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Preliminary Soils Map of the Fremont Lake South Quadrangle, Sublette County, Wyoming

by

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

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PRELIMINARY
SOILS MAP OF THE FREMONT LAKE SOUTH QUADRANGLE,
SUBLETTE COUNTY, WYOMING

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EXPLANATION OF MAP UNITS

Note

The soils mapped here have developed mainly in till and in sediments reworked from till of Pinedale, Bull Lake, and earlier ages. A small proportion of the soils have developed in residuum or in colluvium derived from locally exposed bedrock. The Fremont Lake South quadrangle was chosen for soil mapping because a map providing the distribution, age, and description of the tills and other deposits already existed (Richmond, 1973). The map area contains a variety of deposits of piedmont glaciers and is the type locality for Pinedale Till. In addition, Shroba (1977) and Mahaney (1978) have contributed soils data which allow comparison of the morphology and chemical composition of soils on surfaces of differing ages in the study area.

Two new radiocarbon dates are available from soils in the quadrangle. One of these dates, 6070 ± 100 Y.B.P. (S.I. 5699), represents the mean residence time for organic carbon at the base of the A horizon, buried 80-84 inches beneath the surface, in a paleosol. The paleosol appears to represent the onset of a mid-Holocene soil forming interval. It is buried beneath loess and colluvium in a depression between moraines west of Fremont Lake in the NE1/4NE1/4 of Section 11, T. 34 N., R. 109 W. (locality A).

The other date, 9305 ± 75 Y.B.P. (S.I. 5700), is from the base of a peat soil, 44 inches thick, located north of Soda Lake in the NE1/4NE1/4 of Section 27, T. 35 N., R. 109 W. (locality B). Peat has formed in a large, filled depression above glacial outwash, and represents the onset of peat accumulation following a late recessional readvance at that location. The dates provide some indication of the ages of many of the younger soils in the quadrangle. Field evidence and two dates suggest that erosion from the moraine slopes and sediment accumulation in swales and depressions was common throughout the map area during the mid-holocene.

A boulder conglomerate, formerly considered of Pliocene age (Richmond, 1973) is here stated to be of probable Miocene age, as suggested by Richmond (1983), owing to a change in the position and age of the boundary between the Miocene and Pliocene adopted by the U.S. Geological Survey on the basis of papers given at an International Geological Congress Symposium on Late Neogene Epoch boundaries (Tsunemasa and Burckle, 1975).

No comprehensive soil maps of large scale exist for the glacial deposits on the west side of the Wind River Range. In most mountainous regions, detailed soil maps currently stop at the margin of irrigable land. Notable exceptions exist, such as the soil map of Teton County, Wyoming (Young, Lewis, Fowkes, and Glenn, 1982). The need for soils data in areas that presently are not mapped in detail is self-evident in an era of ever-increasing utilization of land, even in sparsely populated regions of the mountainous western United States.

In contrast to the availability of soils maps, detailed geologic maps are more common in the western states. This map is the first soils map of a specific geologic quadrangle that can be compared to a surficial geologic map of the same quadrangle, area for area. If mapping of this sort can firmly establish correlations among soils and parent materials, then geologic maps may aid in the establishment of boundaries for soil map units, and allow soil mappers to work more quickly in areas where such maps exist than in those where they do not.

The first step in the correlative or comparative process is to prepare soils maps for comparison with geologic maps. Terminology and symbols used on this map are selected in accordance with the standards of the United States Department of Agriculture, Soil Conservation Service, as set forth by the Soil Survey Staff (1975). The map unit names include some soil series that have been established by the Soil Conservation Service and some family units. Family units are more general than series units and may include one or more soil series names, as well as series that are as yet unnamed. It is recommended that this map be used in conjunction with United States Geological Survey, Geologic Quadrangle Map, GQ 1138 (Richmond, 1973).

References

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Soil Map Units

ACp — Alfic Cryochrepts, 0 to 20 percent slopes

These soils are formed in old till, probably pre-Bull Lake in age, and are commonly buried. They are exposed in roadcuts along Skyline Drive and in small isolated bodies north and east of Surveyor Park. In a typical profile, the A horizon is very dark-gray silt loam 2 inches thick. The B horizons are dark reddish-brown and yellowish-red sandy loam 20 inches thick. The parent material is light olive brown with reddish-yellow mottles, and consists of gravelly sand several feet thick.

