana	0-3	---	20-40	4.2-4.8
	3-5	---	10-20	4.5-5.5
	5-17	4-10	---	5.1-6.0
	17-60	4-10	---	5.6-6.5
Geist	0-2	---	20-40	3.4-4.6
	2-5	---	10-20	3.8-5.5
	5-16	1-4	---	4.8-5.8
	16-60	1-4	---	5.4-6.2
GO3:				
Schleyer	0-2	---	20-40	3.4-4.6
	2-6	---	10-20	3.8-5.5
	6-21	---	1-3	4.6-5.8
	21-60	1-4	---	5.2-6.0
Turbellina	0-9	---	20-40	3.2-5.4
	9-14	---	10-20	4.2-5.5
	14-60	---	---	4.2-5.5
GO4:				
Kuswash	0-10	---	20-40	3.7-5.6
	10-13	---	10-20	4.1-4.5
	13-25	---	8-15	4.6-5.8
	25-60	---	---	4.6-5.8
Turbellina	0-9	---	20-40	3.2-5.4
	9-14	---	10-20	4.2-5.5
	14-60	---	---	4.2-5.5
Schleyer	0-2	---	20-40	3.4-4.6
	2-6	---	10-20	3.8-5.5
	6-21	---	1-3	4.6-5.8
	21-60	1-4	---	5.2-6.0

Table 9. Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction
	In.	meq/100 g	meq/100 g	pH
IM:				
Shand	0-38	60-90	---	5.5-6.5
	38-60	4-10	---	6.3-6.6
Bonot	0-7	---	20-40	3.5-5.0
	7-22	---	---	3.5-5.0
	22-24	---	---	4.5-5.0
	24-60	---	---	3.7-5.1
Fels	0-18	---	20-40	4.0-4.4
	18-41	---	---	4.0-4.8
	41-60	---	---	---
L1:				
Owhat	0-10	---	20-40	4.9-5.4
	10-14	---	10-20	5.1-5.8
	14-60	---	---	5.1-5.9
MSB:				
Fields	0-1	---	20-40	3.4-4.6
	1-9	---	10-20	4.5-5.5
	9-18	---	4-8	5.1-6.5
	18-36	4-10	---	5.1-6.5
	36-60	---	---	---
Minya, cool	0-1	---	20-40	3.6-4.4
	1-3	---	10-20	3.9-4.8
	3-17	---	4-12	5.0-5.6
	17-60	---	---	---
Frostcircle	0-5	---	20-40	4.5-6.2
	5-11	---	10-20	5.2-6.3
	11-60	---	---	5.4-6.2
MSD:				
Frostcircle	0-5	---	20-40	4.5-6.2
	5-11	---	10-20	5.2-6.3
	11-60	---	---	5.4-6.2
Minya	0-1	---	20-40	3.6-4.4
	1-3	---	10-20	3.9-4.8
	3-17	---	4-12	5.0-5.6
	17-60	---	---	---
Minya, cool	0-1	---	20-40	3.6-4.4
	1-3	---	10-20	3.9-4.8
	3-17	---	4-12	5.0-5.6
	17-60	---	---	---
MSF:				
Elting	0-3	---	20-40	3.0-4.2
	3-11	---	10-20	3.6-5.0
	11-16	---	1-4	4.6-5.4
	16-60	---	1-4	5.0-5.9
Basaltlake	0-4	---	60-80	4.2-4.7
	4-6	---	10-20	4.4-5.0
	6-9	4-10	---	5.4-6.1
	9-60	4-10	---	5.7-7.0

Table 9. Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction
	In.	meq/100 g	meq/100 g	pH
MSF:				
Sonderna	0-3	---	20-40	3.8-5.3
	3-14	12-20	---	4.1-5.7
	14-21	6-12	---	5.2-6.8
	21-60	1-4	---	5.8-7.6
MSHP:				
Steps	0-5	---	20-40	4.5-6.2
	5-8	---	10-20	5.2-6.3
	8-60	1-4	---	5.4-6.2
Basaltlake	0-4	---	60-80	4.2-4.7
	4-6	---	10-20	4.4-5.0
	6-9	4-10	---	5.4-6.1
	9-60	4-10	---	5.7-7.0
MSS:				
Frostcircle	0-5	---	20-40	4.5-6.2
	5-11	---	10-20	5.2-6.3
	11-60	---	---	5.4-6.2
MST:				
Frostcircle	0-5	---	20-40	4.5-6.2
	5-11	---	10-20	5.2-6.3
	11-60	---	---	5.4-6.2
Ogive	0-2	---	20-40	4.7-6.0
	2-10	---	10-20	4.8-5.7
	10-60	1-4	---	5.2-6.2
OPB:				
Phalarope	0-4	---	20-60	4.0-4.8
	4-25	---	10-20	4.5-5.5
	25-60	1-4	---	5.6-6.0
RO:				
Rock outcrop	---	---	---	---
STA:				
Nizina	0-4	---	20-40	4.5-5.6
	4-6	---	10-20	4.8-5.6
	6-60	1-4	---	5.8-6.6
Nizina, rarely flooded	0-1	---	20-40	5.0-5.4
	1-2	---	10-20	4.8-5.6
	2-60	1-4	---	6.0-7.6
TPA:				
McCumberson	0-7	---	20-40	3.3-4.8
	7-12	---	10-20	3.8-5.4
	12-16	---	8-15	5.0-5.6
	16-60	4-10	---	5.5-6.0
Phelanna	0-2	---	20-40	5.2-6.2
	2-19	16-24	---	5.2-6.3
	19-60	4-12	---	5.1-6.2
W:				
Water, fresh	---	---	---	---

Table 10. Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
		In.		In.	In.			
AFA:								
Nizina, cool	Strongly contrasting textural stratification	2-7	Noncemented	---	---	Low	Moderate	Moderate
Sinona	Strongly contrasting textural stratification	6-8	Noncemented	0	0	Low	Moderate	Moderate
Riverwash	none	---	---	---	---	---	---	---
AFE:								
Nizina	Strongly contrasting textural stratification	3-11	Noncemented	---	---	Low	Moderate	Low
AFF:								
Schleyer	Strongly contrasting textural stratification	2-11	Noncemented	0	0	Low	High	High
AFK:								
Skarland	Strongly contrasting textural stratification	2-7	Noncemented	0	0	Low	Moderate	Moderate
Schleyer	Strongly contrasting textural stratification	2-11	Noncemented	0	0	Low	High	High
AFL:								
Schleyer	Strongly contrasting textural stratification	2-11	Noncemented	0	0	Low	High	High
Broxson	Strongly contrasting textural stratification	1-9	Noncemented	0	0	Moderate	Moderate	Moderate
Riverwash	none	---	---	---	---	---	---	---
AFM:								
Osar	Strongly contrasting textural stratification	8-17	Noncemented	0	0	High	High	High
Klute	Strongly contrasting textural stratification	16-41	Noncemented	0	---	Moderate	Moderate	Low
AFN:								
Sonderna	Strongly contrasting textural stratification	5-14	Noncemented	0	0	Moderate	Moderate	Moderate
AFP:								
Basaltlake	Strongly contrasting textural stratification	2-10	Noncemented	---	---	Moderate	Moderate	Moderate
BA:								
Riverwash	none	---	---	---	---	---	---	---
BRA:								
Fields	Strongly contrasting textural stratification	4-11	Noncemented	0	---	Moderate	Moderate	Moderate
	Bedrock (lithic)	22-39	Strongly cemented					

Table 10. Soil Features—Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
		In.		In.	In.			
ESA:								
Waitabit	Strongly contrasting textural stratification	0-6	Noncemented	0	0	Moderate	High	High
Ogive	Strongly contrasting textural stratification	6-17	Noncemented	0	0	Moderate	High	High
ESB:								
Castnot	Strongly contrasting textural stratification	2-7	Noncemented	0	0	Moderate	High	High
Minya	Strongly contrasting textural stratification	2-3	Noncemented	0	0	Moderate	Moderate	Moderate
	Bedrock (lithic)	10-19	Strongly cemented					
Rock outcrop	none	---	---	---	---	---	---	---
EST:								
Petrokov	Strongly contrasting textural stratification	2-6	Noncemented	0	0	Low	High	High
Basaltlake	Strongly contrasting textural stratification	2-10	Noncemented	---	---	Moderate	Moderate	Moderate
Castnot	Strongly contrasting textural stratification	2-7	Noncemented	0	0	Moderate	High	High
FPA:								
Swedna	Strongly contrasting textural stratification	15-60	Noncemented	---	---	High	Moderate	Low
Riverwash	none	---	---	---	---	---	---	---
Dackey	Strongly contrasting textural stratification	15-60	Noncemented	0	0	High	Moderate	Low
FPA1:								
Broxson	Strongly contrasting textural stratification	1-9	Noncemented	0	0	Moderate	Moderate	Moderate
FPB:								
Dackey	Strongly contrasting textural stratification	15-60	Noncemented	0	0	High	Moderate	Low
Tangoe	Strongly contrasting textural stratification	1-2	Noncemented	0	0	Moderate	Moderate	Moderate
Riverwash	none	---	---	---	---	---	---	---
FPC:								
Dackey	Strongly contrasting textural stratification	15-60	Noncemented	0	0	High	Moderate	Low
Tangoe	Strongly contrasting textural stratification	1-2	Noncemented	0	0	Moderate	Moderate	Moderate
Riverwash	none	---	---	---	---	---	---	---

Table 10. Soil Features—Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
		In.		In.	In.			
FPD:								
Dackey	Strongly contrasting textural stratification	15-60	Noncemented	0	0	High	Moderate	Low
Swedna	Strongly contrasting textural stratification	15-60	Noncemented	---	---	High	Moderate	Low
Tangoe	Strongly contrasting textural stratification	1-2	Noncemented	0	0	Moderate	Moderate	Moderate
FPF:								
Broxson	Strongly contrasting textural stratification	1-9	Noncemented	0	0	Moderate	Moderate	Moderate
Nizina, cool	Strongly contrasting textural stratification	2-7	Noncemented	---	---	Low	Moderate	Moderate
FPG:								
Tangoe	Strongly contrasting textural stratification	1-2	Noncemented	0	0	Moderate	Moderate	Moderate
Nizina, dry	Strongly contrasting textural stratification	1-2	Noncemented	---	---	Low	Moderate	Moderate
GO1:								
Schleyer	Strongly contrasting textural stratification	2-11	Noncemented	0	0	Low	High	High
Geist	Strongly contrasting textural stratification	3-5	Noncemented	0	0	Low	Moderate	Moderate
GO2:								
Schleyer	Strongly contrasting textural stratification	2-11	Noncemented	0	0	Low	High	High
Slana	Strongly contrasting textural stratification	2-6	Noncemented	---	---	Moderate	High	High
Geist	Strongly contrasting textural stratification	3-5	Noncemented	0	0	Low	Moderate	Moderate
GO3:								
Schleyer	Strongly contrasting textural stratification	2-11	Noncemented	0	0	Low	High	High
Turbellina	Permafrost	14-25	Strongly cemented	16-33	24-47	High	High	Moderate
GO4:								
Kuswash	Permafrost	20-31	Strongly cemented	16-33	24-47	High	High	Moderate
Turbellina	Permafrost	14-25	Strongly cemented	16-33	24-47	High	High	Moderate
Schleyer	Strongly contrasting textural stratification	2-11	Noncemented	0	0	Low	High	High

Table 10. Soil Features—Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
		In.		In.	In.			
IM:								
Shand	Strongly contrasting textural stratification	38-52	Noncemented	24-35	35-51	High	High	High
Bonot	Permafrost	6-13	Strongly cemented	28-59	39-59	High	High	High
Fels	Permafrost	16-20	Strongly cemented	28-59	39-59	High	High	High
L1:								
Owhat	Permafrost	11-14	Strongly cemented	16-33	24-47	High	High	Moderate
MSB:								
Fields	Strongly contrasting textural stratification	4-11	Noncemented	0	---	Moderate	Moderate	Moderate
	Bedrock (lithic)	22-39	Strongly cemented					
Minya, cool	Strongly contrasting textural stratification	2-3	Noncemented	0	0	Moderate	Moderate	Moderate
	Bedrock (lithic)	10-19	Strongly cemented					
Frostcircle	Permafrost	8-60	Strongly cemented	24-41	35-59	High	High	High
MSD:								
Frostcircle	Permafrost	8-60	Strongly cemented	24-41	35-59	High	High	High
Minya	Strongly contrasting textural stratification	2-3	Noncemented	0	0	Moderate	Moderate	Moderate
	Bedrock (lithic)	10-19	Strongly cemented					
Minya, cool	Strongly contrasting textural stratification	2-3	Noncemented	0	0	Moderate	Moderate	Moderate
	Bedrock (lithic)	10-19	Strongly cemented					
MSF:								
Elting	Strongly contrasting textural stratification	11-23	Noncemented	---	---	High	High	High
Basaltlake	Strongly contrasting textural stratification	2-10	Noncemented	---	---	Moderate	Moderate	Moderate
Sonderna	Strongly contrasting textural stratification	5-14	Noncemented	0	0	Moderate	Moderate	Moderate
MSHP:								
Steps	Permafrost	2-17	Strongly cemented	16-33	24-47	High	High	High
Basaltlake	Strongly contrasting textural stratification	2-10	Noncemented	---	---	Moderate	Moderate	Moderate
MSS:								
Frostcircle	Permafrost	8-60	Strongly cemented	24-41	35-59	High	High	High
MST:								
Frostcircle	Permafrost	8-60	Strongly cemented	24-41	35-59	High	High	High
Ogive	Strongly contrasting textural stratification	6-17	Noncemented	0	0	Moderate	High	High

Table 10. Soil Features—Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
		In.		In.	In.			
OPB:								
Phalarope	Strongly contrasting textural stratification	12-36	Noncemented	0	0	Moderate	High	High
RO:								
Rock outcrop	none	---	---	---	---	---	---	---
STA:								
Nizina	Strongly contrasting textural stratification	3-11	Noncemented	---	---	Low	Moderate	Low
Nizina, rarely flooded	Strongly contrasting textural stratification	2-6	Noncemented	---	---	Low	Moderate	Low
TPA:								
McCumberson	Strongly contrasting textural stratification	9-19	Noncemented	0	0	Moderate	High	High
Phelanna	Strongly contrasting textural stratification	13-23	Noncemented	0	0	High	High	High
W:								
Water, fresh	none	---	---	---	---	---	---	---

Table 11. Water Features

(See text for definitions of terms used in this table. Ponding depth is the estimated range in the depth of water on the surface. Soil moisture status depth is the upper and lower depth below the soil surface.)

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
AFA:									
Nizina, cool	A	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	Occasional	Brief	None	---	---	0-60	Moist
Sinona	C	Apr	None	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	None	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	None	---	None	---	---	0-60	Moist
AFE:									
Nizina	A	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	Occasional	Brief	None	---	---	0-60	Moist
AFF:									
Schleyer	A	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
AFK:									
Skarland	A	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	Occasional	Brief	None	---	---	0-60	Moist
Schleyer	A	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
AFL:									
Schleyer	A	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
Broxson	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Frequent	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Frequent	Brief	None	---	---	0-28	Moist
								28-60	Wet
AFM:									
Osar	D	Apr	None	---	None	---	---	0-30	Moist, frozen
								30-60	Wet
		May	None	---	None	---	---	0- 4	Wet
								4-10	Wet, frozen
								10-30	Moist, frozen
								30-60	Wet
		Jun	None	---	None	---	---	0-10	Wet
								10-20	Wet, frozen
								20-60	Wet
		Jul-Sep	None	---	None	---	---	0-10	Moist
								10-60	Wet
Klute	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	Occasional	Brief	None	---	---	0-60	Moist
AFN:									
Sonderna	C	Apr	Rare	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	Rare	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	Rare	---	None	---	---	0-60	Moist
AFP:									
Basaltlake	D	Apr	None	---	None	---	---	0-30	Moist, frozen
								30-60	Moist
		May	None	---	None	---	---	0- 4	Moist
								4-39	Moist, frozen
								39-60	Moist
		Jun	None	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jul-Sep	None	---	None	---	---	0-60	Moist

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
BRA:									
Fields	C	Apr	None	---	None	---	---	0-30	Moist, frozen
								30-60	Moist
		May	None	---	None	---	---	0- 4	Moist
								4-30	Moist, frozen
								30-60	Moist
		Jun	None	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jul-Sep	None	---	None	---	---	0-60	Moist
ESA:									
Waitabit	B	Apr	None	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	None	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	None	---	None	---	---	0-60	Moist
Ogive	C	Apr	None	---	None	---	---	0-39	Moist, frozen
								39-60	Moist
		May	None	---	None	---	---	0- 4	Wet
								4-39	Moist, frozen
								39-60	Moist
		Jun	None	---	None	---	---	0-10	Wet
								10-30	Moist, frozen
								30-60	Moist
		Jul	None	---	None	---	---	0-20	Moist
								20-30	Wet
								30-60	Moist
		Aug-Sep	None	---	None	---	---	0-60	Moist
ESB:									
Castnot	C	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
Minya	C	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-60	Moist, frozen
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
EST:									
Petrokov	A	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-60	Moist, frozen
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
EST:									
Basaltlake	D	Apr	None	---	None	---	---	0-30	Moist, frozen
								30-60	Moist
		May	None	---	None	---	---	0- 4	Moist
								4-39	Moist, frozen
								39-60	Moist
		Jun	None	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jul-Sep	None	---	None	---	---	0-60	Moist
Castnot	C	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
FPA:									
Swedna	D	Apr	---	---	None	---	---	0- 8	Moist, frozen
								8-47	Wet, frozen
								47-60	Wet
		May	Frequent	Long	None	---	---	0-10	Wet
								10-20	Wet, frozen
								20-60	Wet
		Jun	Frequent	Long	None	---	---	0-60	Wet
		Jul-Sep	Frequent	Long	None	---	---	0- 4	Moist
								4-60	Wet
Dackey	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Occasional	Brief	None	---	---	0-28	Moist
								28-60	Wet
FPA1:									
Broxson	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Frequent	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Frequent	Brief	None	---	---	0-28	Moist
								28-60	Wet
FPB:									
Dackey	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Occasional	Brief	None	---	---	0-28	Moist
								28-60	Wet

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
FPB:									
Tangoe	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Frequent	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Frequent	Brief	None	---	---	0-28	Moist
								28-60	Wet
FPC:									
Dackey	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Occasional	Brief	None	---	---	0-28	Moist
								28-60	Wet
Tangoe	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Frequent	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Frequent	Brief	None	---	---	0-28	Moist
								28-60	Wet
FPD:									
Dackey	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Occasional	Brief	None	---	---	0-28	Moist
								28-60	Wet
Swedna	D	Apr	---	---	None	---	---	0- 8	Moist, frozen
								8-47	Wet, frozen
								47-60	Wet
		May	Frequent	Long	None	---	---	0-10	Wet
								10-20	Wet, frozen
								20-60	Wet
		Jun	Frequent	Long	None	---	---	0-60	Wet
		Jul-Sep	Frequent	Long	None	---	---	0- 4	Moist
								4-60	Wet
Tangoe	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Frequent	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Frequent	Brief	None	---	---	0-28	Moist
								28-60	Wet

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
FPF:									
Broxson	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Frequent	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Frequent	Brief	None	---	---	0-28	Moist
								28-60	Wet
Nizina, cool	A	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	Occasional	Brief	None	---	---	0-60	Moist
FPG:									
Tangoe	C	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-47	Moist
								47-60	Wet
		May	Frequent	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Wet
		Jun-Sep	Frequent	Brief	None	---	---	0-28	Moist
								28-60	Wet
Nizina, dry	A	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	Occasional	Brief	None	---	---	0-60	Moist
GO1:									
Schleyer	A	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
Geist	B	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
GO2:									
Schleyer	A	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
Slana	C	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
Geist	B	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
GO3:									
Schleyer	A	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
Turbellina	D	Apr	None	---	---	---	---	0- 8	Moist, frozen
								8-60	Wet, frozen
		May	None	---	Frequent	Long	8	0- 4	Wet
								4-60	Wet, frozen
		Jun	None	---	Frequent	Long	8	0- 8	Wet
								8-60	Wet, frozen
		Jul	None	---	Frequent	Long	8	0- 8	Moist
								8-17	Wet
								14-60	Wet, frozen
		Aug-Sep	None	---	---	---	---	0- 8	Moist
								8-17	Wet
								14-60	Wet, frozen

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
GO4:									
Kuswash	D	Apr	None	---	None	---	---	0- 8	Moist, frozen
								8-60	Wet, frozen
		May	None	---	None	---	---	0- 4	Wet
								4-60	Wet, frozen
		Jun	None	---	None	---	---	0-10	Wet
								10-60	Wet, frozen
		Jul-Sep	None	---	None	---	---	0- 8	Moist
								8-25	Wet
								25-60	Wet, frozen
Turbellina	D	Apr	None	---	---	---	---	0- 8	Moist, frozen
								8-60	Wet, frozen
		May	None	---	Frequent	Long	8	0- 4	Wet
								4-60	Wet, frozen
		Jun	None	---	Frequent	Long	8	0- 8	Wet
								8-60	Wet, frozen
		Jul	None	---	Frequent	Long	8	0- 8	Moist
								8-17	Wet
								14-60	Wet, frozen
		Aug-Sep	None	---	---	---	---	0- 8	Moist
								8-17	Wet
								14-60	Wet, frozen
Schleyer	A	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
IM:									
Shand	D	Apr	---	---	None	---	---	0-20	Wet, frozen
								20-60	Wet
		May	Occasional	Brief	None	---	---	0- 4	Wet
								4-20	Wet, frozen
								24-60	Wet
		Jun	Occasional	Brief	None	---	---	0-10	Wet
								10-20	Wet, frozen
								20-60	Wet
		Jul-Sep	Occasional	Brief	None	---	---	0-60	Wet
Bonot	D	Apr	None	---	---	---	---	0- 8	Moist, frozen
								8-60	Wet, frozen
		May	None	---	Frequent	Long	8	0- 2	Wet
								2-60	Wet, frozen
		Jun	None	---	Frequent	Long	8	0- 4	Wet
								4-60	Wet, frozen
		Jul	None	---	Frequent	Long	8	0- 7	Moist
								7- 8	Moist, frozen
								8-60	Wet, frozen
		Aug-Sep	None	---	---	---	---	0- 7	Moist
								7- 8	Moist, frozen
								8-60	Wet, frozen

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
IM:									
Fels	D	Apr	None	---	None	---	---	0-31	Moist, frozen
								31-60	Wet, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-31	Moist, frozen
								31-60	Wet, frozen
		Jun	None	---	None	---	---	0-10	Moist
								10-31	Moist, frozen
								31-60	Wet, frozen
		Jul-Sep	None	---	None	---	---	0-18	Moist
								18-31	Moist, frozen
								31-60	Wet, frozen
L1:									
Owhat	D	Apr	None	---	None	---	---	0- 8	Moist, frozen
								8-60	Wet, frozen
		May	None	---	None	---	---	0- 4	Wet
								4-60	Wet, frozen
		Jun	None	---	None	---	---	0-10	Wet
								10-60	Wet, frozen
		Jul-Sep	None	---	None	---	---	0- 8	Moist
								8-20	Wet
								14-60	Wet, frozen
MSB:									
Fields	C	Apr	None	---	None	---	---	0-30	Moist, frozen
								30-60	Moist
		May	None	---	None	---	---	0- 4	Moist
								4-30	Moist, frozen
								30-60	Moist
		Jun	None	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jul-Sep	None	---	None	---	---	0-60	Moist
Minya, cool	C	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-60	Moist, frozen
		Jul-Sep	None	---	None	---	---	0-60	Moist
Frostcircle	D	Apr	None	---	None	---	---	0-39	Moist, frozen
								39-60	Wet, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-39	Moist, frozen
								39-60	Wet, frozen
		Jun	None	---	None	---	---	0- 8	Moist
								8-39	Moist, frozen
								39-60	Wet, frozen
		Jul-Sep	None	---	None	---	---	0-11	Moist
								11-39	Moist, frozen
								39-60	Wet, frozen

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
MSD:									
Frostcircle	D	Apr	None	---	None	---	---	0-39	Moist, frozen
								39-60	Wet, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-39	Moist, frozen
								39-60	Wet, frozen
		Jun	None	---	None	---	---	0- 8	Moist
								8-39	Moist, frozen
								39-60	Wet, frozen
		Jul-Sep	None	---	None	---	---	0-11	Moist
								11-39	Moist, frozen
								39-60	Wet, frozen
Minya	C	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-60	Moist, frozen
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
Minya, cool	C	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-60	Moist, frozen
		Jul-Sep	None	---	None	---	---	0-60	Moist
MSF:									
Elting	B	Apr	None	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	None	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	None	---	None	---	---	0-60	Moist
Basaltlake	D	Apr	None	---	None	---	---	0-30	Moist, frozen
								30-60	Moist
		May	None	---	None	---	---	0- 4	Moist
								4-39	Moist, frozen
								39-60	Moist
		Jun	None	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jul-Sep	None	---	None	---	---	0-60	Moist
Sonderna	C	Apr	Rare	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	Rare	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	Rare	---	None	---	---	0-60	Moist

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
MSHP:									
Steps	D	Apr	None	---	None	---	---	0- 8	Moist, frozen
								8-60	Wet, frozen
		May	None	---	None	---	---	0- 4	Wet
								4-60	Wet, frozen
		Jun	None	---	None	---	---	0- 6	Wet
								6-60	Wet, frozen
		Jul-Sep	None	---	None	---	---	0- 8	Moist
								8-60	Wet, frozen
Basaltlake	D	Apr	None	---	None	---	---	0-30	Moist, frozen
								30-60	Moist
		May	None	---	None	---	---	0- 4	Moist
								4-39	Moist, frozen
								39-60	Moist
		Jun	None	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jul-Sep	None	---	None	---	---	0-60	Moist
MSS:									
Frostcircle	D	Apr	None	---	None	---	---	0-39	Moist, frozen
								39-60	Wet, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-39	Moist, frozen
								39-60	Wet, frozen
		Jun	None	---	None	---	---	0- 8	Moist
								8-39	Moist, frozen
								39-60	Wet, frozen
		Jul-Sep	None	---	None	---	---	0-11	Moist
								11-39	Moist, frozen
								39-60	Wet, frozen
MST:									
Frostcircle	D	Apr	None	---	None	---	---	0-39	Moist, frozen
								39-60	Wet, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-39	Moist, frozen
								39-60	Wet, frozen
		Jun	None	---	None	---	---	0- 8	Moist
								8-39	Moist, frozen
								39-60	Wet, frozen
		Jul-Sep	None	---	None	---	---	0-11	Moist
								11-39	Moist, frozen
								39-60	Wet, frozen
Ogive	C	Apr	None	---	None	---	---	0-39	Moist, frozen
								39-60	Moist
		May	None	---	None	---	---	0- 4	Wet
								4-39	Moist, frozen
								39-60	Moist
		Jun	None	---	None	---	---	0-10	Wet
								10-30	Moist, frozen
								30-60	Moist
		Jul	None	---	None	---	---	0-20	Moist
								20-30	Wet
								30-60	Moist
		Aug-Sep	None	---	None	---	---	0-60	Moist

Table 11. Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Flooding		Ponding		Soil Moisture Status		
			Frequency	Duration	Frequency	Duration	Depth	Depth	Status
							In.	In.	
OPB:									
Phalarope	B	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-30	Moist, frozen
								30-60	Moist
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
STA:									
Nizina	A	Apr	---	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	Occasional	Brief	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	Occasional	Brief	None	---	---	0-60	Moist
Nizina, rarely flooded	A	Apr	Rare	---	None	---	---	0-24	Moist, frozen
								24-60	Moist
		May	Rare	---	None	---	---	0-10	Moist
								10-20	Moist, frozen
								20-60	Moist
		Jun-Sep	Rare	---	None	---	---	0-60	Moist
TPA:									
McCumberson	B	Apr	None	---	None	---	---	0-60	Moist, frozen
		May	None	---	None	---	---	0- 4	Moist
								4-60	Moist, frozen
		Jun	None	---	None	---	---	0-20	Moist
								20-60	Moist, frozen
		Jul-Aug	None	---	None	---	---	0-60	Moist
		Sep	None	---	None	---	---	0- 4	Moist, frozen
								4-60	Moist
Phelanna	D	Apr	None	---	None	---	---	0-30	Moist, frozen
								30-60	Wet
		May	None	---	None	---	---	0- 4	Wet
								4-10	Wet, frozen
								10-30	Moist, frozen
								30-60	Wet
		Jun	None	---	None	---	---	0-10	Wet
								10-20	Wet, frozen
								20-60	Wet
		Jul	None	---	None	---	---	0- 4	Moist
								4-60	Wet
		Aug-Sep	None	---	None	---	---	0-10	Moist
								10-60	Wet

Table 12. Hydric Soils List

(Dashes (---) in any column indicate that the data were not included in the database.)

Map symbol and soil name (percent composition)	Hydric soil	Local landform	Hydric soils criteria			
			Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
AFA:						
Nizina, cool (55%)	No	flood plains on alluvial fans	---	---	---	---
Sinona (25%)	No	fan terraces on alluvial fans	---	---	---	---
Riverwash (15%)	Unranked	flood plains	---	---	---	---
Klute (3%)	No	flood plains on alluvial fans	---	---	---	---
Nizina, dry (2%)	No	flood plains on alluvial fans	---	---	---	---
AFE:						
Nizina (85%)	No	flood plains on alluvial fans	---	---	---	---
Nizina, cool (10%)	No	flood plains on alluvial fans	---	---	---	---
Tangoe (5%)	No	flood plains on alluvial fans	---	---	---	---
AFF:						
Schleyer (90%)	No	fan terraces on alluvial fans	---	---	---	---
Broxson (10%)	No	flood plains on alluvial fans	---	---	---	---
AFK:						
Skarland (60%)	No	flood plains on alluvial fans	---	---	---	---
Schleyer (30%)	No	fan terraces on alluvial fans	---	---	---	---
Nizina, cool (10%)	No	flood plains on alluvial fans	---	---	---	---
AFL:						
Schleyer (40%)	No	fan terraces on alluvial fans	---	---	---	---
Broxson (35%)	No	flood plains on alluvial fans	---	---	---	---
Riverwash (25%)	Unranked	flood plains	---	---	---	---
AFM:						
Osar (55%)	Yes	fan terraces on alluvial fans	2B3	Yes	No	No
Klute (40%)	No	flood plains on alluvial fans	---	---	---	---
Sonderna (5%)	No	fan terraces on alluvial fans	---	---	---	---
AFN:						
Sonderna (90%)	No	fan terraces on alluvial fans	---	---	---	---
Klute (10%)	No	flood plains on alluvial fans	---	---	---	---

Table 12. Hydric Soils List—Continued

Map symbol and soil name (percent composition)	Hydric soil	Local landform	Hydric soils criteria			
			Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
AFP:						
Basaltlake (90%)	No	mountains	---	---	---	---
Nizina, cool (5%)	No	flood plains on alluvial fans on mountains	---	---	---	---
Steps (3%)	Yes	earth hummocks on mountains	2B3	Yes	No	No
Fields (2%)	No	mountains	---	---	---	---
BA:						
Riverwash (95%)	Unranked	flood plains	---	---	---	---
Nizina, dry (3%)	No	flood plains	---	---	---	---
Tangoe (2%)	No	flood plains	---	---	---	---
BRA:						
Fields (85%)	No	mountains	---	---	---	---
Rock outcrop (10%)	Unranked	mountains	---	---	---	---
Steps (5%)	Yes	earth hummocks on mountains	2B3	Yes	No	No
ESA:						
Waitabit (45%)	No	mountains	---	---	---	---
Ogive (35%)	Yes	swales on mountains	2B3	Yes	No	No
Castnot (10%)	No	mountains	---	---	---	---
Osar (10%)	Yes	fan terraces on alluvial fans on mountains	2B3	Yes	No	No
ESB:						
Castnot (50%)	No	mountains	---	---	---	---
Minya (25%)	No	mountains	---	---	---	---
Rock outcrop (20%)	Unranked	mountains	---	---	---	---
Schleyer, cool (5%)	No	mountains	---	---	---	---
EST:						
Petrokov (35%)	No	mountains	---	---	---	---
Basaltlake (30%)	No	swales on mountains	---	---	---	---
Castnot (30%)	No	mountains	---	---	---	---
Ogive (5%)	Yes	swales on mountains	2B3	Yes	No	No

Table 12. Hydric Soils List—Continued

Map symbol and soil name (percent composition)	Hydric soil	Local landform	Hydric soils criteria			
			Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
FPA:						
Swedna (50%)	Yes	flood plains	2B3,4	Yes	Yes	No
Riverwash (30%)	Unranked	flood plains	---	---	---	---
Dackey (15%)	No	flood plains	---	---	---	---
Tangoe (5%)	No	flood plains	---	---	---	---
FPA1:						
Broxson (90%)	No	flood plains on alluvial fans	---	---	---	---
Schleyer (5%)	No	stream terraces	---	---	---	---
Water, fresh (5%)	Unranked	channels, lakes	---	---	---	---
FPB:						
Dackey (40%)	No	flood plains	---	---	---	---
Tangoe (35%)	No	flood plains	---	---	---	---
Riverwash (20%)	Unranked	flood plains	---	---	---	---
Swedna, very wet (3%)	Yes	depressions on flood plains	2B3,3,4	Yes	Yes	Yes
Swedna (2%)	Yes	flood plains	4,2B3	Yes	Yes	No
FPC:						
Dackey (40%)	No	flood plains	---	---	---	---
Tangoe (35%)	No	flood plains	---	---	---	---
Riverwash (20%)	Unranked	flood plains	---	---	---	---
Swedna, very wet (3%)	Yes	depressions on flood plains	4,2B3,3	Yes	Yes	Yes
Swedna (2%)	Yes	flood plains	4,2B3	Yes	Yes	No
FPD:						
Dackey (60%)	No	flood plains	---	---	---	---
Swedna (20%)	Yes	flood plains	2B3,4	Yes	Yes	No
Tangoe (15%)	No	flood plains	---	---	---	---
Swedna, very wet (5%)	Yes	depressions on flood plains	2B3,3,4	Yes	Yes	Yes
FPF:						
Broxson (45%)	No	flood plains	---	---	---	---
Nizina, cool (40%)	No	flood plains	---	---	---	---
Schleyer (10%)	No	stream terraces	---	---	---	---
Riverwash (5%)	Unranked	flood plains	---	---	---	---

Table 12. Hydric Soils List—Continued

Map symbol and soil name (percent composition)	Hydric soil	Local landform	Hydric soils criteria			
			Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
FPG:						
Tangoe (70%)	No	flood plains	---	---	---	---
Nizina, dry (20%)	No	flood plains	---	---	---	---
Riverwash (10%)	Unranked	flood plains	---	---	---	---
GO1:						
Schleyer (75%)	No	hills, outwash plains	---	---	---	---
Geist (20%)	No	hills, outwash plains	---	---	---	---
Turbellina (3%)	Yes	turf hummocks on outwash plains	2B3,3	Yes	No	Yes
Terric Cryohemists (2%)	Yes	depressions on outwash plains	3,1	Yes	No	Yes
GO2:						
Schleyer (55%)	No	outwash plains, hills	---	---	---	---
Slana (25%)	No	hills	---	---	---	---
Geist (15%)	No	hills, outwash plains	---	---	---	---
Phelanna (3%)	Yes	swales on mountains	2B3	Yes	No	No
Turbellina (2%)	Yes	turf hummocks on outwash plains	3,2B3	Yes	No	Yes
GO3:						
Schleyer (40%)	No	outwash plains, hills	---	---	---	---
Turbellina (35%)	Yes	turf hummocks on outwash plains	2B3,3	Yes	No	Yes
Fels (10%)	No	hills on peat plateaus	---	---	---	---
Terric Cryohemists (10%)	Yes	depressions on outwash plains	3,1	Yes	No	Yes
Shand (5%)	Yes	flood plains	1	Yes	No	No
GO4:						
Kuswash (40%)	Yes	outwash plains	2B3	Yes	No	No
Turbellina (40%)	Yes	turf hummocks on outwash plains	2B3,3	Yes	No	Yes
Schleyer (20%)	No	hills, outwash plains	---	---	---	---
IM:						
Shand (35%)	Yes	flood plains	1	Yes	No	No
Bonot (25%)	Yes	turf hummocks on outwash plains	1,3	Yes	No	Yes
Fels (25%)	No	hills	---	---	---	---
Kuswash (10%)	Yes	outwash plains	2B3	Yes	No	No
Turbellina (5%)	Yes	turf hummocks on outwash plains	2B3,3	Yes	No	Yes

Table 12. Hydric Soils List—Continued

Map symbol and soil name (percent composition)	Hydric soil	Local landform	Hydric soils criteria			
			Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
L1:						
Owhat (90%)	Yes	hills	2B3	Yes	No	No
Fields (10%)	No	mountains	---	---	---	---
MSB:						
Fields (45%)	No	mountains	---	---	---	---
Minya, cool (30%)	No	mountains	---	---	---	---
Frostcircle (15%)	Yes	circles on mountains	2B3	Yes	No	No
Ogive (5%)	Yes	swales on mountains	2B3	Yes	No	No
Rock outcrop (5%)	Unranked	mountains	---	---	---	---
MSD:						
Frostcircle (40%)	Yes	circles on mountains, stripes on mountains	2B3	Yes	No	No
Minya (35%)	No	mountains	---	---	---	---
Minya, cool (15%)	No	mountains	---	---	---	---
Rock outcrop (10%)	Unranked	mountains	---	---	---	---
MSF:						
Elting (65%)	No	mountains	---	---	---	---
Basaltlake (15%)	No	mountains	---	---	---	---
Sonderna (15%)	No	fan terraces on alluvial fans	---	---	---	---
Castnot (5%)	No	mountains	---	---	---	---
MSHP:						
Steps (60%)	Yes	earth hummocks on mountains	2B3	Yes	No	No
Basaltlake (25%)	No	mountains	---	---	---	---
Petrokov (10%)	No	mountains	---	---	---	---
Ogive (3%)	Yes	swales on mountains	2B3	Yes	No	No
Nizina, cool (1%)	No	flood plains on alluvial fans on mountains	---	---	---	---
Schleyer, cool (1%)	No	mountains	---	---	---	---
MSS:						
Frostcircle (90%)	Yes	circles on mountains	2B3	Yes	No	No
Basaltlake (10%)	No	mountains	---	---	---	---

Table 12. Hydric Soils List—Continued

Map symbol and soil name (percent composition)	Hydric soil	Local landform	Hydric soils criteria			
			Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
MST:						
Frostcircle (70%)	Yes	circles on mountains	2B3	Yes	No	No
Ogive (15%)	Yes	swales on mountains	2B3	Yes	No	No
Fields (5%)	No	mountains	---	---	---	---
Minya, cool (5%)	No	mountains	---	---	---	---
Rock outcrop (5%)	Unranked	mountains	---	---	---	---
OPB:						
Phalarope (95%)	No	earth hummocks on outwash plains	---	---	---	---
Waitabit (5%)	No	mountains	---	---	---	---
RO:						
Rock outcrop (95%)	Unranked	mountains	---	---	---	---
Minya, cool (3%)	No	mountains	---	---	---	---
Fields (2%)	No	mountains	---	---	---	---
STA:						
Nizina (60%)	No	flood plains	---	---	---	---
Nizina, rarely flooded (25%)	No	flood plains	---	---	---	---
Klute (5%)	No	flood plains	---	---	---	---
Nizina, cool (5%)	No	flood plains	---	---	---	---
Nizina, dry (5%)	No	flood plains	---	---	---	---
TPA:						
McCumberson (70%)	No	earth hummocks on till plains	---	---	---	---
Phelanna (20%)	Yes	swales on till plains	2B3	Yes	No	No
Basaltlake (5%)	No	till plains	---	---	---	---
Frostcircle (5%)	Yes	circles on till plains	2B3	Yes	No	No
W:						
Water, fresh (90%)	Unranked	lakes, channels	---	---	---	---
Swedna, very wet (5%)	Yes	depressions on flood plains	4,2B3,3	Yes	Yes	Yes
Terric Cryohemists (5%)	Yes	lakeshores on outwash plains	3,1	Yes	No	Yes

Table 13. Classification of the Soils

Soil name	Family or higher taxonomic class
Bonot	Dysic, subgelic Typic Hemistels
Basaltlake	Loamy-skeletal, mixed, superactive Typic Eutrocryepts
Broxson	Sandy-skeletal, mixed, subgelic Oxyaquic Gelorthents
Castnot	Loamy-skeletal, mixed, superactive, subgelic Typic Dystrogelepts
Dackey	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid Aquic Cryofluvents
Elting	Sandy-skeletal, mixed Typic Dystrocryepts
Fels	Dysic, subgelic Glacic Folistels
Fields	Coarse-loamy, mixed, superactive Humic Dystrocryepts
Frostcircle	Coarse-loamy, mixed, superactive, subgelic Ruptic-Histic Aquiturbels
Geist	Sandy, mixed, subgelic Typic Eutrogelepts
Klute	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid Typic Cryofluvents
Kuswash	Coarse-loamy, mixed, superactive, subgelic Typic Historthels
McCumberson	Loamy-skeletal, mixed, superactive, subgelic Typic Haplogelods
Minya	Loamy-skeletal, mixed, superactive, subgelic Lithic Haplogelods
Nizina	Sandy-skeletal, mixed Typic Cryorthents
Ogive	Loamy-skeletal, mixed, superactive, subgelic Humic Eutrogelepts
Osar	Coarse-loamy, mixed, superactive, nonacid Humic Cryaquepts
Owhat	Coarse-silty, mixed, superactive, subgelic Typic Historthels
Petrokov	Sandy-skeletal, mixed, subgelic Typic Eutrogelepts
Phalarope	Coarse-silty over sandy or sandy-skeletal, mixed, superactive, subgelic Typic Haplogelods
Phelanna	Coarse-loamy, mixed, superactive, nonacid, subgelic Humic Gelaquepts
Schleyer	Sandy-skeletal, mixed, subgelic Typic Haplogelods
Shand	Loamy-skeletal, mixed, euic Terric Cryosaprists
Sinona	Sandy-skeletal, mixed Typic Eutrocryepts
Skarland	Sandy-skeletal, mixed, subgelic Typic Gelorthents
Slana	Loamy-skeletal, mixed, superactive, subgelic Typic Eutrogelepts
Sonderna	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive Typic Eutrocryepts
Steps	Loamy-skeletal, mixed, superactive, subgelic Typic Histoturbels
Swedna	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid Typic Cryaquents
Tangoe	Sandy-skeletal, mixed Oxyaquic Cryorthents
Terric Cryohemists	Loamy-skeletal, euic Terric Cryohemists
Turbellina	Coarse-silty, mixed, superactive, nonacid, subgelic Typic Histoturbels
Waitabit	Loamy-skeletal, mixed, superactive Typic Haplocryods

Table 14. List of Plants Observed in the Area

Symbol	Scientific Name	Common Name
Trees		
PIGL	Picea glauca	white spruce
POBA2	Populus balsamifera	balsam poplar
POTR5	Populus tremuloides	quaking aspen
Shrubs		
ALCR6	Alnus crispa	American green alder
ALTE2	Alnus tenuifolia	thinleaf alder
ANPO	Andromeda polifolia	bog rosemary
ANPA	Anemone parviflora	smallflowered anemone
ARLA2	Arctagrostis latifolia	wideleaf polargrass
ARAL2	Arctostaphylos alpina	alpine bearberry
ARRU	Arctostaphylos rubra	red fruit bearberry
ARUV	Arctostaphylos uva-ursi	kinnikinnick
BEGL	Betula glandulosa	dwarf birch
BENA	Betula nana	dwarf birch
BEPA	Betula papyrifera	paper birch
CATE11	Cassiope tetragona	white arctic mountain heather
DILA	Diapensia lapponica	pincushion plant
DILAO	Diapensia lapponica ssp. obovata	pincushion plant
DRYAS	Dryas	mountain-avens
DROC	Dryas octopetala	eightpetal mountain-avens
DROCA2	Dryas octopetala ssp. alaskensis	Alaskan mountain-avens
DROCI	Dryas octopetala var. integrifolia	entireleaf mountain-avens
EMNI	Empetrum nigrum	black crowberry
BETULX	hybrid Betula	hybrid Betula
JUCO6	Juniperus communis	common juniper
LEDE5	Ledum decumbens	marsh Labrador tea
LEGR	Ledum groenlandicum	bog Labrador tea
LOPR	Loiseleuria procumbens	alpine azalea
OXMI3	Oxycoccus microcarpos	small cranberry
POFR4	Potentilla fruticosa	shrubby cinquefoil
RHLA2	Rhododendron lapponicum	Lapland rosebay
RIBES	Ribes	currant
RITR	Ribes triste	red currant
ROAC	Rosa acicularis	prickly rose
RUARS	Rubus arcticus ssp. stellatus	arctic blackberry
RUARS2	Rubus arcticus var. stellatus	arctic blackberry
RUID	Rubus idaeus	American red raspberry
SALIX	Salix	willow
SAAL	Salix alaxensis	feltleaf willow
SAAR4	Salix arctica	northern willow
SABA2	Salix babylonica	weeping willow
SABA3	Salix barclayi	Barclay's willow
SABE2	Salix bebbiana	Bebb willow
SABR	Salix brachycarpa	shortfruit willow
SAFU	Salix fuscescens	Alaska bog willow
SAGL	Salix glauca	grayleaf willow
SALA4	Salix lanata	woolly willow
SALAR	Salix lanata ssp. richardsonii	Richardson's willow
SAPL2	Salix planifolia	diamondleaf willow
SARE2	Salix reticulata	netleaf willow
SARO2	Salix rotundifolia	least willow
SAMO11	Saxifraga monticola	tufted alpine saxifrage
SAPL3	Saxifraga platysepala	broadsepal saxifrage
SHCA	Shepherdia canadensis	russet buffaloberry
SIPR	Sibbaldia procumbens	creeping sibbaldia
SPBE	Spiraea beauverdiana	beauverd spirea
ZZSHRUB	unknown-shrubs	unknown-shrubs
VAUL	Vaccinium uliginosum	bog blueberry
VAVI	Vaccinium vitis-idaea	lingonberry
VIED	Viburnum edule	squashberry

Table 14. List of Plants Observed in the Area—Continued

Symbol	Scientific Name	Common Name
Grasses, Sedges, and Rushes		
AGSC5	Agrostis scabra	rough bentgrass
ARLA2	Arctagrostis latifolia	wideleaf polargrass
ARFU2	Arctophila fulva	pendantgrass
ARLA8	Arnica latifolia	broadleaf arnica
CALAM	Calamagrostis	reedgrass
CACA4	Calamagrostis canadensis	bluejoint
CAREX	Carex	sedge
CAAQ	Carex aquatilis	water sedge
CABI5	Carex bigelowii	Bigelow's sedge
CACA11	Carex canescens	silvery sedge
CACA12	Carex capillaris	hairlike sedge
CAEL4	Carex eleusinoides	goosegrass sedge
CALU2	Carex lugens	spruce muskeg sedge
CAMAI2	Carex magellanica ssp. irrigua	boreal bog sedge
CAMIM	Carex microchaeta ssp. microchaeta	smallawned sedge
CAMIN	Carex microchaeta ssp. nesophila	Bering Sea sedge
CAPO	Carex podocarpa	shortstalk sedge
CARO7	Carex rotundata	round sedge
CASA10	Carex saxatilis	rock sedge
CASC10	Carex scirpoidea	northern singlespike sedge
CAVA2	Carex vaginata	sheathed sedge
ELAC	Eleocharis acicularis	needle spikerush
EPAN4	Epilobium anagallidifolium	pimpernel willowherb
ERIOP	Eriophorum	cottongrass
ERAN6	Eriophorum angustifolium	tall cottongrass
ERBR6	Eriophorum brachyantherum	northland cottonsedge
ERSC2	Eriophorum scheuchzeri	white cottongrass
ERVA4	Eriophorum vaginatum	tussock cottongrass
FESTU	Festuca	fescue
FEAL	Festuca altaica	Altai fescue
HIAL2	Hieracium albiflorum	white hawkweed
HIAL3	Hierochloe alpina	alpine sweetgrass
HIOD	Hierochloe odorata	sweetgrass
JUBI	Juncus biflorus	bog rush
JUCA6	Juncus castaneus	chestnut rush
LUZUL	Luzula	woodrush
LUCO5	Luzula confusa	northern woodrush
LUMU2	Luzula multiflora	common woodrush
LUPA4	Luzula parviflora	smallflowered woodrush
PHCOA	Phleum commutatum var. americanum	alpine timothy
POA	Poa	bluegrass
GRASSES	total grasses and grass-like	total grasses and grass-like
TRSP2	Trisetum spicatum	spike trisetum
ZZGRASS	unknown-grasses	unknown-grasses
Forbs and Ferns		
ACDE2	Aconitum delphiniifolium	larkspurleaf monkshood
ACRU2	Actaea rubra	red baneberry
ADMO	Adoxa moschatellina	muskroot
ANPO	Andromeda polifolia	bog rosemary
ANEMO	Anemone	anemone
ANNA	Anemone narcissiflora	narcissus anemone
ANRI	Anemone richardsonii	yellow thimbleweed
ANLU	Angelica lucida	seacoast angelica
ANTEN	Antennaria	pussytoes
ANFR	Antennaria friesiana	Fries' pussytoes
ANMO9	Antennaria monocephala	pygmy pussytoes
ANTI	Anthemis tinctoria	golden chamomile
ARLE	Arabis lemmonii	Lemmon's rockcress
ARLYK2	Arabis lyrata ssp. kamchatica	Kamchatica rockcress
ARNIC	Arnica	arnica
ARFR2	Arnica frigida	snow arnica