ACl/TCl_1 — Argic Cryoborolls-Typic Cryoborolls complex, 0 to 20 percent slopes

These soils are formed in till of Pinedale age and in materials weathered from conglomerate of probable Miocene age. Both parent materials occur widely throughout the map area and produce similar soils. In a typical Argic Cryoboroll profile, the A horizon is very dark grayish-brown gravelly sandy loam 6 inches thick. The B horizon is strong brown and light olive-brown sandy clay 10 inches thick. The parent material is gray bouldery, gravelly sand several feet thick. Under aspen trees, a black layer of partially decomposed organic matter 1 to 2 inches thick overlies the mineral soil. The Typic Cryoborolls are similar to the Argic Cryoborolls except they lack an argillic horizon.

ACl/TCl_2 — Argic Cryoborolls-Typic Cryoborolls complex, 20 to 60 percent slopes

These soils are formed in till on steep Pinedale moraines that are forested, in till on steep slopes along the outer margins of Bull Lake moraines that are currently covered by sage and grasses, and in conglomerate of probable Miocene age with a cover of sage and grasses. A typical profile is described in map unit ACl/TCl_1.

ACl/TCf_1 — Argic Cryoborolls-Typic Cryoboralfs complex, 0 to 20 percent slopes.

These soils are formed in till of Pinedale age under deciduous and coniferous vegetation and are confined to the northern half of the map area. The soils do not correspond to a specific topographic position. A typical Argic Cryoboroll profile is described in map unit ACl/TCl_1 and a Typic Cryoboralf is described in map unit TCf.

ACl/TCf$_2$ Argic Cryoborolls-Typic Cryoboralfs complex, 20 to 60 percent slopes

These soils are formed in till of Pinedale age and occur on north- and west-facing slopes. Vegetative cover is mixed deciduous and coniferous forest; the soils are eroded in areas where vegetation has been disturbed. A typical Argic Cryoboroll profile is described in map unit ACl/TCl$_1$ and a Typic Cryoboralf profile is described in map unit TCf.

Bo Boulder gravelly sandy loam (Argiudic Cryoboroll), 0 to 20 percent slopes

This soil is formed in alluvial terrace deposits of Holocene age and older. They are developed along Pine Creek and in outwash deposits in front of moraines along the southern margin of the map area. In a typical profile, the A horizon layer is very dark gray to gray fine sandy loam, 10 inches thick. The B horizon is light-gray fine sandy loam, 6 inches thick. The parent material is light-gray extremely gravelly loamy sand several feet thick.

Br Burnt Lake stony sandy loam (Typic Cryoboroll), 0 to 40 percent slopes

This soil is formed in till and outwash. It is present on a variety of geomorphic surfaces, supports a variety of vegetative communities, and is the most prevalent soil in the map area. Individual soil bodies tend to be small and are intermixed with other soils; therefore this soil is typically mapped in a soil complex. In a typical profile, the A horizon is very dark grayish-brown and grayish-brown stony or gravelly sandy loam less than 16 inches thick. The parent material is light yellowish-brown stony sandy loam several feet thick.

Br/Su$_1$ Burnt Lake-Sublette complex (Typic Cryoboroll-Argic Pachic Cryoboroll), 0 to 20 percent slopes

These soils are formed in till, loess, and colluvium on gently sloping morainal surfaces and in depressions on the moraines. The highly variable topography makes delineation of individual soils difficult; this soil complex is widespread on Pinedale moraines. A typical Burnt Lake soil is described in map unit Br, and a typical Sublette soil is described in map unit Sr.

Br/Su_2 Burnt Lake-Sublette complex (Typic Cryoboroll-Argic Pachic Cryoboroll), 20 to 60 percent slopes

These soils are formed in till, loess, and colluvium on steeply sloping moraines and in depressions on the moraines. The complex occurs in arcuate patterns that correspond with end and lateral moraines adjacent to Fremont, Half Moon, and Soda Lakes. A typical Burnt Lake Soil is described in map unit Br, and a typical Sublette soil is described in map unit Su.