Table 14. List of Plants Observed in the Area—Continued

Symbol	Scientific Name	Common Name
Forbs and Ferns		
ARAL5	Artemisia alaskana	Alaska wormwood
ARAR9	Artemisia arctica	boreal sagebrush
ARTI	Artemisia tilesii	Tilesius' wormwood
ASTER	Aster	aster
ASSI	Aster sibiricus	arctic aster
ASTRA	Astragalus	milkvetch
ATFI	Athyrium filix-femina	common ladyfern
CALA7	Campanula lasiocarpa	mountain harebell
CAUN2	Campanula uniflora	arctic bellflower
CAPRA	Cardamine pratensis var. angustifolia	cuckoo flower
CACA20	Castilleja caudata	Port Clarence Indian paintbrush
CHTE3	Chrysosplenium tetrandrum	northern golden saxifrage
CLSA2	Claytonia sarmentosa	Alaska springbeauty
COTR3	Corallorrhiza trifida	yellow coralroot
COCA13	Cornus canadensis	bunchberry dogwood
COPA11	Corydalis pauciflora	fewflower fumewort
DEGL3	Delphinium glaucum	Sierra larkspur
DOFR	Dodecatheon frigidum	western arctic shootingstar
DRABA	Draba	draba
DRLO2	Draba longipes	longstalk draba
DRNI	Draba nivalis	yellow arctic draba
DRDI2	Dryopteris dilatata	spreading woodfern
EPAN2	Epilobium angustifolium	fireweed
EPLA	Epilobium latifolium	dwarf fireweed
EPPA	Epilobium palustre	marsh willowherb
EQUIS	Equisetum	horsetail
EQAR	Equisetum arvense	field horsetail
EQFL	Equisetum fluviatile	water horsetail
EQPR	Equisetum pratense	meadow horsetail
EQSC	Equisetum scirpoides	dwarf scouringrush
EQSY	Equisetum sylvaticum	woodland horsetail
EQVA	Equisetum variegatum	variegated scouringrush
GABO2	Galium boreale	northern bedstraw
GATR3	Galium triflorum	fragrant bedstraw
GENTI	Gentiana	gentian
GEGL	Gentiana glauca	pale gentian
GELI2	Geocaulon lividum	false toadflax
GERAN	Geranium	geranium
GEER2	Geranium erianthum	woolly geranium
GEMA4	Geum macrophyllum	largeleaf avens
GYDR	Gymnocarpium dryopteris	western oakfern
HEMA	Hedysarum mackenziei	boreal sweetvetch
HELA4	Heracleum lanatum	common cowparsnip
LEPY	Leptarrhena pyrolifolia	fireleaf leptarrhena
LIBO3	Linnaea borealis	twinflower
LICO6	Listera cordata	heartleaf twayblade
LLSE	Lloydia serotina	common alplily
LUAR2	Lupinus arcticus	arctic lupine
LUAR5	Luzula arcuata	curved woodrush
LYCOP	Lycopersicon	tomato
LYAL3	Lycopodium alpinum	alpine clubmoss
LYAN2	Lycopodium annotinum	stiff clubmoss
LYCL	Lycopodium clavatum	running clubmoss
LYCO3	Lycopodium complanatum	groundcedar
LYSE99	Lycopodium selago	fir clubmoss
METR3	Menyanthes trifoliata	buckbean
MEPA	Mertensia paniculata	tall bluebells
MIAR3	Minuartia arctica	arctic stitchwort
MIRU3	Minuartia rubella	beautiful sandwort
MOLA6	Moehringia lateriflora	bluntleaf sandwort
OXDI3	Oxyria digyna	alpine mountainsorrel
OXMA2	Oxytropis maydelliana	Maydell's oxytrope

Table 14. List of Plants Observed in the Area—Continued

Symbol	Scientific Name	Common Name
Forbs and Ferns		
OXNI	Oxytropis nigrescens	blackish oxytrope
OXSC	Oxytropis scammaniana	Scamman's oxytrope
PAAL20	Papaver alaskanum	rooted poppy
PAMA5	Papaver macounii	Macoun's poppy
PARNA	Parnassia	grass of Parnassus
PAKO3	Parnassia kotzebuei	Kotzebue's grass of Parnassus
PANU5	Parrya nudicaulis	nakedstem wallflower
PEDIC	Pedicularis	lousewort
PECA2	Pedicularis capitata	capitate lousewort
PEKA7	Pedicularis kanei	woolly lousewort
PELA	Pedicularis labradorica	Labrador lousewort
PELA14	Pedicularis lanata	woolly lousewort
PELA3	Pedicularis langsdorfii	Langsdorf's lousewort
PEFR5	Petasites frigidus	arctic sweet coltsfoot
PEHY5	Petasites hyperboreus	arctic sweet coltsfoot
PIVI	Pinguicula villosa	hairy butterwort
PIVU	Pinguicula vulgaris	common butterwort
PLOB	Platanthera obtusata	bluntleaved orchid
POAL	Poa alpigena	Kentucky bluegrass
POAC	Polemonium acutiflorum	tall Jacob's-ladder
POLYG4	Polygonum	knotweed
POAL5	Polygonum alaskanum	Alaska wild rhubarb
POBI5	Polygonum bistorta	meadow bistort
POVI3	Polygonum viviparum	alpine bistort
POTEN	Potentilla	cinquefoil
PODI2	Potentilla diversifolia	varileaf cinquefoil
PONO3	Potentilla norvegica	Norwegian cinquefoil
POPA14	Potentilla palustris	purple marshlocks
PYROL	Pyrola	wintergreen
PYAS	Pyrola asarifolia	liverleaf wintergreen
PYGR	Pyrola grandiflora	largeflowered wintergreen
PYMI	Pyrola minor	snowline wintergreen
PYSE	Pyrola secunda	sidebells wintergreen
RANI	Ranunculus nivalis	snow buttercup
RORIP	Rorippa	yellowcress
ROHI2	Rorippa hispida	hispid yellowcress
RUAC	Rubus acaulis	dwarf raspberry
RUAR	Rubus arcticus	arctic blackberry
RUCH	Rubus chamaemorus	cloudberry
RUAR6	Rumex arcticus	arctic dock
SANGU2	Sanguisorba	burnet
SACA14	Sanguisorba canadensis	Canadian burnet
SAST11	Sanguisorba stipulata	Canadian burnet
SAAN3	Saussurea angustifolia	narrowleaf saw-wort
SAXIF	Saxifraga	saxifrage
SABR6	Saxifraga bronchialis	yellowdot saxifrage
SACE2	Saxifraga cernua	nodding saxifrage
SAES	Saxifraga eschscholtzii	ciliate saxifrage
SAPU6	Saxifraga punctata	heartleaf saxifrage
SARE8	Saxifraga reflexa	reflexed saxifrage
SATR5	Saxifraga tricuspidata	three toothed saxifrage
SEINI2	Sedum integrifolium ssp. integrifolium	entireleaf stonecrop
SEROI3	Sedum rosea ssp. integrifolium	ledge stonecrop
SENEC	Senecio	ragwort
SEAT2	Senecio atropurpureus	arctic groundsel
SEATF	Senecio atropurpureus ssp. frigidus	arctic groundsel
SELU	Senecio lugens	small blacktip ragwort
SIAC	Silene acaulis	moss campion
SOLID	Solidago	goldenrod
SOMU	Solidago multiradiata	Rocky Mountain goldenrod
STELL	Stellaria	starwort
STED	Stellaria edwardsii	longstalk starwort

Table 14. List of Plants Observed in the Area—Continued

Symbol	Scientific Name	Common Name
Forbs and Ferns		
STLA3	Stellaria laeta	longstalk starwort
STLO	Stellaria longifolia	longleaf starwort
STLO2	Stellaria longipes	longstalk starwort
STAM2	Streptopus amplexifolius	claspleaf twistedstalk
SWPE	Swertia perennis	felwort
TARAX	Taraxacum	dandelion
TAAL	Taraxacum alaskanum	northern dandelion
THAL	Thalictrum alpinum	alpine meadow-rue
THSP	Thalictrum sparsiflorum	fewflower meadow-rue
THPH	Thelypteris phegopteris	long beechfern
TOCO	Tofieldia coccinea	northern asphodel
TOPU	Tofieldia pusilla	Scotch false asphodel
FORBS	total forbs	total forbs
TREU	Trientalis europaea	arctic starflower
ZZFORB	unknown-forbs	unknown-forbs
VACA3	Valeriana capitata	captiate valerian
VASI	Valeriana sitchensis	Sitka valerian
VEWO2	Veronica wormskjoldii	American alpine speedwell
VIOLA	Viola	violet
VIEP	Viola epipsila	dwarf marsh violet
VIEPR	Viola epipsila ssp. repens	dwarf marsh violet
VISE2	Viola selkirkii	Selkirk's violet
Lichens		
CETRA2	Cetraria	cetraria lichen
CLADI3	Cladina	reindeer lichen
CLADO3	Cladonia	cup lichen
NEPHR3	Nephroma	kidney lichen
PELTI2	Peltigera	felt lichen
STERE2	Stereocaulon	snow lichen
THAMN3	Thamnolia	whiteworm lichen
LICHEN	total lichens	total lichens
L2ALL	total lichens-crustose and soil crust	total lichens-crustose and soil crust
FOLIO	total lichens-foliose	total lichens-foliose
FRUTI	total lichens-fruticose	total lichens-fruticose
ZZLICHEN	unknown-foliose and fruticose lichens	unknown-foliose and fruticose lichens
Bryophytes		
DICRA8	Dicranum	dicranum moss
HYLOC2	Hylocomium	hylocomium feather moss
HYSP70	Hylocomium splendens	splendid feather moss
LYCOP	Lycopersicon	tomato
PLEUR2	Pleuropogon	semaphoregrass
POJU	Poa juncifolia	Sandberg bluegrass
POLYT5	Polytrichum	polytrichum moss
RACOM	Racomitrium	racomitrium moss
MOSS	total bryophytes-mosses and liverworts	total bryophytes-mosses and liverworts
Ground Surface		
LITTER	litter-herbaceous, mulch, and woody debris	litter-herbaceous, mulch, and woody debris <2.5 cm
LITTER2	litter-woody debris >2.5 cm	litter-woody debris >2.5 cm
SOIL	mineral-bare soil	mineral-bare soil
ROCKB	mineral-surface bedrock	mineral-surface bedrock
ROCK	mineral-surface rock fragments	mineral-surface rock fragments
WATER	water	water

Part 6—Appendixes

Appendix A—Mapping and Classification Hierarchies

Ecological Mapping Hierarchy

The National Hierarchical Framework of Ecological Units used in this inventory is a "...system for stratifying the Earth into progressively smaller areas of increasingly uniform ecological potentials" (ECOMAP 1993). The hierarchy consists of eight levels of ecological units from the Domain, which is the highest and most general level, to the Landtype Phase. A map of the upper four levels (Domain, Division, Province, and Section), was developed for Alaska by Nowacki and Brock (1995) using a top-down approach of progressively subdividing the state into smaller segments. Descriptions and other data for the Section level are included in McNab and Avers (1994), Bailey and others (1994), and Cleland and others (1997).

The upper four levels of the hierarchy for the Delta River and are based on Nowacki and Brock (1995). The lower four levels (Subsection, Landtype Associations, Landtypes, and Landtype Phases) were developed during this survey. The criteria for each of these levels are described in the following paragraphs. Table 2 lists the complete hierarchy for the project area.

Two classifications, *Soil Taxonomy* (Soil Survey Staff 1999) (the U.S. soil classification system used to classify soils) and the ECOMAP Hierarchy (ECOMAP 1993) (an ecological classification for grouping landscapes at various scales) were used and integrated as part of this project. Each soil is correlated to an ecological site (landtype). Soils were split into phases when the soil classification did not differentiate between soils but ecological potentials did. An example is a comparison of Nizina and Klute, two soil components that are included within Ecological Site Loamy High Flood Plains. Nizina has a very shallow stratified loamy alluvial mantle over sand and gravel and Klute has a shallow or moderately deep mantle of stratified loamy alluvial mantle over sand and gravel. Based on *Soil Taxonomy* (Soil Survey Staff 1999) and criteria defined at the family level, Nizina is in the sandy-skeletal, mixed Typic Cryorthents family with Klute categorized as coarse-loamy over sandy or sandy-skeletal, mixed superactive Typic Cryofluvents. To maintain the soil taxonomic integrity of the soil map, two soil components are differentiated even though these two soils share the same Ecological Site assignment. Unfortunately, the natural ecological boundaries that define Ecological Sites do not correspond to the artificial boundaries imposed by *Soil Taxonomy* (Soil Survey Staff 1999).

General summary of principal map unit design criteria for the eight levels in the hierarchy are provided below and modified for the Delta River Area from Cleland and others (1997). An up-to-date list of descriptions of the upper four levels of the hierarchy for the United States is currently maintained at the following website http://www.fs.fed.us/land/pubs/ecoregions/toc.html.

Hierarchy Description

Ecoregion Scale

At the Ecoregion scale, ecological units are recognized by differences in global, continental, and regional climatic regimes and gross physiography. The basic assumption is that climate governs energy and moisture gradients, thereby acting as the primary control over more localized ecosystems. Three levels of ecoregions, adapted from Bailey (1980), are identified in the hierarchy:

1. *Domains* are subcontinental divisions of broad climatic similarity, such as lands that have the dry climates defined by Koppen (1931), which are affected by latitude and global atmospheric conditions. For example, the climate of the Polar Domain is controlled by arctic air masses, which create cold, dry environments where summers are short. In contrast, the climate of the Humid Tropical Domain is influenced by equatorial air masses and there is no winter season. Domains are also characterized by broad differences in annual precipitation, evapotranspiration, potential natural vegetation, and biologically significant drainage systems. The four Domains are named according to the principal climatic descriptive features: Polar, Dry, Humid Temperate, and Humid Tropical. The Delta River Area lies entirely within the Polar Domain.

2. *Divisions* are subdivisions of domains determined by isolating areas of definite vegetational affinities (for example, prairie or forest) that fall within the same regional climate, generally at the level of the basic

types defined by Koppen (1931) as modified by Trewartha (1968). Divisions are delineated according to the amount of water deficit (which subdivides the Dry Domain into semi-arid, steppe, or arid desert) and the winter temperatures, which have an important influence on biological and physical processes and the duration of any snow cover. This temperature factor is the basis of distinction between temperate and tropical/subtropical dry regions. Divisions are named for the main climatic regions they delineate, such as subarctic. One Division, the Subarctic Regime Mountains is identified for the Delta River Area.

3. *Provinces* are climatic subzones, controlled primarily by continental weather patterns such as length of dry season and duration of cold temperatures. Provinces are also characterized by similar soil orders. The climatic subzones are evident as extensive areas of similar potential natural vegetation such as those mapped by Kuchler (1964). Provinces are named typically using a binomial system consisting of a geographic location and vegetative type such as M135 Alaska Range Humid Tayga-Tundra-Meadow Province (Bailey and others 1985).

Highland areas that exhibit altitudinal vegetation zonation and that have the climatic regime (seasonality of energy and moisture) of adjacent lowlands are classified as provinces (Bailey and others 1985). The climatic regime of the surrounding lowlands can be used to infer the climate of the highlands. For example, in the Mediterranean division along the Pacific Coast, the seasonal pattern of precipitation is the same for the lowlands and highlands except that the mountains receive about twice the quantity. The provinces are named for the lower-elevation and upper-elevation (subnival) belts, for example, Rocky Mountain forest-alpine meadows. A single Province is identified in the Delta River Area, M135 Alaska Range Humid Tayga-Tundra-Meadow Province, based on the province levels listed on the U.S. Forest Service website (http://www.fs.fed.us/land/pubs/ecoregions/toc.html).

Subregional Scale

Subregions are characterized by combinations of climate, geomorphic process, topography, and stratigraphy that influence moisture availability and exposure to radiant solar energy, which in turn directly control hydrologic function, soil-forming processes, and potential natural community distributions. Sections and Subsections are the two ecological units mapped at this scale.

1. Sections are broad areas of similar sub-regional climate, geomorphic process, stratigraphy, geologic origin, topography, and drainage networks. Such areas are often inferred by relating geologic maps to potential natural vegetation "series" groupings such as those mapped by Kuchler (1964). In recent years, numerical analyses of weather station and remotely sensed climatic information have assisted in determining Section boundaries. Boundaries of some sections approximate geomorphic provinces (for example, Blue Ridge) recognized by geologists. Section names generally describe the predominant geomorphic type or feature upon which the ecological unit delineation is based, such as Section M135A—Alaska Mountains, the only Section identified in the Delta River Area by Nowacki and Brock (1995). A description of this Section is maintained at the following USDA-Forest Service website (http://www.fs.fed.us/land/pubs/ecoregions/ch12.html). A map and description of Sections for Denali Park are provided in the General Resource Descriptions section of this document.

2. *Subsections* are smaller areas within Sections with similar surficial geology, lithology, geomorphic process, soil groups, subregional climate, and potential natural communities. Subsection boundaries usually correspond with discrete changes in geomorphology and biome. M135A.M2—Alaska Mountains.Alpine Mountains Subsection and M135A.M2L—Alaska Mountains.Boreal Mountains Subsection provide two examples of Subsections identified in the Delta River Area. A map and description of Subsections for the area are provided in the General Resource Descriptions section of this document.

Landscape Scale

At the landscape scale, ecological units are defined by general topography, geomorphic process, surficial geology, associations of soil families, and potential natural communities, patterns, and local climates (Forman and Godron 1986). These factors affect biotic distributions, hydrologic function, natural disturbance regimes, and general land use. Local landform patterns become apparent at this level in the hierarchy, and differences among units are usually obvious to on-the-ground observers. At this level,

terrestrial features and processes may also have a strong influence on ecological characteristics of aquatic habitats (Platts 1979; Ebert et al. 1991).

1. *Landtype association* is the only ecological unit represented at this scale in the hierarchy. These are groupings of landtypes or subdivisions of subsections based on similarities in geomorphic process, geologic rock types, soil complexes, stream types, lakes, wetlands, subseries, or plant association vegetation communities. Repeatable patterns of soil complexes and plant communities are useful in delineating map units at this level. Names of Landtype Associations are often derived from geomorphic history and vegetation community. Landtype Associations are synonymous with the 152 detailed soil map units described in the Resource Description section of this document. Digital maps at the Landtype Association level are a principle product of this project.
2. *Soil Map Units* are identified as divisions of *Landtype associations* based on soil differences that influence how individual soil components are named and classified in *Soil Taxonomy* (Soil Survey Staff 1999). This is not a recognized part of the ECOMAP-Hierarchy, but is an artificial division based on the *Soil Taxonomy*.

Land Unit Scale

At the basic land unit scale, ecological units are designed and mapped in the field based on properties of local topography, rock types, soils, and potential natural vegetation. These factors influence the structure and composition of plant communities, hydrologic function, and basic land capability. Landtypes and landtype phases are the ecological units identified at this scale. For this project, these are considered as scale independent features of the landscape. Landtypes are synonymous with Ecological Sites described elsewhere in this document.

1. *Landtypes* (Ecological Sites) are subdivisions of landtype associations or groupings of landtype phases based on similarities in soils, landform, rock type, geomorphic process, and plant associations. Land surface form influences hydrologic function (for example, drainage density, dissection, and relief) and is often used to delineate different landtypes in mountainous terrain. Valley bottom characteristics (for example, confinement) are commonly used in establishing riparian landtype map units. Names of landtypes include an abiotic and biotic component. For the Delta River Area, only the abiotic component was used in the naming of Landtypes. The Landtypes or Ecological Sites occurring in the area are described in the Detailed Resource Descriptions section of this document.
2. *Landtype Phase*s are subdivisions of Landtypes based on topographic criteria (for example, slope shape, steepness, aspect, and position), hydrologic characteristics, associations and consociations of soil taxa, and plant associations and phases that influence or reflect the microclimate and productivity of a site. Landtype phases are often established based on interrelationships between soil characteristics and potential natural communities. In riparian mapping, landtype phases may be established to delineate different stream-type environments (Herrington and Dunham 1967). The naming convention is similar to Landtypes. Landtype Phases are not identified for all Landtypes and have not been specifically designated in this document. The Landtype phase is the smallest ecological unit recognized in the hierarchy. These are subdivisions of Landtypes based on topographic criteria such as slope shape or position, hydrologic characteristics, and plant associations and phases that influence or reflect microclimate and productivity of the site. Landtype Phases are used in this project to describe subordinate areas of micro-relief or microclimate within a Landtype. These areas have a significantly different plant community than the dominant condition observed within the Landtype. Examples of micro-relief include areas of micro-highs or micro-lows on periglacial landforms such as circles, gelifluction lobes, steps, and stripes where micro-climate differences produce one or more significantly different subordinate plant communities. Another example of a soil microclimate difference that warrants the use of a Landscape Phases is stream terraces that have two or more potential plant communities occurring together in a mosaic. A slight variation in the thickness of the loamy surface layer over sand and gravel affects rooting depth and plant available water, which results in two significantly different potential plant communities. The subordinate community is assigned a Landtype Phase. Landtype Phases are also used when two or more significantly different potential plant communities occur on the same soil component and the differences between the communities cannot be distinguished based on obvious disturbance or site properties. Again, the subordinate community is assigned a Landtype Phase. Within the Landtype descriptions, an Ecological Status assignment of “wetter microsite,” “drier microsite,” “beaver-impacted

site and vegetation," or various pond succession designations are used to designate Landtype Phases, though these were used to a limited extend on this project.

Plot Data

Point or plot sampling units are used to gather ecological data for inventory, monitoring, and quality control, and for developing classifications of vegetation, soils, or ecological types. This plot data is entered into a database for analysis, description, and interpretation of ecological units (Keane and others 1990). Plots, while not mappable, can be shown on maps as point data.

Ecological Mapping Hierarchy as Used in Delta River

For the Delta River area, the Subsection, Landtype Association, Landtype (Ecological Site), and Landtype Phase levels were developed using a bottom-up approach by aggregating detailed units into more generalized units. The two most detailed levels, Landtype (Ecological Site) and Landtype Phase, were identified and described as part of the field mapping procedure. The Landtype level represents a defined array of soil and site properties that result in a unique potential natural community and predictable seral communities. These are thought to be stable properties that are not likely to change significantly over time. Criteria that are often important in distinguishing Landtypes include surface soil texture and associated pH, slope, elevation, the presence of a shallow water table or permafrost, and flooding regime. Common disturbance factors resulting in the various seral communities within Landtypes in the Delta River Area are limited primarily to flooding and inundation since fire, for the most part, was insignificant. Landtype Phases are used to describe subordinate areas within a Landtype with micro-relief or microclimate that results in one or more potential natural communities. Landtype Associations are scale dependent landscape units that include natural aggregations of spatially related Landtypes that can be consistently delineated on aerial photography.

Most soil map units in this survey are associations and complexes. Associations are map units with two or more soil components that could be delineated at the map scale but instead are grouped together because of their association on similar landforms. Complexes are map units consisting of two or more soil components, which are mapped together in a single unit because of a complex repeating pattern within which the individual soil components cannot be delineated at the map scale of 1:24,000 (see ECOMAP Landtype and Landtype Phases). Many of the map units on flood plains are complexes and most upland units are complexes and associations.

National Hierarchical Framework of Ecological Units provides a basis for assessing resource conditions at multiple scales and levels of information resolution. The Subsection level developed during this survey is applicable to area-wide planning, modeling, and management activities. The Landtype Association or Soil Map Unit level is applicable to project and management unit and sub-unit planning and modeling.

Ecological Classification Hierarchy

This survey makes use of two levels of ecological classification—Landtype (Ecological Site) classification and soil classification. A Landtype, which is the more general level of ecological classification, is a basic unit of ecological land classification and represents a type of land with a distinctive combination of potential natural communities, soils, landforms, hydrology, climate, and ecological properties and processes. Landtypes of the Delta River Area are described in the ECOMAP Landtypes and Landtype Phases.

Soils are the building blocks of Landtypes. Usually, soils have a more narrowly defined range of morphological, physical, and chemical properties than a Landtype. One or more soils that have similar vegetative and ecological potentials and processes are grouped together to define a Landtype. Soils of the survey area are described in Detailed Soil Descriptions.

Landtype-Soil Correlation

To effectively build a Landtype classification from the soil classification, a high degree of correlation between soils, vegetation, and ecological potential is necessary. To establish the relationships and maintain correlation, vegetative characteristics and ecological patterns and processes observed in the field are used in conjunction with soil characteristics and other criteria specified in *Soil Taxonomy* and *Keys to Soil Taxonomy* (Soil Survey Staff 1999; 2003). Delta River Area soils are classified to the series level (see Classification of the Soils). One example of a soil classified to the series level is Nizina. Soil phases (Soil Survey Staff 1999) are defined if the range in properties for a soil is too broad to maintain the correlation with vegetative and other ecological properties. Phases are applied at any level of the soil classification, but are used at the series level in this survey. When a soil is split into multiple soil phases, phase name modifiers are added to the soil name to identify the phases. This was often necessary when two distinctive plant communities exist on what otherwise appears to be the same soil due to differences in flooding disturbance. To accommodate these two distinctive communities, a rarely flooded phase was assigned to the component so the component name is represented as Nizina, rarely flooded.

Landtype (Ecological Site) R173XY258—Gravelly flood plains, cool, is an example of how soils are defined and grouped into a Landtype (Ecological Site). Within this site are two unique soil components, Tangoe and Nizina, dry. Vegetation is similar on all of these and is feltleaf willow-mixed shrub/herbaceous scrub. The primary difference between these components is the presence of a seasonal water table between 20 to 39 inches depth in Tangoe soils with no observed water table within 59 inches depth in Nizina, dry soils. Otherwise, both soil components have a similar sequence and morphology of soil horizons, other site and soil properties, and all share similar vegetative and ecological properties and potentials.

Relationship Between Ecological Classifications and Mapping

As noted previously, four ecological levels —Subsections, Landtype Associations, Landtypes, and Landtype Phases—were developed during this survey. Subsections represent aggregations of Landtype Associations, which are aggregations of Landtypes. Landtype Phases describe variations in potential natural communities due to micro-relief or microclimate. The soils themselves are components or building blocks of the Soil Map Units. A Soil Map Unit represents an area on the landscape and consists of one or more soils or miscellaneous areas (see Resource Descriptions section). For example, soil map unit AFA-Nizina-Sinona-Riverwash complex, 0 to 12 percent slopes represents a segment of the landscape made up of two dominant soils and a miscellaneous land area, Riverwash. The proportion of each of these components, where it occurs within the unit, and other characteristics of the unit are described in the map unit description.

Because each soil component is correlated to an Ecological Site (Landtype), an Ecological Site or Landtype map can be derived from the soil map. In soil map unit AFA, the Nizina soil correlates with Ecological Site F173XY151—Loamy high flood plains. The soil component Sinona correlates with Ecological Site F173XY355-Gravelly colluvial slopes, warm. The miscellaneous land area Riverwash is not assigned an Ecological Site since it represents a non-soil area. In an Ecological Site or Landtype map, soil map unit AFA would be included in an Ecological Site or Landtype map unit named Loamy high flood plains-Gravelly colluvial slopes, warm-Riverwash complex.

Appendix B—Discussion of Soil and Geomorphic Processes

Soil is the unconsolidated mineral and organic material on the surface of the earth that serves as the natural medium for the growth of land plants (Soil Survey Division Staff 1993). Soil differs from the material from which it was derived in many physical, chemical, and morphological properties and characteristics. Environmental factors such as climate, parent material, topography, and living organisms, all acting over time, influence soil development. The influence of any one of these factors varies from place to place, but the interaction of all of them determines the kind of soil that forms. The exact combination of physiochemical and biological reactions that transforms materials into the soil horizons of a specific soil cannot be determined with certainty. Soil processes are best described as a package of soil forming factors with associated characteristics that may be observed in the field. The fluvial process, described in detail below in Soil Processes and Indicators, provides an example of a package of soil forming factors. A discussion of individual soil forming factors including climate, parent material, topography, living organisms, and time with reference to important processes associated with each factor are provided. This is followed by an independent discussion of the major soil and geomorphic processes identified for the Delta River Area and a section on permafrost and soil formation.

Soil Forming Factors

Climate

The climate of the Delta River Area, which is described in the section General Nature of the Area, is characterized by a distinctive climatic zone corresponding to the Polar Domain of Bailey and others (1994). The climate of the Polar Domain of the Alaska Range, often referred to as the interior climatic zone, is continental with long cold winters, short warm summers, relatively low precipitation, and a moisture deficit during the growing season.

The interior climatic zone lies within the zone of discontinuous permafrost described by Péwé (1975). A more complete description of the complex relationship between soils and permafrost is provided in the section Permafrost and Soil Formation. Permafrost, though extensive in the lowlands of interior Alaska, is less common in the mountains of the Alaska Range and generally constitutes less than about 25 percent of upland landscapes within the Delta River Area.

Periodic winter winds are also a distinctive climatic characteristic of the area. Winds distribute snow disproportionately across the landscape resulting in large drifts on leeward slopes and extensive areas of barren windswept ridges and flats. Areas swept clear of snow have deep seasonal frost or permafrost. Micro-relief in these areas includes a host of periglacial features such as circles, steps, and turf hummocks within the alpine biome (Plates 22 and 10). In swales and leeward slopes where snow accumulates, the thick insulating blanket of snow prevents deep frost during winter and the slow release of water saturates soils beneath and down slope of the drifts well into the summer months.

The interior climatic zone experiences a significant moisture deficit during most summers (evapotranspiration in excess of precipitation). As a result, the amount of water available for weathering and translocation of soil minerals is low. Soil horizon expression is generally only weak to moderate in medium textured materials with braunification the dominant soil process in well drained permafrost free soils (Plate 23). An exception exists where coarse-textured materials in an upland setting promotes weathering and translocation of minerals as described in the Schleyer soil and illustrated in Plate 24.

The terminology used to describe and classify soil of the Delta River area reflects the cold climate of the Alaska Range (see Classification of the Soils). Within the gravelly alpine mountain areas, the most extensive soil Orders found include the Inceptisols and Spodosols. Within these two Orders, the Gelepts and Gelods are the two common Suborders. The “Gel” prefix indicates that these are the coldest Suborders within these soil Orders. Definitive characteristics of the Suborders include mean annual soil temperatures less that 32 degrees F and a lack of permafrost within 7 fees of the surface. These highly conductive gravelly soils experience major seasonal swings in soil temperature. Winter soil temperatures

at 20 inches may dip to 0 degree F or lower during late February and peak at 59 degrees F or warmer during mid-August, as soil temperature measurements from a similar soil in Denali National Park illustrates (Clark and Duffy 2005). Also, mean annual soil temperature is typically below 30 degrees F in these soils (Figure 4).

The presence of permafrost in area soils also underscores the cold nature of the regional climate. Though not as extensive as the previously described soils, the Gelisols (soils with permafrost within two meters depth) is the next most common soil Order present in the Delta River Area. These soils are the product of a cold climate in conjunction with the insulating affect of thick organic mats overlying loamy or silty mineral soils with characteristic low conductivity properties. In contrast with the Gelepts and Gelods Suborders previously described, the Gelisols experience only slight changes in seasonal soil temperatures with an overall mean annual soil temperature only slightly below 32 degrees F (Figure 5). Permafrost, the definitive characteristic of this soil Order is present at shallow to moderate depths (Plate 11).

Parent Material

Soil parent materials are divided into organic and mineral. Organic materials consist of a predominance of nonliving, partially to highly decomposed plant materials. Surface mats of organic materials cover most soils of Delta River Area with the exception of exposed bedrock, active talus slopes, and soils on low flood plains. The thickness of organic materials varies widely. On steep meta-stable mountain slopes, the organic mat is discontinuous and generally less than one inch thick. On plains and hills within the alpine and boreal biomes, the mat generally ranges from 1 to 16 inches thick and in wet depressions ranges from 20 inches to several feet thick. Origins of organic materials that form these mats are tied to three specific soil processes: braunification, podzolization, and hydromorphism.

On well drained mineral soils, a dynamic equilibrium exists between organic material production and decomposition. Percolation of water through mineral soils removes soil bases and acidifies the soils. Acidic surface conditions favor both the establishment of moss and the preservation of surface litter from vascular plants. Long-term preservation of organic materials is enhanced by low soil temperatures, which suppress microbial activity. However, significant accumulations of organic materials are rarely observed in well drained soils and this is attributed to high organic turnover from oxidation. Organic mats on well drained soils are typically only a few inches thick (Plate 22) and rarely exceed eight inches. Two soil processes associated with soil acidification and organic mat establishment on well drained soils are braunification and podzolization.

Thicker organic deposits are frequently associated with saturated soil conditions where organic materials accumulate under acidic, saturated, anaerobic conditions (Plate 9). These conditions are represented by the process hydromorphism. Though not extensive in the Delta River Area, most areas of soils with moderately thick hydromorphic organic surface mats (8 to 20 inches) are on more gently sloping landforms within the Alaska Mountains-Glaciated Uplands and Alaska Mountains-Alpine Mountains Subsections, where soils have shallow water tables perched over permafrost. Though of minor extent, soils with thick hydromorphic organic deposits (20 to over 59 inches thick) without permafrost are found in depressions on all landscapes throughout the Delta River Area.

Mineral parent materials include colluvium, glacial, fluvial, and eolian deposits. Within the mountainous regions, soils are predominately formed in gravelly colluvium derived from bedrock. The variable nature of rock types over short distances made tying specific soil properties to individual rock types difficult at the scale of this project.

Mountainous areas throughout the remainder of the Delta River Area consist of a mixture of rock types that vary considerably in physical appearance and chemical properties over short distances. Soils in these areas are formed in a variety of rock types including sedimentary, igneous, and metamorphic. Weathering products include loam or sandy loam textures, and a medium level of soil cations such as calcium, magnesium, and potassium. Basaltlake, is a typical soil component formed in colluvium and is represented in map unit MSHP-Steps-Basaltlake association, 14 to 75 percent slopes (Plate 25).

Other parent materials include alluvium, glacial drift, and eolian materials. The physical and chemical properties of these materials influence the type of soil that forms. Within the Alaska Mountains-Glaciated Uplands, well drained upland soils that form in a thin layer of loess over coarse-textured glacial outwash

deposits all have well expressed soil horizons (Plate 24). Coarse, porous materials maximize percolation of rainwater and melting snow, which promotes weathering and translocation of minerals in soils. Also, these soils have the warmest summer soil temperatures of the regional soils, which enhances biological activity and weathering processes. Elsewhere, soils formed in loess over till or colluvium of mixed lithology have significantly finer textures with lower permeability, properties favorable to only moderate soil horizon development and expression (Plate 26).

The texture of the unconsolidated materials influences the thermal properties of the soil and whether or not permafrost is a commonly occurring landscape phenomenon. Soils formed in till have loamy textures with low rock fragment content and relatively low thermal conductivity properties and thus permafrost is common. Thermal conductivity properties are discussed further in the Permafrost and Soil Formation section.

Topography

Topography influences the degree of down slope movement of materials, the collection or dispersion of water, as well as soil temperature and moisture relations associated with aspect and snow distribution. Slope steepness is one example of topographic influences on soil formation. Steeper slopes are inherently unstable and more subject to down-slope movement, conditions unfavorable to soil weathering and the differentiation of soil horizons. For example, on steep mountains above about 2,953 feet elevation barren rock outcrops and scree slopes are dominated by colluvial processes with no apparent soil development (Plate 27).

Elsewhere, the topography factor combines with one or more of the other soil forming factors. Soils on mountains (topography) with a continuous mat of vegetation (living organisms) illustrate the combined influences of two soil forming factors. Below about 2,953 feet elevation, even on very steep slopes, colluvial processes are offset somewhat by the stabilizing affects of dense root and vegetation mats formed by avens, cassiope, and other dwarf ericaceous shrubs. The biological mat stabilizes soils, favoring the braunification process. The product of this combination of factors and processes includes a thin organic mat, and a thin dark “A” horizon underlain by a moderately thick reddish brown “Bw” horizon (Plate 26).

Topography also influences the accumulation of water on the landscape. On various landforms within the alpine and subalpine biomes, snow accumulates in swales and depressions and drifts persist into late spring and early summer. As drifts melt from swales, a steady discharge of water saturates soils down slope, promoting anaerobic conditions and the accumulation of organic matter within the mineral surface layer. Closed depressions lack surface drainage outlets and remain saturated for longer periods during the growing season. Prolonged anaerobic conditions associated with saturation favor the accumulation of thick organic deposits (Plate 9).

Flooding is another expression of the topography factor. Flooding frequency and elevation above active river channels influences the texture of flood deposits and the type of vegetation that grows. Areas adjacent to active channels are regularly scoured by high velocity flood waters and soils are gravelly (Plate 28) with water tables near the surface. Accumulation of calcium carbonate and other salts are also a result of fluvial processes on early successional plant communities along flood plains. These processes were described by Van Cleve and others (1993) along the Tanana River flood plain near Fairbanks. Topographic-vegetation relations on these positions include the presence of young willow scrub and herbaceous communities that established between flooding events or managed to survive previous events. On more elevated and less frequently flooded positions water velocity of over-bank flooding is slowed by the dense stands of mixed tall alder-willow scrub, and alluvium consists of finer textured stratified sandy and silty deposits (Plate 29).

Topographic exposure also influences the type of soils that form. In mountainous alpine areas, a stark contrast exists in vegetation in depressions on slopes where snow accumulates. Swales remain snow covered into late spring, which favors herbaceous vegetation, and remain seasonally saturated until late spring (Plate 30).

Patterned ground are micro-relief features associated with mixing of the soil by frost action (cryoturbation). This phenomenon is represented throughout the alpine biome in the Delta River Area. Two general groups of patterned ground are identified and include those features with permafrost and

those without permafrost within the five feet deep soil profile. Common patterned ground features with permafrost include turf hummocks, peat mounds, and circles. Earth hummocks, another commonly occurring micro feature, generally lack permafrost. Specific cryogenic processes that form the various patterned ground features are described in the following paragraphs.

Earth and turf hummocks are irregular or bumpy features each with local horizontal and vertical relief of up to 20 inches. Earth hummocks are limited to more gently sloping positions within the mountainous alpine biome. Turf hummocks are extensive throughout the alpine biome (Plate 10). Both hummock forms are the result of ice segregation, differential freezing, and differential ground heaving with or without permafrost present (Embleton and King 1968; Sigafoos and Hopkins 1951). The origin of these features has been attributed to deeper frost penetration in micro-low positions where saturated conditions often exist and conduct cold temperatures downward, causing lateral thrusting or squeezing, often injecting mineral and organic material into or beneath the micro-highs, resulting in hummock growth. Turf hummocks or cottongrass tussocks are common features on slopes less than about 6 percent and are underlain by permafrost.

Steps are elongated or lobate earth hummocks on steeper slopes with the long axis of the step orientated in a down slope direction with overall slopes from about 8 to 35 percent (Plate 31). The process of formation is similar to that for hummocks, with the addition of a significant gravity factor caused by steep slopes. During freezing, ice crystals grow and displace soil particles in a direction controlled by the direction of freezing. In other words, the soil particles move toward the direction from which the frost enters and penetrates the ground. On thaw, the particles resettle in a direction controlled by gravity. Thus, if the cooling surface is inclined, the displaced particles will always resettle slightly down hill from their original position (Embleton and King 1968).

Peat mound development, as described by Williams and Smith (1989), is attributable to a thin cover of snow, which allows for deep frost penetration and frost heaving. These features are underlain by permafrost at shallow depths in the Delta River Area, especially in the Alaska Mountains-Glaciated Uplands Subsection. Peat mounds form discrete, irregularly spaced bumps three feet or more across and several inches to three feet or more in height. The drier peat near the surface of these elevated areas increases the overall insulating qualities of the peat, thus maintaining frozen soil conditions throughout the summer and promoting the formation of ice crystals and masses. Abundant water from the adjacent wet meadows and ponds feeds the developing ice core of the mound. Free water in contact with the frozen core then 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 several centimeters or meters above the surrounding landscape (Figure 4).

Circles (or mud boils) are clusters of more or less circular features several feet in diameter with slightly raised centers that are often free of vegetation (Plate 22). Circles are found throughout the alpine biome in the Delta River Area, generally on slopes less than 20 percent. Beneath the center of the circles, permafrost is intermittent and relatively deep in the soil profile. The troughs surrounding the circles are several feet wide, have alpine scrub vegetation, thick organic mats, shallow permafrost, and a shallow water table perched over the frost. Swanson and others (1999) attribute the formation of circles to a process described as “diapirism,” which is the upward movement of relatively low density saturated soil material above the permafrost table. Soil material with a low bulk density, as a result of a high ice content, is described as being present just below the permafrost table. This material has a significantly lower bulk density than the overlying drier mineral soil material. As a result of this unstable bulk density profile, upward movement of the low-density soil material is likely to occur when the soil surface is disturbed or warm summer temperatures causes it to thaw. The flow upward to the surface forms the slightly elevated, often vegetation-free micro-feature.

Living Organisms

The living organism factor includes animals, lower plants, and higher plants. Many biochemical processes involving the cycling of different elements occur in soil where the organic compounds exuded by the roots and produced by microbial degradation of organic debris are involved and provide the energy

needed in the biological weathering process. Also, the mixing and breakdown of organic materials by animals are important to soil formation.

Animals contribute, to various degrees, to the mixing and decomposition of organic materials in all soils in the Delta River Area. Large mammals like moose, caribou, black bears, and grizzly bears contribute locally to mixing of soils, but are rarely responsible for determining the type of soil that forms.

Earthworms, though significant contributors in more temperate climates, are minor contributors because of their small size and very low density. Voles are observed as significant contributors to surface organic matter accumulation and mixing in some soils, especially soils of the Ecological Site Loamy Slopes, Wet, which has white spruce/willow woodland vegetation. Thick organic accumulations are commonly observed on the soil surface from extensive burrowing by voles, which possibly contributes to the thick dark surface mineral “A” horizon.

The lower plants include moss, fungi, bacteria, and algae. Observing lower plants, especially microorganisms in a field setting, and correlating these with specific soil processes is very difficult and beyond the scope of this project. In addition, it is difficult to isolate the exclusive role of microorganisms in the soil system considering their diversity and proportion of the soil biota. The effectiveness of microorganisms in decomposing rocks and minerals was demonstrated by Glazovskaya (1950). He described fungi as being the most destructive of the micro flora, producing chelating organic acids similar to fulvic and humic acids. Mosses and lichens are the only members of the lower plants consistently documented during this survey. The presence of a continuous moss or lichen layer on the soil surface is indicative of soil stability and suggests that soils processes such as braunification and podzolization are active on the site. Lack of a surface moss layer suggests surface disturbance by colluvial processes, flooding, fire, or the presence of productive herbaceous plant communities that prevents moss establishment.

The higher plants are the vascular plants, which includes trees, shrubs, grasses, and forbs. This category of living organisms provide the most profound affect on soils of Delta River Area, since the higher plants contribute significantly to the organic matter content of soils, as well as soil stability. Certain tree species like spruce are susceptible to wildfire, which directly influences thermal properties and permafrost dynamics on some soils. In addition to the stabilizing affects of vegetation, various plant communities contribute to the braunification process because of the acidity of their litter. Precipitation percolating downward through surface litter and moss acidifies mineral soils. In alpine areas especially throughout the Tangle Lakes area, the resinous litter from shrub birch (Plate 31) is an important contributor to soil acidification and braunification. In the subalpine and boreal biomes alder, a strong soil acidifier (Crocker and Major 1955) (Plate 33), and white spruce contribute to surface acidification, which promotes braunification. A discussion of the significance of higher plants and plant communities on soil formation follows.

In the high alpine mountains of the Alaska Mountains-Alpine Mountains Subsection at the upper limit of vegetation at approximately 2,625 to 3,281 feet elevation, vegetation is dominated by dwarf scrub types (Plate 5) are considered meta-stable with braunification and colluviation the principle processes identified. Within the alpine biome below about 2,625 feet elevation within the Alaska Mountains-Alpine Mountains Subsection, vegetation is dominated by shrub birch-bog blueberry scrub (see Ecological Site Description Gravelly Slopes), and shrub birch-dwarf ericaceous scrub mosaic communities (see Ecological Site Description Gravelly Slopes, High Elevation). A mosaic of shrub birch and lichen types are found extensively throughout the area on ridge crests on mountains, and glaciated hills where micro-relief changes dramatically over short distances. Ridges are exposed to wind and often have a sparse cover of alpine bearberry and lichen with a high percentage of exposed rock fragments. More protected concave to plain shaped surfaces and leeward slopes of hills support shrub birch scrub types. Soils supporting shrub birch scrub types have relatively stable surfaces favorable for braunification and podzolization processes. Soils under shrub birch-ericaceous scrub communities are significantly more acid than under other alpine communities. Typical soil reactions are extremely acid (pH 3.5 to 4.4) in the surface mineral horizon under shrub birch with strongly or moderately acid (pH 5.1 to 6.0) reaction under various dwarf scrub types including alpine bearberry, white mountain avens, and other low growing nonvascular plants. Also, the presence of gray leached eluvial “E,” indicative of acid leaching and the podzolization process, is more common in soils that support shrub birch scrub types than the other alpine scrub types.

At tree line, low productivity white spruce forests and woodlands are commonly found on soils with seasonal near-surface water tables perched over low permeable materials such as loamy alluvium or gravelly till. Osar soils provide an example of these seasonal perched water table conditions (Plate 26). These soils have thick surface “A” horizons enriched by the importation of nutrients from up slope positions by down slope movement of the water table. Reaction in the surface “A” horizon of Osar is moderately acid or slightly acid, significantly less acidic than in the adjacent well drained Klute soils, which lack near-surface water tables.

The most productive forests in the Delta River Area are on flood plains at lower elevation. The most common type is the white spruce-poplar/alder forest (see Ecological Site description Loamy Flood Plains). Soils here have a thick loamy alluvial mantle that is enriched by occasional, brief flooding and sediment depositions that provide favorable physical and chemical soil properties for productive forest establishment and maintenance.

Relations exist between various scrub communities and soils in riparian areas throughout the survey area. These relations are best expressed in terms of relative elevation above active flood channels, with several discrete flood plain levels evident on the landscape. Low flood plain positions include primarily gravel bar areas. These areas have a high recurrence of flooding and are often adjacent to active flood channels that have sparse or no vegetation (Plate 35). With a slight increase in elevation above the active channel, vegetation cover increases to a sparse cover of feltleaf willow scrub and herbaceous meadow communities formed primarily in gravelly alluvium. The upper boundary of the water table ranges between 20 inches and 3 feet in depth during summer (Plate 28) (see Ecological Site Description Gravelly Low Flood Plains, High Elevation). Mid-flood plain positions have closed scrub poplar-willow scrub and alder scrub communities on well drained soils consisting of a thin and often discontinuous organic mat over a thin mantle of stratified sandy and silty alluvium underlain by sand and gravel (Ecological Site Description Loamy Flood Plains). The combination of relatively dense scrub cover and relative height above the active flood channel favors low velocity flood inundations and the accumulation of a thin mantle of stratified sand and silts. A thin, discontinuous surface organic mat and slight acidification of the surface “A” horizon suggests several years to decades between individual flood episodes. High flood plains are the next discrete flood plain level where flooding is infrequent and the ground surface is relatively stable, allowing the formation of a relatively thick continuous organic mat and acidification of the surface mineral “A” horizon. The period between flooding events is likely decades, allowing for periods of stability that favor the replacement of scrub types with the more slow growing forest species such as white spruce.

Dwarf spruce woodlands, often referred to as “taiga,” are the single most extensive potential natural vegetation group found in the Interior Alaska Lowlands. However, this group is absent in the Delta River Area.

Time

The time that a soil is exposed to soil-forming processes also determines the degree of mineral weathering and horizon development. Soils of the Delta River Area are grouped into four relative age categories: young, intermediate, old, and paleosols. Young soils are those subject to episodic or continuous disturbance that restricts the development of soil horizons other than thin surface accumulation of organic material or organic enrichment of the mineral surface horizon. These soils lack significant surface stability and the age of these soils may range from months to decades. Included within this group are actively flooded soils (Plate 28) and soils on steep scree and talus slopes (Plate 27).

Soils categorized as intermediate in age are those that are in dynamic equilibrium between a process that favors vertical percolation of water and horizon differentiation and a process that favors the destabilization or halting of the soil forming processes. Generally speaking, landform surfaces associated with intermediate age soil are typically Holocene in age (less than 10 thousand years old). Members of this group include well drained soils on moderately steep slopes with continuous root mats (Plate 5), well drained soils on high flood plains and stream terraces, and soils with permafrost (Plate 36) on all landforms. With the exception of soils with permafrost, braunification is the most active process in these intermediate age soils. Resulting soil features indicative of the braunification process include a surface “A” and subsurface “Bw” horizons. However, the destabilizing influences of colluvial processes have

minimized the degree of expression of braunification process and total horizon depth rarely extends to depths below 20 inches. Also included within this age group are soils with thick surface organic horizons and associated permafrost and poor drainage (Plate 7). The presence of a thick organic mat and permafrost indicates a certain degree of surface stability. Destabilizing factors that may offset soil development includes surface failures as a result of natural surface disturbance and frost churning (cryoturbation). The dominant process associated with these intermediate age soils is hydromorphism. Specific soil indicators associated with hydromorphism include establishment of a thick saturated organic mat and saturated conditions over permafrost.

Soils categorized as old are those formed on landforms that are not subject to the significant destabilizing affects of slope, cryoturbation, or other processes that alter or halt weathering of soil minerals. Surface age is estimated as early Pleistocene (9 to 250 thousand years). Members of this group provide the best expression and overall depth of soil horizon development under the current climate conditions. A typical sequence of mineral horizons includes “A, E, Bhs, Bs, BC” and this sequence extends to depths of 30 inches or more. Included in this group are Schleyer (Plate 24) and Geist soils formed in loess over sandy and gravelly glaciofluvial deposits on terraces, plains, and hills (Plate 1).

Soil Processes and Indicators

Soil processes are defined as a combination of physiochemical and biological reactions that have actually transformed materials into soil horizons. The factors of soil formation previously recognized are thought of as controls on processes that result in observable and measurable features. Simplified concepts of solution, oxidation, reduction, hydrolysis, hydration, chelation, ionic substitution, synthesis, and crystallization have been applied to transformations of individual compounds and components of soils. Combinations of these elementary processes are believed to occur in the development of soils. Where a combination has been dominated by a particular process, or by a rate of a particular process, the resulting combination has often been given a name (Wilding and others 1984). The primary processes of braunification, colluviation, fluvial processes, hydromorphism, and podzolization are described below and illustrated geospatially for the Delta River Area in Figure 8. Each process discussed is related to observable sets of soil properties, or field indicators, used to establish dominant processes.

Colluviation is a depositional process by mass wasting or overland flow. Sediment deposited by mass wasting is generally nonsorted and nonstratified. Individual particles are not rounded. These characteristics distinguish colluvium from sediments deposited by fluvial processes (Longwell and others 1969). Products of colluvial processes include talus and solifluction deposits. In the Delta River Area, this process is enhanced by extreme temperature variations throughout the year. Multiple freeze-thaw cycles not only fracture exposed bedrock but also destabilize the slopes where the rock fragments accumulate. This process is extensive throughout the mountains and along river escarpments. Field indicators of this process include long plain slopes or conical features extending down slope from steep exposures of bedrock to the base of the slope. Soils within colluvial cones consist of nonsorted soil materials with 30 percent or more by volume angular rock fragments. The unstable surface on steep colluvial slopes results in the absence of soil horizons and the general lack of vegetation (Plate 27). On more stable or “meta-stable” colluvial slopes, a continuous organic mat underlain by an “A,” “Bw,” “C,” and “R” horizon sequence is more common. These characteristics are expressed in the typical soil profile illustrated in Plate 26.

Fluvial processes include the erosion, transportation, and deposition of alluvium by water. This process is a good example of the topographic and time factors of soil formation. Periodic flooding results in soils that exhibit minimal horizon development. Along low gradient streams, such as those found within the Alaska Mountains-Lowland Flood Plains, Terraces and Fans Subsection, low velocity flood waters deposit thick deposits of stratified sandy and silty sediments (Plate 29). A typical valley profile of this low gradient, meandering stream is provided in Plate 37. Along higher gradient streams, such as those found within the Alaska Mountains-Interior Flood Plains and Terraces and Alaska Mountains-Alpine Flood Plains, Terraces and Fans Subsections, high velocity floodwaters deposit gravelly and cobbly alluvium as channel deposits. Higher flood plain positions along these higher gradient streams consist of loamy over sandy and gravelly alluvium. Landscape indicators of fluvial processes includes the presence of barren or sparsely vegetated gravel bars, channels, and alluvial flats adjacent to active river channels (Plate 35), as

well as debris, ice gouged trees, and watermarks on vegetation. Vegetation indicators of fluvial disturbance include the presence of young stands of feltleaf willow and alder shrub, herbaceous vegetation (Plate 38), or balsam poplar forest types adjacent to stream channels. Soil indicators include stratification of sandy and silty textured sediments and buried organic layers (Plate 29) and relatively high soil reaction (pH) relative to soils on adjacent upland positions.