Br/TCf Burnt Lake (Typic Cryoboroll)-Typic Cryoboralfs complex, 0 to 40 percent slopes

These soils are formed in till. The north end of Fremont Ridge is characterized by well developed Cryoboralfs formed in till of Bull Lake Age. Today these soils support sage and grasses. Soils north of Little Soda Lake and Half Moon Lake formed in younger parent materials and have a forest cover today. A typical Burnt Lake soil is described in map unit Br, and a typical Typic Cryoboralf is described in map unit TCf.

Br/LCn/TCn Burnt Lake (Typic Cryoboroll)-Lithic Cryorthents-Typic Cryorthents complex, 40 to 90 percent slopes

These soils are on extremely steep slopes and are formed in thin till and in debris weathered from granitic bedrock. They are most common in the forested northeastern part of the map area. A typical Burnt Lake soil is described in map unit Br. A typical Lithic Cryorthent has an A horizon that is very dark-brown and dark-brown sandy loam 3 inches thick. The parent materials are dark yellowish-brown gravelly and stony sand about 15 inches thick over gray granite bedrock. The Typic Cryorthents are like the Lithic Cryorthents except that parent material is thicker in the former.

CCq Calcic Cryaquolls, 0 to 5 percent slopes

These soils occur in depressions in the area of the Soda Lake lobe. In a typical profile, the A horizon is very dark-gray to dark brown calcareous clay loam 8 inches thick. The parent material is strong brown and light olive-brown calcareous gravelly clayey sand 16 inches thick over sandy gravel.

CuCq Cumulic Cryaquolls, 0 to 5 percent slopes

These soils are formed in Holocene alluvium along a minor drainage way in the extreme southeastern part of the map. In a typical profile, the A horizon is very dark-

grayish brown clay loam 36 inches thick. The parent material is bluish-gray sandy clay 2 or more feet thick.

Gk/ACl — Gelkie (Argic Cryoboroll)-Argic Cryoborolls complex, 0 to 20 percent slopes

This soil complex is formed in till and colluvium and is confined to those portions of the Bull Lake moraines that are irrigated in the southwestern corner of the map area. In a typical profile, the A horizon of the Gelkie soil is dark-brown gravelly sandy loam 8 inches thick. The B horizon is brown sandy clay loam 16 inches thick. The parent material is dark grayish-brown and grayish-brown calcareous gravelly sandy clay till several feet thick. The A horizon of the Argic Cryoboroll is dark-brown gravelly sandy loam 10 inches thick. The B horizon is brown gravelly sandy clay loam 20 inches thick. The parent materials consist of layers of brown and light-olive brown gravelly sands that overlie calcareous, olive, gravelly, sandy clay several feet thick.

Gk/Br — Gelkie-Burnt Lake complex (Argic Cryoboroll-Typic Cryoboroll), 0 to 6 percent slopes

This soil complex is formed in outwash of Bull Lake age and is located in the southeast corner of the map area. This unit is confined to high, nearly level outwash terraces that can be traced to Bull Lake moraines. Typical Gelkie and Burnt Lake soils are described in map units Gk/ACl and Br, respectively.

Gk/Br/Su — Gelkie-Burnt Lake-Sublette complex (Argic Cryoboroll-Typic Cryoboroll, Argic Pachic Cryoboroll), 0 to 20 percent slopes

This soil complex is formed in till of Bull Lake age in the southern part of the map. Gelkie soils are widespread throughout the map unit. Burnt Lake soils are confined to steep, exposed and/or eroded slopes and moraine crests in the unit. Sublette soils are found on southeast-facing slopes and in depressions. Typical Gelkie and Burnt Lake soils are described in map units Gk/ACl and Br, respectively. A typical Sublette soil is described in map Su.

HCq/Cq — Histic Cryaquolls-Cryaquolls complex, 0 to 5 percent slopes

These soils are found in low topographic positions where the water table is high, supporting a wetland vegetation of grasses and sedges. They occur sporadically throughout the map area, although the largest soil bodies

of this complex are in Hay Gulch and Surveyor Park. In a typical Histic Cryaquoll profile, the O horizon is black to dark-brown peat 4 inches thick. The B horizon is dark-olive silty clay 3 feet thick. The parent material is bluish-gray sandy silty clay several feet thick. The Cryaquolls are similar to the Histic Cryaquolls, except that they lack a surface peat layer.