Fluvial processes in conjunction with other landscape factors result in variation in nutrient productivity between riparian systems. Two broad categories of alluvial soils have been identified in the Delta River Area, those with excess bases and those without. A specific fluvial process called “Enrichment” is assigned to those soils with excess bases. Enrichment includes the saturation or accumulation of basic soil metals such as calcium, magnesium, potassium, and sodium in surface soil layers. Enrichment includes both the deposition of base rich sediments by flooding and the concentration of bases in the upper soil profile by upward diffusion of base-rich water from a near-surface water table to the drier soil surface during periods of dry, warm weather. Enrichment results in the accumulation of calcium and magnesium carbonate compounds that sometimes form a white or brown crust on the soil surface. Soils with excessive carbonates effervesce when dilute hydrochloric acid is added. Effervescence is often observed in the surface mineral layers of the Nizina, dry, component of map unit FPG-Tangoe-Nizina, dry, complex. On low flood plains, pH of 7.6 or more in soil surface mineral layers also is a general indication of enrichment.

Hydromorphism is associated with near-surface saturated conditions and is an extensively occurring process throughout the Delta River Area. Hydromorphism provides a good example of the topographic factor of soil formation, since water collects locally in small concave micro-positions on all landforms, above restrictive layers with low permeability such as till or permafrost, and as regional features that may underlie river valleys and basins. A distribution of map units with hydromorphism identified as a primary or secondary process is provided in Figure 8. This process includes the chemical reduction, mobilization, and movement of soluble minerals and the formation of thick surface organic mats under saturated anaerobic conditions. Plant roots and soil microbes deplete the soil oxygen in these saturated soils, causing anaerobic conditions. Subsequently, iron and manganese, the primary pigments in mineral soils, are converted to reduced forms. These reduced compounds are mobile in the soil solution and are easily stripped from the soil by the water table. Soils stripped of mineral pigments in this way take on a neutral gray through bluish color, as illustrated in Plate 29, and referred to as redox depletions. Soil morphological features indicative of this process are noted with the “Cg” horizon. The mobilized minerals are transported through the soil by ground water to an oxidized zone. Here, mineral oxidation and precipitation occur, imparting a yellowish through reddish color to the soil, features referred to as redox concentrations. Where the water table fluctuates near the surface, the soil environment commonly alternates between reduced and oxidized states, and soils frequently display a complex mottled pattern of both reddish-oxidized (concentrations) and grayish-reduced colors (depletions). Permanently saturated soils often have thick organic layers (Plate 9). The accumulation and stability of organic deposits in these soils is attributed to prolonged saturation and the associated anaerobic environment.

There are three general groups of hydromorphic soils in the Delta River Area. These include aquifer-wet, topographically-wet, and climatically-wet soils. Aquifer-wet soils include those on flood plains and broad depressions in which a local or regional water table is present within the soil profile. An example of an aquifer-wet soil and associated landscape is illustrated in Plate 39. Evidence of aquifer-wet or extensive aquifer systems include the presence of abundant kettle lakes and ponds within glaciated landscapes and multiple oxbows and cutoff meanders on flood plains. Soil indicators of hydromorphism on these landforms include a near surface water table during much of the year, abundant redox depletions and concentrations, or thick saturated organic horizons. Vegetation indicators include a prevalence of wet sedge meadow or willow/sedge meadow types (Plate 40).

Topographically-wet soils include both open swales and closed depressions where the source of water is run-in from adjoining uplands or from precipitation. Water is held near the surface for prolonged periods because of the relatively low permeability of underlying materials. Topographically-wet mineral soils in swales or nivation hollows occupied by snow beds are common to the alpine and subalpine biomes. Saturated conditions result from melting snow-drifts that persist well into the summer and saturate soils down slope. Soils in these depressions are normally slightly more nutrient rich than adjoining well drained soils and have a water table at or very near the surface during a portion of the growing season. Soil

indicators of hydromorphism in these soils include a thick organic surface layer or thick organic rich mineral layer eight inches or more thick. Soil indicators of these seasonally saturated topographically-wet soils include a thick dark mineral surface horizon and faint reddish redox concentrations in subsoil horizons. A typical landscape illustrating topographically-wet soils is provided in Plate 30.

The climatically-wet soils are saturated soils overlying permafrost. Climatically-wet soils are very poorly or poorly drained with permafrost present within seven feet of the soil surface during summer. A combination of melting snow, summer precipitation, and progressive melting of the top of the permafrost during summer maintain saturated conditions. Soils are extremely to very acid in the surface organic layer and variable within the mineral layers. Soil indicators of hydromorphism in these soils include a thick surface organic mat eight inches or more thick, weakly to moderately expressed redoximorphic features, and saturated conditions in the thawed zone above the permafrost. Low productivity scrub and sedge communities in uplands and pattern ground features, specifically circles and steps, are indicators of climatically-wet soils and the presence of permafrost in the Delta River Area (Plate 41).

Braunification is the release of iron from primary minerals by oxidation or hydration. This gives the soil matrix brownish, reddish-brown, and red colors respectively (Wilding and others 1984). This process provides a good example of the joint influences of the time and topographic factors of soil formation. Braunification is common on vegetated mountain slopes, terraces, glacial plains, and hills throughout uplands of the area. The process is common to soils on relatively stable surfaces not influenced by flooding or excessive down-slope movement of soil materials. Here downward movement of water through the soil profile and free movement of oxygen promote weathering of primary iron minerals. Surface stability promotes the removal of excess basic metal cations from the soil through leaching and plant use. This is normally accompanied by a lowering in soil reaction (pH) in surface layers. The weathering and translocation of primary soil minerals, including iron and organic matter, accompany soil acidification. Surface indicators of braunification include the presence of a continuous surface organic mat or dwarf scrub cover and a thin dark surface mineral horizon, all indicative of surface stability. Additional soil indicators include the presence of a light brown to yellowish brown subsurface layer that indicates weathering and translocation of primary soil minerals (Plate 23). Soil reaction also gradually increases with depth, as illustrated in the detailed soil description for Castnot.

Podzolization includes the chelation and chemical migration of aluminum and iron and organic matter downward in the soil profile, leaving silica in the leached layer (Wilding and others 1984). This process provides a good example of the combined influences of climate and parent material factors of soil formation. A distribution of map units affected by the podzolization process is provided in Figure 8. This process of alteration and translocation is normally active under extremely acid soil conditions that are normally associated with high precipitation. Indicators of this process include a thin gray leached surface “E” horizon over a reddish or reddish brown “Bs” subsoil horizon (Plate 24). Soils displaying indicators of podzolization, or “podzols,” are extensive in uplands throughout the Alaska Mountains-Glaciated Uplands Subsection. Here, podzolization is more dependent on specific site and soil properties including coarse-textured soils and the presence of shrub birch, a known soil acidifier (Plate 32).

Cryoturbation includes the churning of surface and subsoil layers by frost action and the micro-relief features associated with this process are often referred to as “periglacial features.” This process is well expressed within the thin, annually thawed zone in soils underlain with permafrost but permafrost is not requisite. Indicators of cryoturbation include disrupted and broken soil horizons, mixing of materials from different horizons, and mechanical sorting of materials (Agriculture Canada Expert Committee on Soil Survey 1987). Cryoturbation is most evident in soils with abundant soil moisture, high rates of cooling (affected by vegetation and snow cover), and frequent freeze-thaw cycles (Embleton and King 1968). The presence of earth and turf hummocks, circle, steps and peat mounds provide surface evidence of cryoturbation in underlying soils (Plates 10 and 22). Micro-relief features associated with cryoturbation were described previously in Topography.

Permafrost and Soil Formation

Permafrost is soil or geologic material that is continuously at or below 32 degrees F. (National Research Council of Canada 1988). Permafrost, though not considered a soil or landscape process, has

a unique set of associated properties and processes. Permafrost as a landscape feature provides a good example of the climate factor of soil formation. Permafrost is found extensively on glacial plains and more gently sloping mountain slopes throughout the Delta River Area. A distribution of soil map units with permafrost is provided in Figure 9. Permafrost in soils commonly occurs as fine ice crystals between individual soil grains with occasional seams and lenses (Plate 11). The overall ice content ranged from about 60 to 70 percent by volume. Ice content of 80 percent or more by volume in ice cored mounds is estimated for Fels soils, a component in map unit IM—Shand-Bonot-Fels complex, 0 to 60 percent slopes. Disturbance of the surface organic mat of permafrost soils on slopes of 10 percent or more often results in melting of permafrost and slope failure as soils liquify and flow down slope. Slope failures associated with melting permafrost in soils as a result of natural disturbance have been observed on map unit MSHP-Steps-Basaltlake association, 14 to 75 percent slopes.

Permafrost is generally absent in the Alaska Mountains-Alpine Flood Plains, Terraces and Fans and the Alaska Mountains-Lowland Flood Plains, Terraces and Fans Subsections. Permafrost is absent on flood plains because of hydrologic factors. Permafrost formation in soils of the uplands requires the presence of a loamy or finer texture material with relatively low rock fragment content and low thermal conductivity properties. Thermal conductivity values quantify how rapidly heat is conducted through soil. These values are relatively low in moist organic materials and moist mineral soils with loamy or finer textures (Jury and others 1991). Low conductivity favors slow warming of soils and overall low summer soil temperatures, conditions favorable to permafrost formation. As for soils formed in gravelly alluvium on flood plains and colluvium in mountains, higher thermal conductivity properties favor heat transfer from the atmosphere during summer, resulting in rapid warming and relatively high summer soil temperatures, conditions unfavorable to permafrost formation.

Wildfires are common in interior Alaska, however, landscapes within the Delta River Area appear to have had minor impacts from fire. Rarely was charcoal observed in soil profiles and plant communities do not appear to have been extensively altered significantly by fire.

Appendix C—Survey Methods

NRCS developed inventory objectives and procedures in conjunction with potential users within the BLM. Principle focus of the project was to develop soil maps and associated interpretations to provide baseline information for management of soil and vegetation resources along the Delta Wild and Scenic River, a land designation managed by the BLM. To accomplish this, it was necessary to have sufficient map detail and field documentation to support a detailed (Order 2) soil survey along more heavily used flood plains and a detailed reconnaissance (Order 3) soil survey in less intensively used uplands.

The mapping base provided by BLM was color infrared aerial photography at a nominal scale of 1:24,000, dated August 1999. Orthophoto quads covering the entire survey area were made by NRCS from the same photography. Prior to field work, the photography was prepaired for field use and studied in detail to determine general soil-landform and soil-vegetation relationships. Relevant literature and other information on the climate, geology, geomorphology, hydrology, and vegetation of the area were assembled and reviewed.

Two levels of mapping intensity were used for the soils maps. The complex of flood plains and stream terraces immediately adjacent to the river channel, which receives the highest intensity of recreational use and provides the most productive and diverse wildlife habitat, was of greatest concern and interest to BLM biologists and land managers. Within this area, minimum polygon size is about 10 acres.

Approximately 75 percent of the delineations were visited during field work. Delineation boundaries were located from field observation and stereoscopic photo-interpretation.

The remaining uplands, with a lower intensity of land use and a lesser quality of wildlife habitat, were mapped at a lower level of intensity. In these areas, several representative delineations of each map unit were visited in the field to determine general characteristics. Polygon boundaries were located using a combination of stereoscopic photo-interpretation and established landform, soil, and vegetation relations. Average polygon size in the uplands is larger than 10 acres.

Soils and vegetation field data were collected by transecting tentative soil map units and making observations at predetermined intervals. A transect consisted of one to ten or more stops depending on the size and complexity of the unit. Corresponding soils and vegetation data and notes were linked using common transect and stop numbers. All transect and stop locations were plotted on the aerial photographs and USGS 1:63,360 topographic maps for permanent record and later reference during map preparation and data analysis.

Field data were entered into the Alaska Soil Survey Field Database (SSFDD) for data management and analysis. Results of data analysis were entered into the National Soil Information System database (NASIS).

Soils

Soil survey procedures can be grouped into two categories—map making and field documentation.

The following general steps were used to complete the soils map:

1. Tentative soil map unit boundaries (polygons and line symbols) were drawn on aerial photographs using stereoscopic photo interpretation. Landform signatures and vegetation patterns provided a basis for initial boundary locations.

2. This was followed by field evaluation of polygon boundaries during which soils data were collected and tentative assignment of map units were made.

3. An office evaluation of the data and review of field notes was completed and followed by adjustment of polygon boundaries and assessment of map unit assignments. A detailed description for each map unit was then prepared identifying the setting and major and minor components in the unit.

4. Soil map unit boundaries were transferred from the color infrared photographs to the orthophoto quads. Each polygon and line symbol was labeled with an appropriate symbol identifying the map unit.

Field documentation was collected, recorded on field forms, and entered into the SSFDD. This form consists of location, site, and horizon fields. The location field provides geo-reference information for each transect. Included are the legal location of each transect, map unit assignment, field photo number, and

1:63,360 scale quadrangle name. The site data field includes information on landscape properties and soil classification. Some data elements included in this field are slope, aspect, depth to water table, depth to permafrost, and estimated flooding frequency. Soil properties such as soil horizons, texture, rock fragments, and reaction observed at each stop are recorded in the horizon data field. These data provide the basic documentation from which soil map unit descriptions and interpretations are based.

Soil, vegetation, site characteristics, and projected level of management were used as the basis for map units. Soil components within each map unit consist of soils with similar soil properties, site characteristics, and potential vegetation. In valleys, subtle differences in flooding regime, soils, or vegetation are important in terms of riparian management and were a consideration in map unit design. Map units were set up to account for these slight differences in properties. In uplands, a less diverse set of site, soil, and vegetation characteristics is apparent. Subtle differences in soils often have little effect on management of the unit and a more broadly defined unit is sufficient. Component characteristics are described in the soil map unit descriptions.

Vegetation

Vegetation information was collected to support the development of ecological sites. This included assigning each transect stop to a vegetation type and collecting species and cover data to characterize the stand. Field classification was based on the structure and composition of a stand and included a separate assignment for each major stratum (up to five strata) in a stand. The call for a stratum included ADP codes for height class, canopy closure, and dominant species. Tree strata height classes (code) were tall (T1), medium (T2), stunted (TX), and regeneration (T3). Shrub height classes were tall (S2), medium (SM), low (S3), and dwarf (S4). Herbaceous and cryptogam height classes were tall (T), low (L), and dwarf (D). Canopy closure classes were closed (C; 75-100 percent cover), moderately closed (MC; 60-75 percent), moderately open (MO; 45-60 percent), open (O; 25-45 percent), and woodland (W; 10-25 percent). On occasions, canopy closure was coded W- (less than 10 percent) to note the occurrence of minor strata. ADP codes for plant species were taken from the Alaska Plants Database, a subset of PLANTS Database (USDA 2001).

Detailed stand descriptions were done at one or more selected stops on each transect. Stands were selected subjectively to be representative of the vegetation structure and composition observed along the transect. In most cases, at least one stand of each major type of vegetation occurring within each transect was described. A plotless, reconnaissance technique was used to describe the vegetation. Data were collected within an area of the stand approximately centered on the representative soil pit. Sample area size was variable but encompassed an area large enough to encounter all species in the stand and adequately represent the variability within the stand.

In each sample stand, canopy cover by species of vascular plants and total moss and total lichen cover were estimated to the nearest 5 percent (nearest one percent when cover was less than seven percent). Each species was also assigned to a representative stratum. Unknown species were collected for later possible identification. Cover of persistent and nonpersistent litter, bare soil, rock fragments, and ponded water and the approximate height of each major strata also were recorded. In many stands in woodland and forest vegetation the diameter, age, and total height of selected trees and tree basal area were measured to further characterize the structure and productivity of the stand. In addition to the stand descriptions, also recorded on each transect were coded entries and notes about fire history, successional status, wildlife use, landscape and successional relationships, variability within and between stands, and unusual communities and inclusions.

The major tasks following field work were to assign each stop to an ecological site based on interim vegetation types and ecological sites. The following general steps were used to develop the ecological site classifications:

1. Stand data were stratified by a combination of initial field classification of the vegetation and preliminary ecological site assignments. Preliminary Potential Natural Communities and any seral communities were generated from the database for each ecological site. General concepts of successional relationships between different vegetation types on similar sites were established.

2. Final ecological site codes were assigned to the data and final association tables were generated for the apparent potential natural community (PNC), or riparian plant association, and for each successional stage in an ecological site.

3. Final ecological site descriptions were generated by automated report utilizing data from both the SSFDD field data and the NASIS information. The frequency of occurrence, average canopy cover, and range in canopy cover for each species were calculated for the PNC and any seral vegetation types occurring within each ecological site. Ranges in soil and site properties were compiled for each ecological site.

Appendix D—Classification and Description of the Soils

This section includes a general description of the U.S. Soil Taxonomy used to classify soils in the Delta River Area (Soil Survey Staff 1999; 2003). Detailed descriptions of each soil series including a pedon, a small three-dimensional area of soil that is typical of the series in the survey area, is available at the website address provided below.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field, or inferred from those observations, or from laboratory measurements. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth, or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Cryept (*Cry*, meaning cold, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Eutrocryepts (*Eutro*, meaning high base saturation, plus *cryept*, the suborder of the Inceptisols that have a cryic temperature regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Eutrocryepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, cation-exchange activity classes, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, superactive Typic Eutrocryepts.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Classification of the soils of the Delta River area is given in Table 13.

The Official Series Descriptions (OSDs) provide the most current information about the series mapped in this survey area. These descriptions are available on the Web at http://soils.usda.gov. One soil, Terric Cryohemists, is named at the subgroup level in the U.S. Soil Taxonomy. This soil is described below.

Terric Cryohemists

Taxonomic Classification

- Loamy-skeletal, euic Terric Cryohemists

Depth class: very deep
Drainage class: very poorly drained
Landforms: closed depressions on outwash plains
Parent material: grassy organic material over gravelly till
Elevation: 2,792 to 3,012 feet (851 to 918 m)
Slope: 0 percent
Annual precipitation: 22 to 28 inches (564 to 715 mm)
Annual temperature: 25 degrees (-4 degrees C)
Frost-free period: 50 to 70 days

Modal Pedon Location

Map unit in which located: GO3—Turbellina-Schleyer complex, 0 to 30 percent slopes in the Delta River Area, Alaska
General location in survey area: Tangle Lakes area about three miles west of Dickey Lake; UTM coordinates: Zone 6, Easting 540399, Northing 6980850

Modal Pedon

Oe—0 to 25 inches (0 to 64 cm); dark brown (10YR 3/3) mucky peat; many very fine and fine roots; very strongly acid; abrupt wavy boundary.
Cg1—25 to 28 inches (64 to 71 cm); olive gray (5Y 4/2) extremely gravelly sandy loam; massive; friable, nonsticky and nonplastic; 50 percent gravel, 20 percent cobbles; strongly acid; gradual wavy boundary.
C2—28 to 60 inches (71 to 152 cm); variegated extremely cobbly sandy loam; massive; very friable, nonsticky and nonplastic; 35 percent gravel, 25 percent cobbles; strongly acid.

Range in Characteristics

Soil moisture class: aquic
Average annual soil temperature: 34 to 36.5 degrees F (1 to 2.5 degrees C)
Depth to strongly contrasting textural stratification: 25 to 50 inches (64 to 127 cm)

Oe horizon:
Chroma—hue of 7.5YR or 10YR; value of 3 or 4; chroma of 3 or 4
Organic matter content—65 to 90 percent
Reaction—very strongly to strongly acid

Cg and C horizons:
Texture—extremely cobbly sandy loam; very gravelly loam; very gravelly sandy loam, extremely gravelly sandy loam
Clay content—0 to 10 percent
Silt content—10 to 40 percent
Sand content—45 to 80 percent
Organic matter content—0 to 2 percent
Rock fragments—20 to 45 percent rounded very strongly cemented gravel; 10 to 35 percent rounded very strongly cemented cobbles
Reaction—strongly to slightly acid

Appendix E—Ecological Sites

An ecological site is a basic unit of ecological land classification. It represents a type of land with a distinctive combination of potential natural communities, soils, landforms, hydrology, climate, and ecological properties and processes. Examples of ecological properties and processes include vegetation succession, nutrient cycling, and productivity. Ecological site classification is not oriented to any type of land or land use and is applicable to forest and rangeland, wetlands, and uplands. The relationship among climate, landforms, soils, and vegetation, and the ability to discern differences in the cumulative effect of these factors from one site to another, is the basis for ecological site classification. The ecological sites of the Delta River area are listed in Table 2.

The primary emphasis of ecological site classification is usually the vegetation on a site. The plants observed in the Delta River Area are listed in Table 14. Vegetation is considered to be an indicator of the integrated factors of the environment. Productivity, the response of the vegetation to various types of disturbances, and use and management of the vegetation are principal concerns to land owners and managers.

A secondary but equally important emphasis of site classification is landform and soil relationships. In general, the relationships between landforms and soils across the landscape are fairly predictable. Natural disturbances such as wildfire, wind, and flooding, result in considerable variation in vegetation. Landforms and soils provide a stable resource base by which ecological sites can be determined regardless of existing vegetative conditions. In addition, inferences can be made regarding site dynamics and stability, soil processes, and appropriate management systems based on landform and soil types.

While abrupt or distinct breaks between landforms, soils, and vegetation occasionally occur, more often than not the transition is gradual and indistinct. In addition, precipitation, temperature, and other climatic patterns, as well as microclimatic variables like elevation, change gradually across the landscape. An ecological site classification, therefore, should be viewed as a landscape model. The boundaries between ecological sites are sometimes arbitrary and approximate. On the ground, the characteristics and properties within and between ecological sites are complex and variable, and usually overlap to some degree.

Ecological site classification provides a useful framework for correlating and compiling data and interpretations on multiple resources and landscape processes. Site classification is also a valuable framework for organizing, applying, and monitoring resource conservation systems for various land uses.

Potential Natural Community

By definition, an ecological site is characterized by a single potential natural community (PNC). The PNC is the assemblage of plant species that most nearly achieves a long-term steady state of productivity, structure, and composition on a site (Tueller 1973, cited by National Research Council 1994). The occurrence of a single potential plant community is based on the notion that over time, and in the absence of disturbances to the vegetation and changes in the site, succession (or the gradual and successive replacement of one plant community by another) eventually leads to a single plant community that best reflects the integrated factors of the environment. While this theory has been questioned on both theoretical and practical grounds (National Research Council 1994), the PNC provides a benchmark from which long-term and short-term responses of the vegetation to disturbances and pathways and processes of succession can be related.

Site Progression

Site progression refers to gradual and progressive changes over time to the physical and environmental conditions of the site that result in a different PNC. In riparian systems and permafrost environments, there is a high potential for progressive changes as a result of geomorphic and soil forming processes and climatic influences and potentials. Vegetation succession on sites undergoing gradual site progression generally does not lead to a true PNC. Changes in the site are occurring concurrently with

succession such that a "long-term steady state of productivity, structure, and composition" is never achieved.

Along rivers, a low flood plain is gradually elevated to the height of a stream terrace in response to flooding, channel migration and down-cutting, and the deposition of alluvium by flood waters. As the height of the land surface above the channel increases, flooding frequency and duration decrease and the depth to water table increases. Site changes of this nature usually occur gradually over the life cycle of valley formation.

Primary vegetation succession may occur concurrently with flood plain-stream terrace site progression. In Alaska, the sequence is typically from low stature herb and shrub communities on recently exposed alluvium to tall forest communities on stream terraces. The latest successional stage attainable on a specific hydrologically influenced surface is referred to as a riparian association (Hansen 1989 cited by Gebhardt et al. 1990). For ecological sites in a riparian zone, the PNC is frequently a riparian association.

In permafrost environments, post fire vegetation succession on most boreal forest sites is accompanied by a gradual increase in the abundance and thickness of the moss-organic layer on the soil surface. As the insulating capacity of the moss-organic layer increases, soil warming during summer is reduced and overall soil temperature decreases. Eventually, the permafrost table forms or rises within the soil profile and the soil drainage is restricted, often to the degree that a shallow water table is perched on the permafrost surface. Nutrient cycling and availability decreases markedly, as does site productivity, along with the changes in the soil environment. Productive hardwood and spruce forests gradually are replaced by unproductive mixed spruce woodland and scrub bogs.

The time frame and transition dynamics for site progression from a relatively warm, well drained, permafrost free condition to a cold, poorly drained, shallow permafrost condition are not well understood. For purposes of site classification, a reasonable hypothesis is that the duration of the well drained, permafrost free productive condition persists for at least the life cycle of the initial spruce stand. Separate ecological sites are described for productive, well drained, permafrost free sites and poorly drained, shallow permafrost sites. The PNC is then defined as the latest successional stage observed on the site. On the permafrost free sites the PNC often is not a "long-term steady state of productivity, structure, and composition."

Site Retrogression

Wildfire and flooding are two common recurring disturbance factors in interior Alaska. However, the absence of dwarf spruce forest within the area and low occurrence of charcoal in soils suggests that fire influence is relatively minor. Flooding, a common recurring disturbance factor on flood plains, can interrupt or retard site progression. Depending on velocity and duration of a flooding event, vegetation may be destroyed by the physical abrasion of sediment, prolonged saturation of the site, or burial. Depending on flood intensity and duration, significant site retrogression can occur quickly from a single flood episode. The degree of site alteration is influenced by the site’s height above active channels, as well as its position and orientation to the channel.

Depending on site factors and intensity and duration of the flooding event, not all flooding events lead to site retrogression. Higher flood plains experience less frequent flood events with more mature plant communities such as forest types less sensitive to brief flooding events. Well established vegetation reduces flood velocity and encourages deposition of sediments. Lower flood plains flood more frequently and have young, often herbaceous and scrub communities that are relatively rapid growing and can quickly colonize a site following significant flooding events. Soils are often gravelly, resulting from deeper, high gradient flood waters and a regime dominated by the removal of sandy and silty sediments from surfaces.

Flood plains consist of a number of terraces that have a successively lower frequency of flooding as their elevation above active channels increases. The vegetation on each flood plain level reflects the dominant flood regime. Vegetation, site, and soil properties associated with each flooding regime are expressed by a single PNC. In addition to identifying the latest successional stage as the PNC, ecological site classification provides a framework for recognition and describing progression-retrogression dynamics and relationships.

Soil-Site Correlation

An ecological site consists of a group of one or more soils that have similar vegetative and ecological potentials and processes. While a number of different soils may be grouped together into an ecological site, any individual soil may be included in only a single site. To establish soil-site relationships and maintain the one-to-one correlation, vegetative characteristics and ecological patterns and processes are used in conjunction with soil characteristics and other criteria specified in *Soil Taxonomy* and *Keys to Soil Taxonomy* (Soil Survey Staff 1999; 2003) to develop the soil classification.

Because of the one-to-one correlation between a soil and an ecological site, the ecological site can be determined by knowing the soil. This is particularly useful when the vegetation is not a definitive indicator of the site—for example, when vegetation has been altered by disturbance or management or when vegetation on two sites is similar in composition and structure. The one-to-one correlation means that an ecological site map can be derived from the soils map. The soil components correlated to the Delta River Area ecological sites are listed in Table 2.

Site Descriptions

Depressions, Flooded (R173XY552AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Depressions, Flooded
Site ID: R173XY552AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Glaciated Uplands (M135A.G1)

Physiographic Features

Elevation: 2,848 to 2,999 feet
Slope Range: 0 to 1 percent
Aspect (clockwise direction): non-influencing
Landform: flood plains

	Frequency	*Duration*	*Beginning Month*	*Ending Month*
Flooding:	Occasional	Brief	May	Sep
Ponding:	None			

Climatic Features

Annual Precipitation: 22 to 24 inches
Annual Air Temperature: 25 degrees F.
Frost Free Period: 50 to 70 days

Soil Features

Parent Materials: grassy organic material over gravelly till
Restrictive Features: strongly contrasting textural stratification at 38 inches
Drainage Class: very poorly drained
Rooting Depth: RV: 29 inches *Range:* 13 to 52 inches

Soil Layers and Properties within Representative Rooting Depth:

Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
29	peat	moderately rapid	.34	5.8	80	

Vegetation Features

Vegetation Type

Diamondleaf willow/sedge scrub

Ecological Status

Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Diamondleaf willow/sedge scrub	20	6	8	11	3

Characteristics of Diamondleaf willow/sedge scrub

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 5. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SL-SM	SAPL2	Salix planifolia	15.0	38	80	60	48
GM-GT	CAAQ	Carex aquatilis	25.0	45	55	60	52
GT	CACA4	Calamagrostis canadensis	15.0	20	25	40	28
GM	ARLA8	Arnica latifolia	10.0	10	10	20	14
FD	POPA14	Potentilla palustris	25.0	25	25	20	22
FD	EQFL	Equisetum fluviatile	15.0	15	15	20	17
FD	ZZFORB	unknown-forbs	5.0	5	5	20	10
L	LICHEN	total lichens	0.0	0	0	60	0
M	MOSS	total bryophytes-mosses and liverworts	10.0	17	25	60	32
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	5.0	22	45	60	36
B	WATER	water	5.0	17	25	60	32
B	SOIL	mineral-bare soil	0.0	5	15	60	17
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	60	0
B	ROCK	mineral-surface rock fragments	0.0	0	0	60	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):

Shand (Loamy-skeletal, euic Terric Cryosaprists)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
IM	Shand-Bonot-Fels complex, 0 to 60 percent slopes

Depressions, Frequently Flooded (R173XY501AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Depressions, Frequently Flooded
Site ID: R173XY501AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Lowland Flood Plains, Terraces, and Fans (M135A.V1L)

Physiographic Features

Elevation: 2,549 to 3,113 feet
Slope Range: 0 to 1 percent
Aspect (clockwise direction): non-influencing
Landform: depressions on flood plains

	Frequency	*Duration*	*Beginning Month*	*Ending Month*	*Depth (inches)*
Flooding:	Frequent	Long	May	Sep	
Ponding:	Frequent	Very long	May	Sep	9.8

Climatic Features

Annual Precipitation: 22 to 35 inches
Annual Air Temperature: 24 to 25 degrees F.
Frost Free Period: 50 to 80 days

Soil Features

Parent Materials: sandy and silty alluvium over sandy and gravelly alluvium
Restrictive Features: strongly contrasting textural stratification at 28 inches
Drainage Class: very poorly drained
Rooting Depth: RV: 50 inches *Range:* 29 to 60 inches

Soil Layers and Properties within Representative Rooting Depth:
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness *(inches)*	**Texture**	**Permeability**	**AWC** *(inches/inch)*	**pH**	**Effective CEC** *(me/100g)*	**CEC** *(me/100g)*
5	slightly decomposed plant material	moderately rapid	.34	5.8		80
10	silt loam	moderate	.19	5.8		20
14 to 20	stratified sand to silt; extremely gravelly coarse sand	moderate to rapid	.03 to .13	6.2		2 to 16

Vegetation Features

Vegetation Type
Sedge wet meadow 2

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	**Total**	**Per Stand** *Min.*	*Avg.*	*Max.*	**Number of Stands**
Sedge wet meadow 2	5	2	4	5	2

Characteristics of Sedge wet meadow 2

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 3. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover			Percent Constancy	Importance Value
			Min.	*Avg.*	*Max.*		
GM	CAAQ	Carex aquatilis	80.0	80	80	67	73
GM	CACA4	Calamagrostis canadensis	5.0	5	5	33	13
L	LICHEN	total lichens	0.0	0	0	67	0
M	MOSS	total bryophytes-mosses and liverworts	5.0	25	45	67	41
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	30.0	38	45	67	50
B	WATER	water	5.0	13	20	67	30
B	LITTER2	litter-woody debris >2.5 cm	0.0	8	15	67	23
B	SOIL	mineral-bare soil	0.0	0	0	67	0
B	ROCK	mineral-surface rock fragments	0.0	0	0	67	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Swedna, very wet (Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid Typic Cryaquents)

Soil Map Units

This ecological site is associated with a minor soil component in the map units listed. It is not associated with a major component in any map unit.

Symbol	Map Unit Name
FPB	Dackey-Tangoe-Riverwash complex
FPC	Dackey-Tangoe-Riverwash, high elevation, complex
FPD	Dackey-Swedna-Tangoe complex
W	Water

Gravelly Flood Plains (F173XY204AK)

Ecological Site Characteristics

Site Type: Forest
Site Name: Gravelly Flood Plains
Site ID: F173XY204AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Lowland Flood Plains, Terraces, and Fans (M135A.V1L)

Physiographic Features

Elevation: 2,365 to 2,723 feet
Slope Range: 0 to 3 percent

Aspect (clockwise direction): non-influencing
Landform: flood plains
Frequency
Flooding: Rare
Ponding: None

Climatic Features

Annual Precipitation: 28 to 33 inches
Annual Air Temperature: 25 to 26 degrees F.
Frost Free Period: 60 to 80 days

Soil Features

Parent Materials: silty eolian deposits over loamy alluvium over sandy and gravelly alluvium
Restrictive Features: strongly contrasting textural stratification at 2 inches
Drainage Class: somewhat excessively drained
Rooting Depth: RV: 12 inches *Range:* 8 to 16 inches

Soil Layers and Properties within Representative Rooting Depth:
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness *(inches)*	Texture	Permeability	AWC *(inches/inch)*	pH	Effective CEC *(me/100g)*	CEC *(me/100g)*
1	slightly decomposed plant material	moderately rapid	.34	5.2		30
1	silt loam	moderate	.19	5.0		15
10	extremely gravelly coarse sand	rapid	.03	6.6		2

Vegetation Features

Vegetation Type
White spruce-poplar/soapberry forest

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
White spruce-poplar/soapberry forest	6	6	6	6	1

Characteristics of White spruce-poplar/soapberry forest

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 2. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
TT	PIGL	Picea glauca	25.0	25	25	50	35
TT	POBA2	Populus balsamifera	10.0	10	10	50	22
SM	ZZSHRUB	unknown-shrubs	55.0	55	55	50	52
SM	SAAL	Salix alaxensis	10.0	10	10	50	22
L	LICHEN	total lichens	10.0	10	10	50	22
M	MOSS	total bryophytes-mosses and liverworts	65.0	65	65	50	57
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	15.0	15	15	50	27
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	50	0
B	SOIL	mineral-bare soil	0.0	0	0	50	0
B	ROCK	mineral-surface rock fragments	0.2	0	0	50	0
B	WATER	water	0.0	0	0	50	0

Site Tree Measurements:
Only dominant, codominant, and open grown trees were measured. Height of Measurements = height above ground at which age and diameter were measured. G = ground level, B = breast height (ca 1.5 m).

Tree Species	Age (years)	Diameter (inches)	Height (feet)		Number of Trees	Height of Measurements
Picea glauca	63	8.0	45	*Min.*	3	B
	65	10.0	47	*Avg*		
	69	14.0	50	*Max.*		

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Nizina, rarely flooded (Sandy-skeletal, mixed Typic Cryorthents)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
STA	Nizina-Nizina, rarely flooded, complex

Gravelly Flood Plains, Cool (R173XY258AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Gravelly Flood Plains, Cool
Site ID: R173XY258AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Lowland Flood Plains, Terraces, and Fans (M135A.V1L)
Alpine Flood Plains, Terraces, and Fans (M135A.V1)

Physiographic Features

Elevation: 2,251 to 3,507 feet
Slope Range: 0 to 20 percent
Aspect (clockwise direction): non-influencing
Landform: flood plains; flood plains on alluvial fans

	Frequency	*Duration*	*Beginning Month*	*Ending Month*
Flooding:	Frequent	Brief	May	Sep
Ponding:	None			

Climatic Features

Annual Precipitation: 25 to 52 inches
Annual Air Temperature: 22 to 25 degrees F.
Frost Free Period: 50 to 80 days

Soil Features

Parent Materials: loamy alluvium over sandy and gravelly alluvium
Restrictive Features: strongly contrasting textural stratification at 2 to 3 inches
Drainage Class: excessively drained to somewhat poorly drained
Rooting Depth: RV: 10 inches *Range:* 4 to 22 inches

Soil Layers and Properties within Representative *Rooting Depth:*
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
0 to 2	slightly decomposed plant material	moderately rapid	.34	6.0		80
1 to 2	sandy loam	moderate	.17	6.9		16
7 to 8	extremely gravelly coarse sand	rapid	.03	7.1		2

Vegetation Features

Vegetation Type
Feltleaf willow-mixed shrub/herbaceous scrub

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Per Stand Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Feltleaf willow-mixed shrub/herbaceous scrub	60	9	18	27	6

Characteristics of Feltleaf willow-mixed shrub/herbaceous scrub

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 9. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SM-ST	SAAL	Salix alaxensis	15.0	27	45	33	30
SM-ST	BEGL	Betula glandulosa	0.2	5	10	22	10
SM	SALIX	Salix	80.0	88	95	22	44
SL-SM	SABA3	Salix barclayi	5.0	43	80	22	31
SL-SM	ZZSHRUB	unknown-shrubs	5.0	33	60	22	27
SL	SPBE	Spiraea beauverdiana	5.0	6	7	33	14
GM-GT	CACA4	Calamagrostis canadensis	0.2	6	13	44	16
FM	HEMA	Hedysarum mackenziei	10.0	12	15	33	20
FM	MEPA	Mertensia paniculata	6.0	11	15	22	16
L	LICHEN	total lichens	0.0	9	40	67	25
M	MOSS	total bryophytes-mosses and liverworts	10.0	26	40	67	42
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	5.0	42	90	67	53
B	SOIL	mineral-bare soil	0.0	8	25	67	23
B	ROCK	mineral-surface rock fragments	0.0	7	20	67	22
B	LITTER2	litter-woody debris >2.5 cm	0.0	3	10	67	14
B	WATER	water	0.0	0	0	67	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Tangoe (Sandy-skeletal, mixed Oxyaquic Cryorthents)
Nizina, dry (Sandy-skeletal, mixed Typic Cryorthents)
Skarland (Sandy-skeletal, mixed, subgelic Typic Gelorthents)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
AFK	Skarland-Schleyer complex, 8 to 20 percent slopes
FPB	Dackey-Tangoe-Riverwash complex
FPC	Dackey-Tangoe-Riverwash, high elevation, complex
FPD	Dackey-Swedna-Tangoe complex
FPG	Tangoe-Nizina, dry, complex

Gravelly Frozen Slopes (R173XY180AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Gravelly Frozen Slopes
Site ID: R173XY180AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Alpine Mountains (M135A.M2)
Glaciated Uplands (M135A.G1)

Physiographic Features

Elevation: 2,392 to 3,487 feet
Slope Range: 0 to 65 percent
Aspect (clockwise direction): non-influencing
Landform: earth hummocks on mountains; hills; outwash plains
Landform Positions: backslopes; footslopes; summits

	Frequency
Flooding:	None
Ponding:	None

Climatic Features

Annual Precipitation: 23 to 33 inches
Annual Air Temperature: 25 degrees F.
Frost Free Period: 50 to 80 days

Soil Features

Parent Materials: silty eolian deposits; silty eolian deposits over gravelly cryoturbate; silty eolian deposits over sandy and silty outwash
Restrictive Features: permafrost at 8 to 13 inches; strongly contrasting textural stratification at 11 to 13 inches
Drainage Class: poorly drained
Rooting Depth: RV: 11 inches *Range:* 4 to 18 inches

Soil Layers and Properties within Representative Rooting Depth:

Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
5 to 10	peat; slightly decomposed plant material	moderately rapid	.34	4.4 to 5.4	30	
1 to 3	silt loam; mucky silt loam; muck	moderate	.19	4.1 to 5.8	15	20

Vegetation Features

Vegetation Type
Shrub birch-mixed ericaceous shrub/sedge scrub

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Per Stand Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Shrub birch-mixed ericaceous shrub/sedge scrub	58	8	16	33	8

Characteristics of Shrub birch-mixed ericaceous shrub/sedge scrub

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 10. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SL-SM	BEGL	Betula glandulosa	10.0	17	35	60	32
SD-SM	SAPL2	Salix planifolia	2.0	6	10	80	22
SD-SL	VAUL	Vaccinium uliginosum	6.0	22	40	70	39
SD-SL	LEDE5	Ledum decumbens	0.2	11	20	60	26
SD-SL	BENA	Betula nana	20.0	25	30	20	22
SD	VAVI	Vaccinium vitis-idaea	0.2	5	25	70	19
SD	SARE2	Salix reticulata	0.2	6	15	40	15
GM	CAREX	Carex	15.0	26	40	40	32
GM	CABI5	Carex bigelowii	0.2	30	65	30	30
L	LICHEN	total lichens	0.0	19	60	80	39
L	FRUTI	total lichens-fruticose	5.0	15	25	20	17
L	L2ALL	total lichens-crustose and soil crust	0.2	0	0	10	0
M	MOSS	total bryophytes-mosses and liverworts	15.0	49	90	80	63
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	0.0	13	25	80	32
B	ROCKB	mineral-surface bedrock	1.0	1	1	10	3
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	80	0
B	SOIL	mineral-bare soil	0.0	0	0	80	0
B	ROCK	mineral-surface rock fragments	0.0	0	0	70	0
B	WATER	water	0.0	0	1	80	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):

Owhat (Coarse-silty, mixed, superactive, subgelic Typic Historthels)
Kuswash (Loamy, mixed, superactive, subgelic Typic Historthels)
Steps (Loamy-skeletal, mixed, superactive, subgelic Typic Histoturbels)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
GO4	Kuswash-Turbellina-Schleyer complex, 0 to 30 percent slopes
L1	Owhat peat, 2 to 15 percent slopes
MSHP	Steps-Basaltlake, association, 14 to 75 percent slopes

Gravelly Frozen Slopes, Ruptic (R173XY182AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Gravelly Frozen Slopes, Ruptic
Site ID: R173XY182AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Alpine Mountains (M135A.M2)
Glaciated Uplands (M135A.G1)

Physiographic Features

Elevation: 2,365 to 5,295 feet
Slope Range: 0 to 25 percent
Aspect (clockwise direction): non-influencing
Landform: circles on mountains; circles on till plains; stripes on mountains
Landform Positions: backslopes; summits

	Frequency
Flooding:	None
Ponding:	None

Climatic Features

Annual Precipitation: 23 to 52 inches
Annual Air Temperature: 24 to 25 degrees F.
Frost Free Period: 50 to 80 days

Soil Features

Parent Materials: silty eolian deposits over gravelly alluvium
Restrictive Features: permafrost at 11 inches
Drainage Class: poorly drained
Rooting Depth: RV: 8 inches *Range:* 3 to 17 inches

Soil Layers and Properties within Representative Rooting Depth:

Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
5	peat	moderately rapid	.34	5.4	30	
3	silt loam	moderate	.19	5.8		20

Vegetation Features

Vegetation Type

Shrub birch/sedge scrub mosaic
Lichen/dwarf scrub mosaic

Ecological Status

Climax plant community
Climax plant community on drier microsites

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Shrub birch/sedge scrub mosaic	38	8	12	21	6
Lichen/dwarf scrub mosaic	50	13	22	34	3

Characteristics of Shrub birch/sedge scrub mosaic

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 13. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SL-SM	BEGL	Betula glandulosa	5.0	31	50	46	38
SL-SM	SAPL2	Salix planifolia	0.2	7	15	31	15
SD-SL	VAUL	Vaccinium uliginosum	5.0	16	25	46	27
SL	LEDE5	Ledum decumbens	5.0	13	20	23	17
SD-SL	LEGR	Ledum groenlandicum	4.0	6	10	23	12
GM	CAREX	Carex	0.2	7	15	31	15
L	LICHEN	total lichens	10.0	37	80	46	41
L	FOLIO	total lichens-foliose	3.0	3	3	8	5
M	MOSS	total bryophytes-mosses and liverworts	0.2	33	70	46	39
B	SOIL	mineral-bare soil	0.0	7	25	46	18
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	0.0	4	15	46	14
B	ROCK	mineral-surface rock fragments	0.0	1	5	46	7
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	46	0
B	WATER	water	0.0	0	0	46	0

Characteristics of Lichen/dwarf scrub mosaic

Ecological Status: Climax plant community on drier microsites

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 3. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SD-SL	VAUL	Vaccinium uliginosum	15.0	17	20	100	41
SL	SALIX	Salix	7.0	7	7	33	15
SL	LEDE5	Ledum decumbens	5.0	5	5	33	13
SD	SARE2	Salix reticulata	0.2	7	15	100	26
SD	ARAL2	Arctostaphylos alpina	3.0	5	7	67	18

Stratum	Symbol	Scientific Name	Percent Canopy Cover			Percent Constancy	Importance Value
			Min.	*Avg.*	*Max.*		
SD	LOPR	Loiseleuria procumbens	10.0	10	10	33	18
GM	CABI5	Carex bigelowii	4.0	15	25	67	32
L	LICHEN	total lichens	35.0	55	80	100	74
M	MOSS	total bryophytes-mosses and liverworts	5.0	32	60	100	57
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	3.0	14	30	100	37
B	ROCK	mineral-surface rock fragments	0.0	2	5	100	14
B	WATER	water	0.2	2	5	100	14
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	100	0
B	SOIL	mineral-bare soil	0.0	0	0	100	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Frostcircle (Coarse-loamy, mixed, superactive, nonacid, subgelic Ruptic-Histic Aquiturbels)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
MSB	Fields-Minya-Frostcircle association, 0 to 75 percent slopes
MSD	Frostcircle-Minya-Minya, cool, complex, 0 to 28 percent slopes
MSS	Frostcircle peat, 0 to 25 percent slopes
MST	Frostcircle-Ogive association, 0 to 25 percent slopes

Gravelly Low Flood Plains, High Elevation (R173XY257AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Gravelly Low Flood Plains, High Elevation
Site ID: R173XY257AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Alpine Flood Plains, Terraces, and Fans (M135A.V1)

Physiographic Features

Elevation: 2,667 to 2,943 feet
Slope Range: 0 to 2 percent
Aspect (clockwise direction): non-influencing
Landform: flood plains; flood plains on alluvial fans

	Frequency	*Duration*	*Beginning Month*	*Ending Month*
Flooding:	Frequent	Brief	May	Sep
Ponding:	None			

Climatic Features

Annual Precipitation: 23 to 28 inches

Annual Air Temperature: 25 degrees F.
Frost Free Period: 50 to 70 days

Soil Features

Parent Materials: loamy alluvium over sandy and gravelly alluvium
Restrictive Features: strongly contrasting textural stratification at 2 inches
Drainage Class: somewhat poorly drained
Rooting Depth: RV: 18 inches *Range:* 5 to 60 inches

Soil Layers and Properties within Representative Rooting Depth:
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
2	sandy loam	moderate	.17	6.9		16
16	extremely gravelly coarse sand	rapid	.03	7.1		2

Vegetation Features

Vegetation Type
Feltleaf willow scrub, cool

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Per Stand Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Feltleaf willow scrub, cool	40	3	11	16	7

Characteristics of Feltleaf willow scrub, cool

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 7. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SL-ST	SAAL	Salix alaxensis	25.0	45	60	57	51
SL-SM	SAPL2	Salix planifolia	15.0	52	70	43	47
GM-GT	CACA4	Calamagrostis canadensis	5.0	53	85	86	68
FM	EQUIS	Equisetum	5.0	7	10	43	17
L	LICHEN	total lichens	0.0	3	10	100	17
M	MOSS	total bryophytes-mosses and liverworts	0.2	25	55	100	50
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	0.0	41	90	100	64
B	ROCK	mineral-surface rock fragments	0.0	9	60	100	30
B	LITTER2	litter-woody debris >2.5 cm	0.0	4	15	100	20
B	SOIL	mineral-bare soil	0.0	0	0	100	0
B	WATER	water	0.0	0	0	100	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Broxson (Sandy-skeletal, mixed, subgelic Oxyaquic Gelorthents)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
AFL	Schleyer-Broxson-Riverwash complex
FPA1	Broxson sandy loam
FPF	Broxson-Nizina, cool, complex

Gravelly Mountains, Acid (R173XY303AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Gravelly Mountains, Acid
Site ID: R173XY303AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Boreal Mountains (M135A.M2L)
Alpine Mountains (M135A.M2)
Glaciated Uplands (M135A.G1)
Nonvegetated Alpine Mountains (M135A.B1)

Physiographic Features

Elevation: 2,231 to 5,295 feet
Slope Range: 2 to 75 percent
Aspect (clockwise direction): non-influencing
Landform: mountains; swales on mountains; till plains
Landform Positions: backslopes; footslopes

	Frequency
Flooding:	None
Ponding:	None

Climatic Features

Annual Precipitation: 28 to 52 inches
Annual Air Temperature: 24 to 26 degrees F.
Frost Free Period: 50 to 80 days

Soil Features

Parent Materials: silty eolian deposits over gravelly colluvium; silty eolian deposits over gravelly colluvium and/or till
Restrictive Features: bedrock (lithic) at 33 inches; strongly contrasting textural stratification at 6 to 9 inches
Drainage Class: well drained
Rooting Depth: RV: 15 inches *Range:* 2 to 33 inches

Soil Layers and Properties within Representative Rooting Depth:

Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
2 to 3	slightly decomposed plant material	moderately rapid	.34	3.9 to 4.2	30 to 70	
3 to 7	silt loam	moderate	.19	4.6 to 5.0	15	
3 to 6	very cobbly sandy loam; very cobbly loam	moderate	.13	5.7 to 6.1		6

Vegetation Features

Vegetation Type
Green alder/red current/bluejoint scrub

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Green alder/red current/bluejoint scrub	69	6	13	23	12

Characteristics of Green alder/red current/bluejoint scrub

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 16. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
ST	ALCR6	Alnus crispa	65.0	87	100	38	57
ST	ALTE2	Alnus tenuifolia	5.0	62	80	31	44
SL-SM	RITR	Ribes triste	1.0	24	80	56	37
SL-SM	SPBE	Spiraea beauverdiana	0.2	11	50	56	25
SM	SAPL2	Salix planifolia	5.0	8	15	31	16
SD-SL	VAUL	Vaccinium uliginosum	0.2	19	60	25	22
SD	EMNI	Empetrum nigrum	0.2	7	20	19	12
GM-GT	CACA4	Calamagrostis canadensis	0.2	6	25	69	20
FM	GYDR	Gymnocarpium dryopteris	0.2	18	40	19	18
FD	LYAN2	Lycopodium annotinum	3.0	14	25	19	16
FD	RUAR	Rubus arcticus	0.2	5	15	19	10
L	LICHEN	total lichens	0.0	5	45	75	19
M	MOSS	total bryophytes-mosses and liverworts	0.2	11	25	75	29
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	5.0	50	95	75	61
B	SOIL	mineral-bare soil	0.0	5	20	75	19
B	LITTER2	litter-woody debris >2.5 cm	0.0	3	15	75	15
B	ROCK	mineral-surface rock fragments	0.0	2	15	75	12
B	WATER	water	0.0	0	0	75	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Fields (Loamy-skeletal, mixed, superactive Humic Dystrocryepts)
Basaltlake (Loamy-skeletal, mixed, superactive Typic Dystrocryepts)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
AFP	Basaltlake, 12 to 25 percent slopes
BRA	Fields silt loam, 18 to 65 percent slopes
EST	Petrokov-Basaltlake-Castnot complex, 6 to 65 percent slopes
MSB	Fields-Minya-Frostcircle association, 0 to 75 percent slopes
MSF	Elting-Basaltlake-Sonderna complex, 2 to 48 percent slopes
MSHP	Steps-Basaltlake, association, 14 to 75 percent slopes