LCn/TCn/TCf/TCl Lithic Cryorthents-Typic Cryorthents-Typic Cryoboralfs-Typic Cryoborolls complex, 0 to 40 percent slopes

These soils are formed in thin colluvium and till over bedrock. The complex is located in the northeastern corner of the map area on the east and west sides of Fremont Lake. In a typical Lithic Cryorthent profile, the A horizon is very dark-gray and dark grayish-brown sandy loam 3 inches thick. The parent material is dark yellowish-brown gravelly sand about 8 inches thick and overlies bedrock. A typical Typic Cryorthent profile is similar to a Lithic Cryorthent except that it is thicker, generally greater than 20 inches thick over bedrock. A typical Typic Cryoboralf and a typical Typic Cryoboroll are described in map units TCf and AC1/TC1, respectively.

Nf New Fork gravelly loam (Typic Cryaquoll), 0 to 5 percent slopes

This soil is formed in Holocene alluvium along Pine Creek. In a typical profile, the A horizon is very dark brown gravelly loam 8 inches thick. The B horizon is dark grayish-brown fine sandy loam 8 inches thick. The parent material is brown sandy gravel with yellowish-brown mottles; it is several feet thick.

Pd/Bo Pinedale-Boulder complex (Argiudic Cryoboroll-Argiudic Cryoboroll), 0 to 5 percent slopes

These soils are formed in pre-Bull Lake alluvium on high terraces mostly in the southern part of the map area. In a typical Pinedale profile, the A horizon is dark-brown gravelly sandy loam 6 inches thick. The B horizon is brown gravelly sandy clay loam 16 inches thick. The parent material is yellowish-brown, calcareous, very gravelly sand several feet thick. A typical Boulder soil is described in map unit Bo.

Rk Rock outcrop

This map unit consists of bedrock in which surface slope varies from gentle to steep. The largest areas of exposed bedrock are adjacent to Fremont Lake at the northern end of the map area.

Su — Sublette sandy loam (Argic Pachic Cryoboroll), 0 to 20 percent slopes

This soil is formed in eolian silt and colluvium that overlie till on lower slopes of moraines and in depressions throughout the map area. Few areas of the soil are large enough to map separately; those mapped are in swales between high steeply sloping lateral moraines on the west side of Fremont Lake. In a typical profile, the A horizon is very dark brown sandy loam 10 inches thick. The B horizon is dark grayish-brown and dark brown sandy loam 20 inches thick. The parent material is grayish-brown sandy loam 2 or more feet thick.

TCq — Typic Cryaquolls, 0 to 20 percent slopes

These soils are formed in lacustrine sediments adjacent to Halls Lake. In a typical profile, the A horizon is very dark-brown silt loam 4 inches thick. The B horizon is black and dark-gray silty clay 21 inches thick. The parent material is olive-gray clayey silt with yellowish-gray mottles and is several feet thick. Lake varves, preserved beneath the soil, have been recovered from cores that penetrated 28 feet beneath the surface.

TCf — Typic Cryoboralfs, 0 to 30 percent slopes

These soils are formed in tills of Pinedale and Bull Lake age under coniferous vegetation. They are situated on the steeply sloping flanks of Pinedale moraines in the northwest and on till of Bull Lake age in the northeast. In a typical profile, the O horizon is black partially decomposed organic litter 2 inches thick, the E horizon is grayish-brown gravelly sand 1 to 2 inches thick, and the B horizon is dark-brown sandy loam 10 to 12 inches thick. The parent material is dark-brown and brown bouldery sandy loam several feet thick.

TCp — Typic Cryochrepts, 0 to 20 percent slopes

These soils are formed in sandy to gravelly outwash and kame deposits of Pinedale age. The soils occur throughout the map area, but are most common beneath sage in the area adjacent to Soda Lake. In a typical profile, the A horizon is dark-brown gravelly sandy loam 8 inches thick. The parent materials are brown and yellow beds of sand and gravel several feet thick.

A — Location of radiocarbon date sample.