Gravelly Mountains, High Elevation (R173XY310AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Gravelly Mountains, High Elevation
Site ID: R173XY310AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Alpine Mountains (M135A.M2)
Nonvegetated Alpine Mountains (M135A.B1)

Physiographic Features

Elevation: 2,546 to 5,295 feet
Slope Range: 2 to 65 percent
Aspect (clockwise direction): non-influencing
Landform: mountains
Landform Positions: backslopes; shoulders; summits

	Frequency
Flooding:	None
Ponding:	None

Climatic Features

Annual Precipitation: 25 to 52 inches
Annual Air Temperature: 24 to 25 degrees F.
Frost Free Period: 50 to 70 days

Soil Features

Parent Materials: silty eolian deposits over colluvium and/or gravelly till; silty eolian deposits over gravelly outwash
Restrictive Features: bedrock (lithic) at 17 inches; strongly contrasting textural stratification at 2 to 4 inches
Drainage Class: somewhat excessively drained or well drained
Rooting Depth: RV: 7 inches *Range:* 2 to 13 inches

Soil Layers and Properties within Representative Rooting Depth:
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
1	slightly decomposed plant material	moderately rapid	.34	3.9 to 4.0	30	
1 to 3	silt loam	moderate	.19	4.2 to4.6	15	
3 to 5	very cobbly loam; extremely cobbly coarse sand	moderate to rapid	.03 to.13	5.4	2 to 6	

Vegetation Features

Vegetation Type
White mountain avens-mixed ericaceous shrub dwarf alpine scrub

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
White mountain avens-mixed ericaceous shrub dwarf alpine scrub	49	9	19	29	6

Characteristics of White mountain avens-mixed ericaceous shrub dwarf alpine scrub

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 6. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SD-SL	VAUL	Vaccinium uliginosum	1.0	9	20	100	30
SD-SL	BEGL	Betula glandulosa	2.0	7	15	67	22
SD-SL	LEDE5	Ledum decumbens	0.2	6	15	83	22
SL	BENA	Betula nana	15.0	15	15	17	16
SD	DROC	Dryas octopetala	1.0	9	15	67	25
SD	ARAL2	Arctostaphylos alpina	0.2	7	20	83	24
SD	EMNI	Empetrum nigrum	1.0	6	15	100	24
SD	DRYAS	Dryas	25.0	25	25	17	21
SD	ARRU	Arctostaphylos rubra	5.0	5	5	17	9
L	LICHEN	total lichens	2.0	40	75	100	63
L	L2ALL	total lichens-crustose and soil crust	20.0	20	20	17	18
M	MOSS	total bryophytes-mosses and liverworts	0.0	7	15	100	26
B	ROCK	mineral-surface rock fragments	0.2	22	60	100	47
B	SOIL	mineral-bare soil	0.0	5	15	100	22
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	0.0	4	15	100	20
B	ROCKB	mineral-surface bedrock	15.0	15	15	17	16
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	100	0
B	WATER	water	0.0	0	0	100	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Minya, cool (Loamy-skeletal, mixed, superactive, subgelic Lithic Haplogelods)
Schleyer, cool (Sandy-skeletal, mixed, subgelic Typic Haplogelods)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
MSB	Fields-Minya-Frostcircle association, 0 to 75 percent slopes
MSD	Frostcircle-Minya-Minya, cool, complex, 0 to 28 percent slopes

Gravelly Mountains, Warm (F173XY355AK)

Ecological Site Characteristics

Site Type: Forest
Site Name: Gravelly Mountains, Warm
Site ID: F173XY355AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Lowland Flood Plains, Terraces, and Fans (M135A.V1L)
Boreal Mountains (M135A.M2L)
Glaciated Uplands (M135A.G1)

Physiographic Features

Elevation: 2,211 to 3,438 feet
Slope Range: 0 to 60 percent
Aspect (clockwise direction): non-influencing
Landform: fan terraces on alluvial fans; fan terraces on alluvial fans on mountains; mountains
Landform Positions: backslopes; footslopes
Frequency
Flooding: Rare or None
Ponding: None

Climatic Features

Annual Precipitation: 28 to 40 inches
Annual Air Temperature: 24 to 26 degrees F.
Frost Free Period: 50 to 80 days

Soil Features

Parent Materials: loamy alluvium over sandy and gravelly alluvium; loamy eolian deposits over sandy and gravelly alluvium; silty eolian deposits over gravelly outwash; silty eolian deposits over gravelly till
Restrictive Features: strongly contrasting textural stratification at 5 to 21 inches
Drainage Class: somewhat excessively drained or well drained
Rooting Depth: RV: 12 inches *Range:* 3 to 23 inches

Soil Layers and Properties within Representative Rooting Depth:

Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness *(inches)*	Texture	Permeability	AWC *(inches/inch)*	pH	Effective CEC *(me/100g)*	CEC *(me/100g)*
1 to 3	slightly decomposed plant material	moderately rapid	.34	3.4 to 5.6	30	80
2 to 9	silt loam; very fine sandy loam	moderate	.19	4.0 to 5.6	15	16
1 to 7	gravelly sandy loam	moderate to rapid	.03 to .14	4.6 to 5.7	2	6

Vegetation Features

Vegetation Type
White spruce/green alder forest
Broadleaf deciduous-white spruce forest

Ecological Status
Climax plant community
Late stage of fire induced secondary succession

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
White spruce/green alder forest	27	12	14	18	4
Broadleaf deciduous-white spruce forest	28	28	28	28	1

Characteristics of White spruce/green alder forest

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 5. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
TT	PIGL	Picea glauca	4.0	12	20	80	31
SM-ST	ZZSHRUB	unknown-shrubs	5.0	34	60	80	52
ST	ALTE2	Alnus tenuifolia	55.0	55	55	20	33
SM	SAPL2	Salix planifolia	5.0	8	10	60	22
SM	BEGL	Betula glandulosa	5.0	5	5	20	10
SL	RITR	Ribes triste	5.0	10	15	60	24
SD	VAUL	Vaccinium uliginosum	5.0	5	5	20	10
FD	COCA13	Cornus canadensis	0.2	6	15	80	22
FD	LYCOP	Lycopersicon	5.0	5	5	40	14
L	LICHEN	total lichens	0.0	5	10	80	20
M	MOSS	total bryophytes-mosses and liverworts	20.0	36	65	80	54
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	20.0	31	40	80	50
B	LITTER2	litter-woody debris >2.5 cm	0.0	8	30	80	25
B	SOIL	mineral-bare soil	0.0	0	0	80	0
B	ROCK	mineral-surface rock fragments	0.0	0	0	80	0
B	WATER	water	0.0	0	0	80	0

Site Tree Measurements:

Only dominant, codominant, and open grown trees were measured. Height of Measurements = height above ground at which age and diameter were measured. G = ground level, B = breast height (ca 1.5 m).

Tree Species	Age (years)	Diameter (inches)	Height (feet)		Number of Trees	Height of Measurements
Picea glauca	73	9.0	35	*Min.*	6	B
	133	13.5	53	*Avg*		
	207	18.0	75	*Max.*		

Characteristics of Broadleaf deciduous-white spruce forest

Ecological Status: Late stage of fire induced secondary succession

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 1. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
TT	PIGL	Picea glauca	15.0	15	15	100	39
TM	PIGL	Picea glauca	5.0	5	5	100	22
ST	BEGL	Betula glandulosa	60.0	60	60	100	77
ST	SABA3	Salix barclayi	30.0	30	30	100	55
ST	ALCR6	Alnus crispa	10.0	10	10	100	32
SL	SPBE	Spiraea beauverdiana	5.0	5	5	100	22
GT	CACA4	Calamagrostis canadensis	5.0	5	5	100	22
FM	GYDR	Gymnocarpium dryopteris	30.0	30	30	100	55
FM	SACA14	Sanguisorba canadensis	5.0	5	5	100	22

Stratum	Symbol	Scientific Name	Percent Canopy Cover			Percent Constancy	Importance Value
			Min.	*Avg.*	*Max.*		
FD	LYAN2	Lycopodium annotinum	5.0	5	5	100	22
L	LICHEN	total lichens	0.0	0	0	100	0
M	MOSS	total bryophytes-mosses and liverworts	40.0	40	40	100	63
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	60.0	60	60	100	77
B	LITTER2	litter-woody debris >2.5 cm	15.0	15	15	100	39
B	WATER	water	10.0	10	10	100	32
B	SOIL	mineral-bare soil	0.2	0	0	100	0
B	ROCK	mineral-surface rock fragments	0.2	0	0	100	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Sonderna (Coarse-loamy over sandy or sandy-skeletal, mixed, superactive Typic Eutrocryepts)
Waitabit (Loamy-skeletal, mixed, superactive Typic Haplocryods)
Elting (Sandy-skeletal, mixed Typic Dystrocryepts)
Sinona (Sandy-skeletal, mixed Typic Eutrocryepts)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
AFA	Nizina-Sinona-Riverwash complex, 0 to 12 percent slopes
AFN	Sonderna very fine sandy loam, 0 to 4 percent slopes
ESA	Waitabit-Ogive complex, 22 to 60 percent slopes
MSF	Elting-Basaltlake-Sonderna complex, 2 to 48 percent slopes

Gravelly Slopes (R173XY358AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Gravelly Slopes
Site ID: R173XY358AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Boreal Mountains (M135A.M2L)
Alpine Mountains (M135A.M2)
Glaciated Uplands (M135A.G1)

Physiographic Features

Elevation: 2,661 to 3,812 feet
Slope Range: 0 to 70 percent
Aspect (clockwise direction): non-influencing
Landform: earth hummocks on outwash plains; hills; mountains
Landform Positions: backslopes; footslopes; summits

	Frequency
Flooding:	None
Ponding:	None

Climatic Features

Annual Precipitation: 23 to 37 inches
Annual Air Temperature: 24 to 25 degrees F.
Frost Free Period: 50 to 70 days

Soil Features

Parent Materials: silty eolian deposits over colluvium and/or gravelly till; silty eolian deposits over gravelly colluvium; silty eolian deposits over gravelly colluvium and/or till; silty eolian deposits over gravelly outwash
Restrictive Features: bedrock (lithic) at 16 inches; strongly contrasting textural stratification at 5 to 25 inches
Drainage Class: well drained
Rooting Depth: RV: 9 inches *Range:* 2 to 24 inches

Soil Layers and Properties within Representative Rooting Depth:
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
1 to 3	slightly decomposed plant material	moderately rapid	.34	3.9 to 4.6	30 to 40	
2 to 6	silt loam	moderate	.19	4.2 to 5.0	15	
2 to 4	gravelly sandy loam; very cobbly loam	moderate	.13 to .14	5.4 to 5.6	6	6

Vegetation Features

Vegetation Type
Shrub birch-bog blueberry scrub

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Per Stand Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Shrub birch-bog blueberry scrub	61	6	13	31	14

Characteristics of Shrub birch-bog blueberry scrub

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 18. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SM-ST	SAGL	Salix glauca	0.2	6	20	28	13
SL-SM	BEGL	Betula glandulosa	20.0	46	65	78	60
SL-SM	SAPL2	Salix planifolia	1.0	5	10	39	14
SD-SL	VAUL	Vaccinium uliginosum	10.0	24	70	78	43
SD-SL	LEGR	Ledum groenlandicum	3.0	14	25	50	26
SD-SL	SPBE	Spiraea beauverdiana	0.2	6	15	28	13
SD	EMNI	Empetrum nigrum	1.0	12	25	56	26
SD	VAVI	Vaccinium vitis-idaea	0.2	7	30	67	22
GM	FEAL	Festuca altaica	0.2	8	25	22	13
L	LICHEN	total lichens	0.2	31	65	78	49
M	MOSS	total bryophytes-mosses and liverworts	1.0	35	75	78	52
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	0.0	19	95	78	38
B	ROCK	mineral-surface rock fragments	0.0	4	30	78	18

Stratum	Symbol	Scientific Name	Percent Canopy Cover			Percent Constancy	Importance Value
			Min.	*Avg.*	*Max.*		
B	LITTER2	litter-woody debris >2.5 cm	0.0	1	7	78	9
B	SOIL	mineral-bare soil	0.0	0	5	78	0
B	WATER	water	0.0	0	0	78	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Phalarope (Coarse-silty over sandy or sandy-skeletal, mixed, superactive, subgelic Typic Haplogelods)
Slana (Loamy-skeletal, mixed, superactive Typic Eutrogelepts)
Minya (Loamy-skeletal, mixed, superactive, subgelic Lithic Haplogelods)
Castnot (Loamy-skeletal, mixed, superactive, subgelic Typic Dystrogelepts)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
ESB	Castnot-Minya-Rock Outcrop complex, 12 to 90 percent slopes
EST	Petrokov-Basaltlake-Castnot complex, 6 to 65 percent slopes
GO2	Schleyer-Slana-Geist complex, 0 to 70 percent slopes
MSD	Frostcircle-Minya-Minya, cool, complex, 0 to 28 percent slopes
OPB	Phalarope silt loam, 0 to 5 percent slopes

Gravelly Slopes, High Elevation (R173XY356AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Gravelly Slopes, High Elevation
Site ID: R173XY356AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Alpine Flood Plains, Terraces, and Fans (M135A.V1)
Alpine Mountains (M135A.M2)
Glaciated Uplands (M135A.G1)

Physiographic Features

Elevation: 2,546 to 3,812 feet
Slope Range: 0 to 65 percent
Aspect (clockwise direction): non-influencing
Landform: earth hummocks on till plains; fan terraces on alluvial fans; hills; mountains; outwash plains; stream terraces
Landform Positions: backslopes; shoulders; summits

	Frequency
Flooding:	None
Ponding:	None

Climatic Features

Annual Precipitation: 22 to 37 inches
Annual Air Temperature: 24 to 25 degrees F.
Frost Free Period: 50 to 70 days

Soil Features

Parent Materials: silty eolian deposits over gravelly outwash; silty eolian deposits over gravelly till; silty eolian deposits over sandy outwash
Restrictive Features: strongly contrasting textural stratification at 5 to 12 inches
Drainage Class: somewhat excessively drained or well drained
Rooting Depth: RV: 13 inches *Range:* 3 to 30 inches

Soil Layers and Properties within Representative Rooting Depth:
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
2 to 3	slightly decomposed plant material	moderately rapid	.34	3.9 to 4.4	30	
3 to 5	silt loam	moderate	.19 to .22	4.6 to 5.4	12 to 15	
1 to 8	extremely cobbly coarse sand	moderate to rapid	.03 to .19	4.7 to 5.8	2 to 15	2 to 6

Vegetation Features

Vegetation Type	Ecological Status
Shrub birch-dwarf ericaceous scrub mosaic	Climax plant community
Lichen/white mountain avens-alpine bearberry dwarf scrub mosaic	Climax plant community on drier microsites

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Shrub birch-dwarf ericaceous scrub mosaic	70	8	12	18	19
Lichen/white mountain avens-alpine bearberry dwarf scrub Mosaic	55	9	17	35	5

Characteristics of Shrub birch-dwarf ericaceous scrub mosaic

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 25. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SL-SM	BEGL	Betula glandulosa	5.0	44	90	76	58
SL-SM	SAPL2	Salix planifolia	0.2	9	35	52	22
SL-SM	SPBE	Spiraea beauverdiana	0.2	6	15	24	12
SD-SL	VAUL	Vaccinium uliginosum	5.0	14	35	64	30
SD-SL	LEGR	Ledum groenlandicum	0.2	13	35	32	20
SD-SL	LEDE5	Ledum decumbens	1.0	9	35	32	17
SD	EMNI	Empetrum nigrum	0.2	8	40	48	20
SD	VAVI	Vaccinium vitis-idaea	0.2	6	20	64	20
SD	ARRU	Arctostaphylos rubra	1.0	7	20	16	11
GM-GT	CACA4	Calamagrostis canadensis	3.0	12	30	16	14
L	LICHEN	total lichens	0.2	33	75	76	50
L	FOLIO	total lichens-foliose	30.0	30	30	4	11
L	FRUTI	total lichens-fruticose	5.0	5	5	4	4

Stratum	Symbol	Scientific Name	Percent Canopy Cover			Percent Constancy	Importance Value
			Min.	*Avg.*	*Max.*		
M	MOSS	total bryophytes-mosses and liverworts	5.0	41	95	76	56
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	0.2	11	50	76	29
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	5	76	0
B	SOIL	mineral-bare soil	0.0	0	5	76	0
B	ROCK	mineral-surface rock fragments	0.0	0	5	76	0
B	WATER	water	0.0	0	0	76	0

Characteristics of Lichen/white mountain avens-alpine bearberry dwarf scrub mosaic

Ecological Status: Climax plant community on drier microsites

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 7. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover			Percent Constancy	Importance Value
			Min.	*Avg.*	*Max.*		
SL-SM	BEGL	Betula glandulosa	10.0	27	60	43	34
SD-SL	VAUL	Vaccinium uliginosum	1.0	13	30	71	30
SD	ARAL2	Arctostaphylos alpina	5.0	12	20	43	23
SD	EMNI	Empetrum nigrum	0.2	7	25	71	22
L	LICHEN	total lichens	0.2	29	65	71	45
M	MOSS	total bryophytes-mosses and liverworts	0.2	19	40	71	37
B	ROCK	mineral-surface rock fragments	0.0	32	85	71	48
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	0.0	9	30	71	25
B	SOIL	mineral-bare soil	0.0	1	7	71	8
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	71	0
B	WATER	water	0.0	0	0	71	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
McCumberson (Loamy-skeletal, mixed, superactive, subgelic Typic Haplogelods)
Geist (Sandy, mixed, subgelic Typic Eutrogelepts)
Petrokov (Sandy-skeletal, mixed, subgelic Typic Eutrogelepts)
Schleyer (Sandy-skeletal, mixed, subgelic Typic Haplogelods)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
AFF	Schleyer silt loam, 0 to 5 percent slopes
AFK	Skarland-Schleyer complex, 8 to 20 percent slopes
AFL	Schleyer-Broxson-Riverwash complex
EST	Petrokov-Basaltlake-Castnot complex, 6 to 65 percent slopes
GO1	Schleyer-Geist complex, 0 to 30 percent slopes
GO2	Schleyer-Slana-Geist complex, 0 to 70 percent slopes
GO3	Turbellina-Schleyer complex, 0 to 30 percent slopes
GO4	Kuswash-Turbellina-Schleyer complex, 0 to 30 percent slopes
TPA	McCumberson-Phelanna complex, 2 to 12 percent slopes

Loamy Flood Plains (F173XY100AK)

Ecological Site Characteristics

Site Type: Forest
Site Name: Loamy Flood Plains
Site ID: F173XY100AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Lowland Flood Plains, Terraces, and Fans (M135A.V1L)
Alpine Flood Plains, Terraces, and Fans (M135A.V1)
Alpine Mountains (M135A.M2)

Physiographic Features

Elevation: 2,211 to 2,933 feet
Slope Range: 0 to 20 percent
Aspect (clockwise direction): non-influencing
Landform: flood plains; flood plains on alluvial fans; flood plains on alluvial fans on mountains

	Frequency	*Duration*	*Beginning Month*	*Ending Month*
Flooding:	Occasional	Brief	May	Sep
Ponding:	None			

Climatic Features

Annual Precipitation: 28 to 40 inches
Annual Air Temperature: 24 to 26 degrees F.
Frost Free Period: 50 to 80 days

Soil Features

Parent Materials: loamy alluvium over sandy and gravelly alluvium; sandy and silty alluvium over sandy and gravelly alluvium
Restrictive Features: strongly contrasting textural stratification at 3 to 28 inches
Drainage Class: somewhat excessively drained to somewhat poorly drained
Rooting Depth: RV: 13 inches *Range:* 3 to 34 inches

Soil Layers and Properties within Representative Rooting Depth:

Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness *(inches)*	**Texture**	**Permeability**	**AWC** *(inches/inch)*	**pH**	**Effective CEC** *(me/100g)*	**CEC** *(me/100g)*
1 to 2	slightly decomposed plant material	moderately rapid	.34	6.0		80
1 to 4	sandy loam; fine sandy loam	moderate	.16 to .17	6.2 to 6.9	16	
8 to 10	extremely gravelly coarse sand; stratified sand to silt	moderate to rapid	.03 to .13	6.2 to 7.1	2 to 16	

Vegetation Features

Vegetation Type
Poplar/mixed shrub forest
Alder scrub

Ecological Status
Climax plant community
Mid-stage of primary succession on flood plains

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Poplar/mixed shrub forest	24	10	11	13	3
Alder scrub	53	11	19	25	5

Characteristics of Poplar/mixed shrub forest

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 4. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
TT	POBA2	Populus balsamifera	15.0	38	60	50	44
TM	POBA2	Populus balsamifera	5.0	13	20	50	25
TS	POBA2	Populus balsamifera	10.0	10	10	25	16
TR	POBA2	Populus balsamifera	5.0	13	20	50	25
ST	ALCR6	Alnus crispa	60.0	75	90	50	61
ST	SAAL	Salix alaxensis	0.2	15	30	50	27
SM	ALTE2	Alnus tenuifolia	15.0	15	15	25	19
SM	ZZSHRUB	unknown-shrubs	15.0	15	15	25	19
GM	CACA4	Calamagrostis canadensis	10.0	10	10	25	16
FT	HELA4	Heracleum lanatum	7.0	7	7	25	13
L	LICHEN	total lichens	0.0	2	5	75	12
M	MOSS	total bryophytes-mosses and liverworts	0.2	13	35	75	31
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	20.0	68	95	75	71
B	LITTER2	litter-woody debris >2.5 cm	5.0	8	10	75	24
B	ROCK	mineral-surface rock fragments	0.0	3	10	75	15
B	SOIL	mineral-bare soil	0.0	0	0	75	0
B	WATER	water	0.0	0	0	75	0

Characteristics of Alder scrub

Ecological Status: Mid-stage of primary succession on flood plains

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 5. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
TR	POBA2	Populus balsamifera	5.0	5	5	20	10
SM-ST	ALCR6	Alnus crispa	0.2	12	25	80	31
SM-ST	SAAL	Salix alaxensis	5.0	5	5	20	10
SM	SALIX	Salix	80.0	87	90	60	72
SM	ZZSHRUB	unknown-shrubs	75.0	75	75	20	39
SM	SAPL2	Salix planifolia	35.0	35	35	20	26
SM	SABE2	Salix bebbiana	5.0	5	5	20	10
SL	VAUL	Vaccinium uliginosum	5.0	5	5	40	14
GT	CACA4	Calamagrostis canadensis	1.0	14	25	60	29
GM	FEAL	Festuca altaica	1.0	6	10	40	15
FM	SACA14	Sanguisorba canadensis	5.0	5	5	20	10
L	LICHEN	total lichens	0.0	3	15	100	17
M	MOSS	total bryophytes-mosses and liverworts	10.0	22	45	100	47
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	15.0	67	95	100	82
B	LITTER2	litter-woody debris >2.5 cm	0.2	6	10	100	24
B	ROCK	mineral-surface rock fragments	0.0	2	10	100	14
B	SOIL	mineral-bare soil	0.0	0	0	100	0
B	WATER	water	0.0	0	0	100	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Dackey (Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid Aquic Cryofluvents)
Nizina, cool (Sandy-skeletal, mixed Typic Cryorthents)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
AFA	Nizina-Sinona-Riverwash complex, 0 to 12 percent slopes
FPA	Swedna-Riverwash-Dackey complex
FPB	Dackey-Tangoe-Riverwash complex
FPC	Dackey-Tangoe-Riverwash, high elevation, complex
FPD	Dackey-Swedna-Tangoe complex
FPF	Broxson-Nizina, cool, complex

Loamy Frozen Wet Terraces, High Elevation (R173XY175AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Loamy Frozen Wet Terraces, High Elevation
Site ID: R173XY175AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Glaciated Uplands (M135A.G1)

Physiographic Features

Elevation: 2,546 to 3,012 feet
Slope Range: 0 to 12 percent
Aspect (clockwise direction): non-influencing
Landform: turf hummocks on outwash plains

	Frequency	*Duration*	*Beginning Month*	*Ending Month*	*Depth (inches)*
Flooding:	None				
Ponding:	Frequent	Long	May	Jun	7.9

Climatic Features

Annual Precipitation: 22 to 31 inches
Annual Air Temperature: 25 degrees F.
Frost Free Period: 50 to 70 days

Soil Features

Parent Materials: grassy organic material; silty outwash
Restrictive Features: permafrost at 10 to 17 inches
Drainage Class: very poorly drained
Rooting Depth: RV: 16 inches *Range:* 3 to 60 inches

Soil Layers and Properties within Representative Rooting Depth:

Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
10	peat; mucky silt loam	moderately rapid	.33 to .34	4.4 to 4.5	30	
6	silt loam; muck	moderate	.19	5.0	15	

Vegetation Features

Vegetation Type
Tussock cottongrass/mixed ericaceous shrub meadow

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Per Stand Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Tussock cottongrass/mixed ericaceous shrub meadow	27	6	11	22	4

Characteristics of Tussock cottongrass/mixed ericaceous shrub meadow

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 5. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SL-SM	SAPL2	Salix planifolia	5.0	10	15	40	20
SD-SL	BEGL	Betula glandulosa	0.2	18	30	80	38
SD-SL	LEDE5	Ledum decumbens	4.0	5	5	40	14
SD	LEGR	Ledum groenlandicum	0.2	23	45	40	30
SD	VAUL	Vaccinium uliginosum	5.0	8	15	60	22
SD	VAVI	Vaccinium vitis-idaea	2.0	7	15	60	20
SD	ZZSHRUB	unknown-shrubs	10.0	10	10	20	14
SD	SAFU	Salix fuscescens	5.0	5	5	20	10
GT	CACA4	Calamagrostis canadensis	20.0	20	20	20	20
GM	ERVA4	Eriophorum vaginatum	30.0	33	35	40	36
GM	ERBR6	Eriophorum brachyantherum	20.0	28	35	40	33
GM	CAAQ	Carex aquatilis	50.0	50	50	20	32
GM	CAREX	Carex	5.0	5	5	20	10
FM	POPA14	Potentilla palustris	5.0	5	5	20	10
FD	RUCH	Rubus chamaemorus	5.0	10	15	40	20
L	LICHEN	total lichens	0.0	18	40	80	38
M	MOSS	total bryophytes-mosses and liverworts	10.0	48	75	80	62
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	5.0	11	15	80	30
B	SOIL	mineral-bare soil	0.0	1	5	80	9
B	WATER	water	0.0	1	5	80	9
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	80	0
B	ROCK	mineral-surface rock fragments	0.0	0	0	80	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):

Bonot (Acid, subgelic Typic Hemistels)
Turbellina (Coarse-silty, mixed, superactive, nonacid, subgelic Typic Histoturbels)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
GO3	Turbellina-Schleyer complex, 0 to 30 percent slopes
GO4	Kuswash-Turbellina-Schleyer complex, 0 to 30 percent slopes
IM	Shand-Bonot-Fels complex, 0 to 60 percent slopes

Loamy High Flood Plains (F173XY151AK)

Ecological Site Characteristics

Site Type: Forest
Site Name: Loamy High Flood Plains
Site ID: F173XY151AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Lowland Flood Plains, Terraces, and Fans (M135A.V1L)
Boreal Mountains (M135A.M2L)

Physiographic Features

Elevation: 2,365 to 2,930 feet
Slope Range: 0 to 18 percent
Aspect (clockwise direction): non-influencing
Landform: flood plains; flood plains on alluvial fans

	Frequency	*Duration*	*Beginning Month*	*Ending Month*
Flooding:	Occasional	Brief	May	Sep
Ponding:	None			

Climatic Features

Annual Precipitation: 28 to 35 inches
Annual Air Temperature: 24 to 26 degrees F.
Frost Free Period: 60 to 80 days

Soil Features

Parent Materials: loamy alluvium over sandy and gravelly alluvium; silty eolian deposits over loamy alluvium over sandy and gravelly alluvium
Restrictive Features: strongly contrasting textural stratification at 6 to 21 inches
Drainage Class: somewhat excessively drained or well drained
Rooting Depth: RV: 13 inches *Range:* 3 to 17 inches

Soil Layers and Properties within Representative Rooting Depth:
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
2 to 4	slightly decomposed plant material	moderately rapid	.34	4.8	30	
2	silt loam	moderate	.19	5.0	15	
7 to 9	stratified sand to silt; extremely gravelly coarse sand	moderate to rapid	.03 to .13	5.6 to 6.1		2 to 16

Vegetation Features

Vegetation Type

White spruce/diamondleaf willow/bog blueberry woodland

Ecological Status

Late stage of primary succession on flood plains

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
White spruce/diamondleaf willow/bog blueberry woodland	62	16	23	36	6

Characteristics of White spruce/diamondleaf willow/bog blueberry woodland

Ecological Status: Late stage of primary succession on flood plains

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 7. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
TT	PIGL	Picea glauca	10.0	25	40	86	46
TM	PIGL	Picea glauca	0.2	10	20	43	21
SL-ST	ZZSHRUB	unknown-shrubs	0.2	21	40	71	39
SM	SALIX	Salix	40.0	48	55	43	45
SL-SM	BEGL	Betula glandulosa	0.2	8	15	86	26
SL-SM	SAPL2	Salix planifolia	5.0	8	10	29	15
SD-SL	VAUL	Vaccinium uliginosum	7.0	13	25	71	30
SL	SHCA	Shepherdia canadensis	5.0	13	25	43	24
SD	EMNI	Empetrum nigrum	0.2	7	10	71	22
GM-GT	CACA4	Calamagrostis canadensis	5.0	11	20	71	28
FD	LYAN2	Lycopodium annotinum	1.0	10	20	43	21
L	LICHEN	total lichens	0.2	3	5	86	16
M	MOSS	total bryophytes-mosses and liverworts	40.0	58	80	86	71
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	10.0	40	60	86	59
B	LITTER2	litter-woody debris >2.5 cm	0.0	4	10	86	19
B	SOIL	mineral-bare soil	0.0	0	0	86	0
B	ROCK	mineral-surface rock fragments	0.0	0	0	86	0
B	WATER	water	0.0	0	0	86	0

Site Tree Measurements:

Only dominant, codominant, and open grown trees were measured. Height of Measurements = height above ground at which age and diameter were measured. G = ground level, B = breast height (ca 1.5 m).

Tree Species	Age (years)	Diameter (inches)	Height (feet)		Number of Trees	Height of Measurements
Picea glauca	63	6.0	30	*Min.*	8	B
	109	10.4	48	*Avg*		
	232	17.0	65	*Max.*		

Map Unit Components Included in this Ecological Site

Component Name (Classification):

Klute (Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid Typic Cryofluvents)
Nizina (Sandy-skeletal, mixed Typic Cryorthents)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
AFE	Nizina silt loam, 6 to 18 percent slopes
AFM	Osar-Klute complex, 6 to 18 percent slopes
STA	Nizina-Nizina, rarely flooded, complex

Loamy Slopes, High Elevation (R173XY253AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Loamy Slopes, High Elevation
Site ID: R173XY253AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Glaciated Uplands (M135A.G1)

Physiographic Features

Elevation: 2,782 to 3,442 feet
Slope Range: 2 to 12 percent
Aspect (clockwise direction): non-influencing
Landform: swales on mountains; swales on till plains
Landform Positions: backslopes

	Frequency
Flooding:	None
Ponding:	None

Climatic Features

Annual Precipitation: 28 to 35 inches
Annual Air Temperature: 24 to 25 degrees F.
Frost Free Period: 50 to 70 days

Soil Features

Parent Materials: silty eolian deposits over gravelly alluvium
Restrictive Features: strongly contrasting textural stratification at 22 inches
Drainage Class: poorly drained
Rooting Depth: RV: 14 inches *Range:* 11 to 18 inches

Soil Layers and Properties within Representative Rooting Depth:
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
2	peat	moderately rapid	.34	5.4	30	
12	silt loam	moderate	.19	5.8		20

Vegetation Features

Vegetation Type
Diamondleaf willow scrub, moist

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Diamondleaf willow scrub, moist	40	12	17	24	4

Characteristics of Diamondleaf willow scrub, moist

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 4. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SM-ST	SAPL2	Salix planifolia	10.0	41	80	100	64
ST	SAGL	Salix glauca	15.0	15	15	25	19
SD-SM	ZZSHRUB	unknown-shrubs	0.2	30	60	75	47
SD	SARE2	Salix reticulata	5.0	5	5	25	11
GM-GT	CACA4	Calamagrostis canadensis	10.0	15	20	75	34
GM	ZZGRASS	unknown-grasses	0.2	20	40	50	32
GM	POA	Poa	5.0	5	5	25	11
FM	EQUIS	Equisetum	5.0	8	10	50	20
L	LICHEN	total lichens	0.2	5	10	100	22
M	MOSS	total bryophytes-mosses and liverworts	15.0	18	20	100	42
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	10.0	41	60	100	64
B	SOIL	mineral-bare soil	0.0	1	5	100	10
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	100	0
B	ROCK	mineral-surface rock fragments	0.0	0	0	100	0
B	WATER	water	0.0	0	0	100	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Phelanna (Coarse-loamy, mixed, superactive, nonacid, subgelic Humic Gelaquepts)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
TPA	McCumberson-Phelanna complex, 2 to 12 percent slopes

Loamy Slopes, Wet (F173XY354AK)

Ecological Site Characteristics

Site Type: Forest
Site Name: Loamy Slopes, Wet
Site ID: F173XY354AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Boreal Mountains (M135A.M2L)

Physiographic Features

Elevation: 2,667 to 2,930 feet
Slope Range: 12 to 35 percent
Aspect (clockwise direction): non-influencing
Landform: fan terraces on alluvial fans; fan terraces on alluvial fans on mountains

	Frequency
Flooding:	None
Ponding:	None

Climatic Features

Annual Precipitation: 31 to 35 inches
Annual Air Temperature: 24 to 25 degrees F.
Frost Free Period: 60 to 80 days

Soil Features

Parent Materials: silty eolian deposits over gravelly alluvium
Restrictive Features: strongly contrasting textural stratification at 10 inches
Drainage Class: poorly drained
Rooting Depth: RV: 13 inches *Range:* 3 to 26 inches

Soil Layers and Properties within Representative Rooting Depth:

Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness *(inches)*	Texture	Permeability	AWC *(inches/inch)*	pH	Effective CEC *(me/100g)*	CEC *(me/100g)*
2	peat	moderately rapid	.34	4.8	30	
8	silt loam	moderate	.19	5.4	15	
3	gravelly loam	moderate	.14	5.8		6

Vegetation Features

Vegetation Type
White spruce/willow woodland, wet
White spruce/shrub birch-willow woodland, wet

Ecological Status
Climax plant community
Late stage of fire induced secondary succession

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand *Min.*	Per Stand *Avg.*	Per Stand *Max.*	Number of Stands
White spruce/willow woodland, wet	20	11	13	14	3
White spruce/shrub birch-willow woodland, wet	40	14	19	30	4

Characteristics of White spruce/willow woodland, wet

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 4. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover			Percent Constancy	Importance Value
			Min.	*Avg.*	*Max.*		
TT	PIGL	Picea glauca	5.0	15	25	75	34
ST	ALTE2	Alnus tenuifolia	10.0	10	10	25	16
SM	SAPL2	Salix planifolia	25.0	38	60	75	53
SM	BEGL	Betula glandulosa	5.0	12	15	75	30
SD-SL	VAUL	Vaccinium uliginosum	10.0	15	20	50	27
SL	SPBE	Spiraea beauverdiana	8.0	9	10	50	21
SD	SARE2	Salix reticulata	10.0	10	10	25	16
GM	CACA4	Calamagrostis canadensis	2.0	6	10	50	17
FD	COCA13	Cornus canadensis	2.0	7	10	75	23
L	LICHEN	total lichens	5.0	7	10	75	23
M	MOSS	total bryophytes-mosses and liverworts	55.0	60	65	75	67
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	10.0	13	15	75	31
B	SOIL	mineral-bare soil	0.0	3	10	75	15
B	LITTER2	litter-woody debris >2.5 cm	0.0	2	5	75	12
B	ROCK	mineral-surface rock fragments	0.0	0	0	75	0
B	WATER	water	0.0	0	0	75	0

Site Tree Measurements:
Only dominant, codominant, and open grown trees were measured. Height of Measurements = height above ground at which age and diameter were measured. G = ground level, B = breast height (ca 1.5 m).

Tree Species	Age (years)	Diameter (inches)	Height (feet)		Number of Trees	Height of Measurements
Picea glauca	67	7.0	30	*Min.*	8	B
	162	11.1	48	*Avg*		
	342	16.0	65	*Max.*		

Characteristics of White spruce/shrub birch-willow woodland, wet

Ecological Status: Late stage of fire induced secondary succession

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 4. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover			Percent Constancy	Importance Value
			Min.	*Avg.*	*Max.*		
TT	PIGL	Picea glauca	10.0	13	20	75	31
TM	PIGL	Picea glauca	15.0	23	30	50	34
SM	BEGL	Betula glandulosa	40.0	50	60	100	71
SL-SM	SAPL2	Salix planifolia	3.0	7	15	100	26
SL-SM	SPBE	Spiraea beauverdiana	0.2	8	15	50	20
SM	ALCR6	Alnus crispa	5.0	5	5	25	11
SL	VAUL	Vaccinium uliginosum	5.0	9	15	100	30
GM-GT	CACA4	Calamagrostis canadensis	0.2	8	20	100	28
GM	CALU2	Carex lugens	35.0	35	35	25	30
FM	EQUIS	Equisetum	1.0	8	15	50	20
FM	PEHY5	Petasites hyperboreus	5.0	5	5	25	11
FD	COCA13	Cornus canadensis	0.2	7	15	75	23
L	LICHEN	total lichens	0.2	6	10	100	24

Stratum	Symbol	Scientific Name	Percent Canopy Cover			Percent Constancy	Importance Value
			Min.	*Avg.*	*Max.*		
M	MOSS	total bryophytes-mosses and liverworts	55.0	63	70	100	79
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	10.0	28	65	100	53
B	LITTER2	litter-woody debris >2.5 cm	0.0	1	2	100	10
B	SOIL	mineral-bare soil	0.0	0	0	100	0
B	ROCK	mineral-surface rock fragments	0.0	0	0	100	0
B	WATER	water	0.0	0	0	100	0

Site Tree Measurements:

Only dominant, codominant, and open grown trees were measured. Height of Measurements = height above ground at which age and diameter were measured. G = ground level, B = breast height (ca 1.5 m).

Tree Species	Age (years)	Diameter (inches)	Height (feet)		Number of Trees	Height of Measurements
Picea glauca	53	6.0	27	*Min.*	6	B
	139	11.3	43	*Avg*		
	204	16.0	65	*Max.*		

Map Unit Components Included in this Ecological Site

Component Name (Classification):

Osar (Coarse-loamy, mixed, superactive, nonacid Humic Cryaquepts)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
AFM	Osar-Klute complex, 6 to 18 percent slopes

Loamy Wet Flood Plains, High Elevation (R173XY152AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Loamy Wet Flood Plains, High Elevation
Site ID: R173XY152AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Lowland Flood Plains, Terraces, and Fans (M135A.V1L)

Physiographic Features

Elevation: 2,451 to 2,730 feet
Slope Range: 0 to 1 percent
Aspect (clockwise direction): non-influencing
Landform: flood plains

	Frequency	*Duration*	*Beginning Month*	*Ending Month*
Flooding:	Frequent	Long	May	Sep
Ponding:	None			

Climatic Features

Annual Precipitation: 28 to 33 inches
Annual Air Temperature: 25 to 26 degrees F.
Frost Free Period: 60 to 80 days

Soil Features

Parent Materials: sandy and silty alluvium over sandy and gravelly alluvium
Restrictive Features: strongly contrasting textural stratification at 29 inches
Drainage Class: poorly drained
Rooting Depth: RV: 14 inches *Range:* 1 to 26 inches

Soil Layers and Properties within Representative Rooting Depth:

Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
1	slightly decomposed plant material	moderately rapid	.34	6.0		80
4	fine sandy loam	moderate	.16	6.2		16
9	stratified sand to silt	moderate	.13	6.2		12

Vegetation Features

Vegetation Type
Diamondleaf willow/horsetail-fragile sedge scrub

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Per Stand Total	Min.	Avg.	Max.	Number of Stands
Diamondleaf willow/horsetail-fragile sedge scrub	21	4	9	12	5

Characteristics of Diamondleaf willow/horsetail-fragile sedge scrub

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 9. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Avg.	Max.	Percent Constancy	Importance Value
SM	ZZSHRUB	unknown-shrubs	40.0	55	70	22	35
SL-SM	SAPL2	Salix planifolia	3.0	27	60	44	34
SL-SM	SAAL	Salix alaxensis	10.0	11	15	44	22
GM	CACA4	Calamagrostis canadensis	20.0	23	25	22	22
GM	CAAQ	Carex aquatilis	20.0	20	20	22	21
FM	EQUIS	Equisetum	0.2	30	60	22	26
L	LICHEN	total lichens	0.0	3	10	56	13
M	MOSS	total bryophytes-mosses and liverworts	5.0	19	40	56	33
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	25.0	35	55	56	44
B	SOIL	mineral-bare soil	0.0	22	60	56	35
B	LITTER2	litter-woody debris >2.5 cm	0.0	1	5	56	7
B	ROCK	mineral-surface rock fragments	0.0	0	0	56	0
B	WATER	water	0.0	0	0	56	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Swedna (Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid Typic Cryaquents)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
FPA	Swedna-Riverwash-Dackey complex
FPD	Dackey-Swedna-Tangoe complex

Peat Mounds, Low Elevation (R173XY114AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Peat Mounds, Low Elevation
Site ID: R173XY114AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Glaciated Uplands (M135A.G1)

Physiographic Features

Elevation: 2,848 to 2,999 feet
Slope Range: 6 to 60 percent
Aspect (clockwise direction): non-influencing
Landform: hills on peat plateaus

	Frequency
Flooding:	None
Ponding:	None

Climatic Features

Annual Precipitation: 22 to 24 inches
Annual Air Temperature: 25 degrees F.
Frost Free Period: 50 to 70 days

Soil Features

Parent Materials: mossy organic material and/or woody organic material
Restrictive Features: permafrost at 18 inches
Drainage Class: well drained
Rooting Depth: RV: 15 inches *Range:* 10 to 20 inches

Soil Layers and Properties within Representative Rooting Depth:
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
15	slightly decomposed plant material	moderately rapid	.34	4.2	30	

Vegetation Features

Vegetation Type
Shrub birch-mixed ericaceous shrub/cloudberry scrub

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Shrub birch-mixed ericaceous shrub/cloudberry scrub	11	6	7	8	3

Characteristics of Shrub birch-mixed ericaceous shrub/cloudberry scrub

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 3. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SM	BENA	Betula nana	10.0	10	10	33	18
SL	BEGL	Betula glandulosa	10.0	23	35	67	39
SD	LEGR	Ledum groenlandicum	20.0	27	35	100	52
SD	VAUL	Vaccinium uliginosum	10.0	13	15	67	30
SD	VAVI	Vaccinium vitis-idaea	5.0	5	5	67	18
SD	EMNI	Empetrum nigrum	5.0	5	5	33	13
GM	CAREX	Carex	5.0	13	20	100	36
FD	RUCH	Rubus chamaemorus	2.0	19	35	100	44
L	LICHEN	total lichens	10.0	38	55	100	62
M	MOSS	total bryophytes-mosses and liverworts	15.0	28	50	100	53
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	25.0	27	30	100	52
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	100	0
B	SOIL	mineral-bare soil	0.0	0	0	100	0
B	ROCK	mineral-surface rock fragments	0.0	0	0	100	0
B	WATER	water	0.0	0	0	100	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Fels (Dysic, subgelic Glacic Folistels)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
IM	Shand-Bonot-Fels complex, 0 to 60 percent slopes

Pond Margins (R173XY500AK)

Ecological Site Characteristics

Site Type: Rangeland

Site Name: Pond Margins
Site ID: R173XY500AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Glaciated Uplands (M135A.G1)

Physiographic Features

Elevation: 2,644 to 3,113 feet
Slope Range: 0 percent
Aspect (clockwise direction): non-influencing
Landform: depressions on outwash plains; lakeshores on outwash plains

	Frequency	*Duration*	*Beginning Month*	*Ending Month*
Flooding:	None			
Ponding:	Frequent	Long	May	Jul

Climatic Features

Annual Precipitation: 22 to 31 inches
Annual Air Temperature: 25 degrees F.
Frost Free Period: 50 to 80 days

Soil Features

Parent Materials: grassy organic material over gravelly till
Restrictive Features: strongly contrasting textural stratification at 25 inches
Drainage Class: very poorly drained
Rooting Depth: RV: 48 inches *Range:* 25 to 60 inches

Soil Layers and Properties within Representative Rooting Depth:
Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness *(inches)*	**Texture**	**Permeability**	**AWC** *(inches/inch)*	**pH**	**Effective CEC** *(me/100g)*	**CEC** *(me/100g)*
25	peat	moderately rapid	.34	5.8		80
23	extremely cobbly sandy loam	moderate	.14	6.3		6

Vegetation Features

Vegetation Type
Sedge wet meadow

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	**Total**	**Per Stand** *Min.*	*Avg.*	*Max.*	**Number of Stands**
Sedge wet meadow	8	8	8	8	1

Characteristics of Sedge wet meadow

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:
Number of stands sampled = 3. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover			Percent Constancy	Importance Value
			Min.	*Avg.*	*Max.*		
SL	BEGL	Betula glandulosa	5.0	5	5	33	13
GM	ERIOP	Eriophorum	40.0	40	40	33	36
GM	CAAQ	Carex aquatilis	35.0	35	35	33	34
L	LICHEN	total lichens	0.0	0	0	33	0
M	MOSS	total bryophytes-mosses and liverworts	5.0	5	5	33	13
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	50.0	50	50	33	41
B	WATER	water	10.0	10	10	33	18
B	LITTER2	litter-woody debris >2.5 cm	0.0	0	0	33	0
B	SOIL	mineral-bare soil	0.0	0	0	33	0
B	ROCK	mineral-surface rock fragments	0.0	0	0	33	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Terric Cryohemists (Loamy-skeletal, euic Terric Cryohemists)

Soil Map Units

This ecological site is associated with a minor soil component in the map units listed. It is not associated with a major component in any map unit.

Symbol	Map Unit Name
GO1	Schleyer-Geist complex, 0 to 30 percent slopes
GO3	Turbellina-Schleyer complex, 0 to 30 percent slopes
W	Water

Swales, High Elevation (R173XY420AK)

Ecological Site Characteristics

Site Type: Rangeland
Site Name: Swales, High Elevation
Site ID: R173XY420AK
Major Land Resource Area: 228—Interior Alaska Mountains

Ecoregion Classification

Section: Alaska Mountains (M135A)
Subsection(s): Boreal Mountains (M135A.M2L)
Alpine Mountains (M135A.M2)

Physiographic Features

Elevation: 2,365 to 3,773 feet
Slope Range: 8 to 45 percent
Aspect (clockwise direction): non-influencing
Landform: swales on mountains
Landform Positions: backslopes; footslopes

	Frequency
Flooding:	None
Ponding:	None

Climatic Features

Annual Precipitation: 23 to 37 inches
Annual Air Temperature: 24 to 25 degrees F.
Frost Free Period: 50 to 70 days

Soil Features

Parent Materials: silty eolian deposits over gravelly till
Restrictive Features: strongly contrasting textural stratification at 10 inches
Drainage Class: somewhat poorly drained
Rooting Depth: RV: 14 inches *Range:* 4 to 26 inches

Soil Layers and Properties within Representative Rooting Depth:

Layers are described from the surface downward. If more than one texture is listed, the predominant texture is listed first. AWC = available water capacity. pH = hydrogen ion activity in the soil using the 1:1 soil-water ratio method. CEC = cation exchange capacity.

Thickness (inches)	Texture	Permeability	AWC (inches/inch)	pH	Effective CEC (me/100g)	CEC (me/100g)
2	peat	moderately rapid	.34	5.0	30	
8	silt loam	moderate	.19	5.1	15	
5	very cobbly loam	moderate	.11	5.9		2

Vegetation Features

Vegetation Type
Diamondleaf willow-mixed willow scrub mosaic

Ecological Status
Climax plant community

Vascular Plant Species Richness:

Vegetation Type	Total	Per Stand Min.	Per Stand Avg.	Per Stand Max.	Number of Stands
Diamondleaf willow-mixed willow scrub mosaic	88	6	25	42	8

Characteristics of Diamondleaf willow-mixed willow scrub mosaic

Ecological Status: Climax plant community

Plant Species Cover, Constancy, and Importance:

Number of stands sampled = 9. Only those vascular, lichen, and bryophyte species with average cover >=5% and constancy >=15% are listed. Importance value equals the square root of Percent Constancy times Average Cover.

Stratum	Symbol	Scientific Name	Percent Canopy Cover Min.	Percent Canopy Cover Avg.	Percent Canopy Cover Max.	Percent Constancy	Importance Value
SD-ST	SAPL2	Salix planifolia	5.0	53	100	67	60
SM-ST	SALIX	Salix	70.0	80	90	22	42
SL-ST	BEGL	Betula glandulosa	0.2	10	25	67	26
SD-SM	SARE2	Salix reticulata	0.2	12	45	44	23
SM	SALA4	Salix lanata	5.0	10	15	22	15
GM-GT	CACA4	Calamagrostis canadensis	0.2	24	60	67	40
GM	CAREX	Carex	0.2	7	20	33	15
FD-FM	EQAR	Equisetum arvense	0.2	5	20	44	15
FM	GEER2	Geranium erianthum	3.0	5	7	22	10
L	LICHEN	total lichens	0.0	3	15	89	16
M	MOSS	total bryophytes-mosses and liverworts	0.2	23	60	89	45
B	LITTER	litter-herbaceous, mulch, and woody debris <2.5 cm	10.0	41	90	89	60
B	LITTER2	litter-woody debris >2.5 cm	0.0	3	10	89	16
B	ROCK	mineral-surface rock fragments	0.0	2	10	89	13
B	WATER	water	0.0	1	10	89	9
B	SOIL	mineral-bare soil	0.0	0	0	89	0

Map Unit Components Included in this Ecological Site

Component Name (Classification):
Ogive (Loamy-skeletal, mixed, superactive, subgelic Humic Eutrogelepts)

Soil Map Units

Only those map units in which the ecological site is associated with a major soil component are listed. The ecological site also may be associated with one or more soil components in other map units.

Symbol	Map Unit Name
ESA	Waitabit-Ogive complex, 22 to 60 percent slopes
MST	Frostcircle-Ogive association, 0 to 25 percent slopes

NRCS Accessibility Statement

The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at helpdesk@helpdesk.itc.nrcs.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.