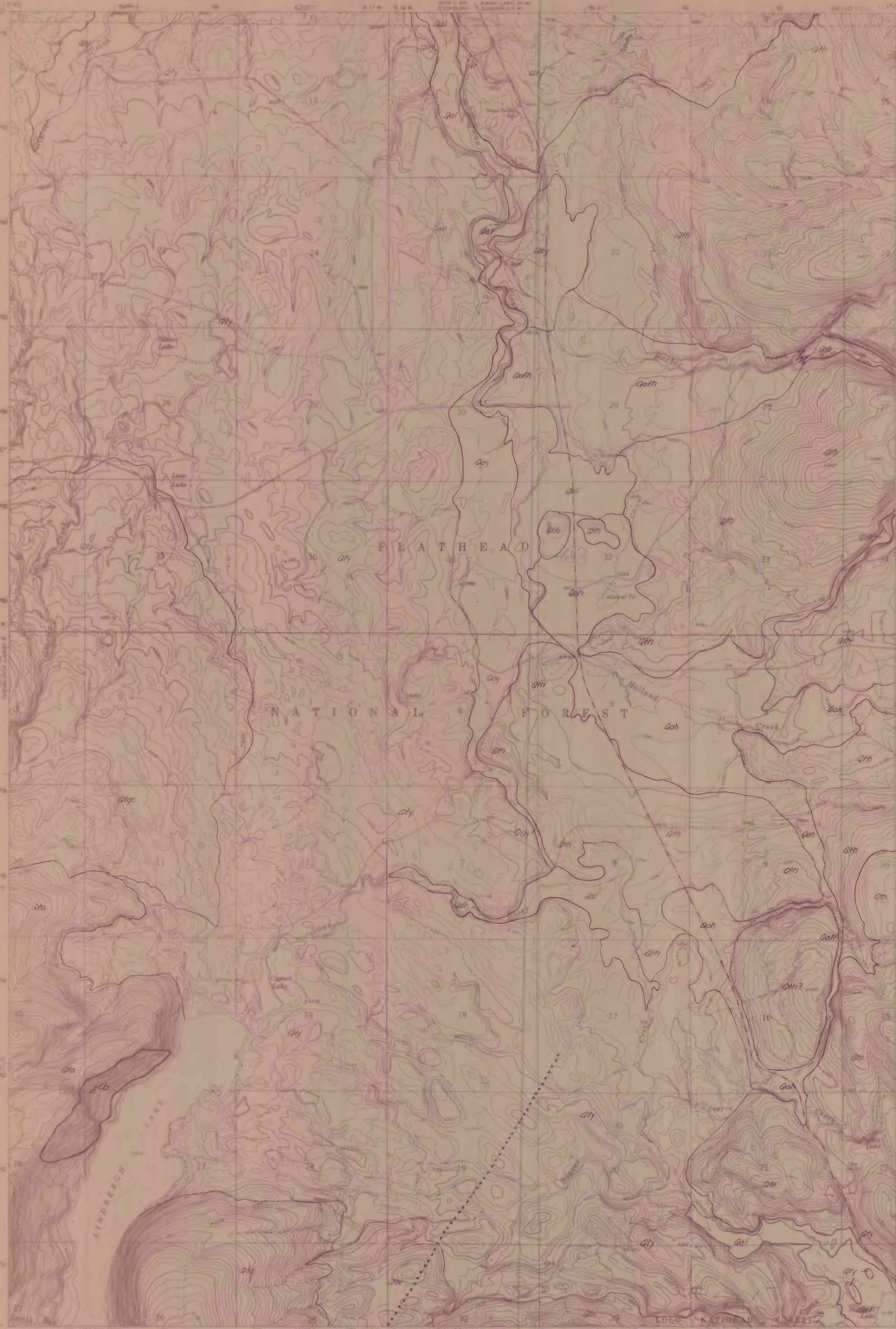
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

OPEN-FILE REPORT
77-198
CYGNET LAKE QUAD. MONT



Base from U.S. Geological Survey, 1965.

U.S. Geological Survey
OPEN FILE REPORT
This map is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

Geology by Irving J. Witkind, 1975. Trace of fault from unpublished maps by J. E. Harrison, U.S. Geological Survey.

QUADRANGLE LOCATION

PRELIMINARY MAP SHOWING SURFICIAL DEPOSITS IN THE CYGNET LAKE QUADRANGLE, MISSOULA COUNTY, MONTANA

By
Irving J. Witkind
1977

Introduction

Personnel of the U.S. Geological Survey, in conjunction with Mark Weber, Geologic Consultant to Missoula and Powell Counties, are studying the earth and water resources of an area that extends from the Big Fork quadrangle on the north to the Avon quadrangle on the south. This map represents one product of that study, and is for the use of environmental and land-use planners. Additional maps south of Highway 200 have been prepared by Weber.

The areal distribution of all geologic units, except alluvium, was determined in the field. The distribution of the alluvium was plotted in the office from aerial photographs.

Surficial deposits

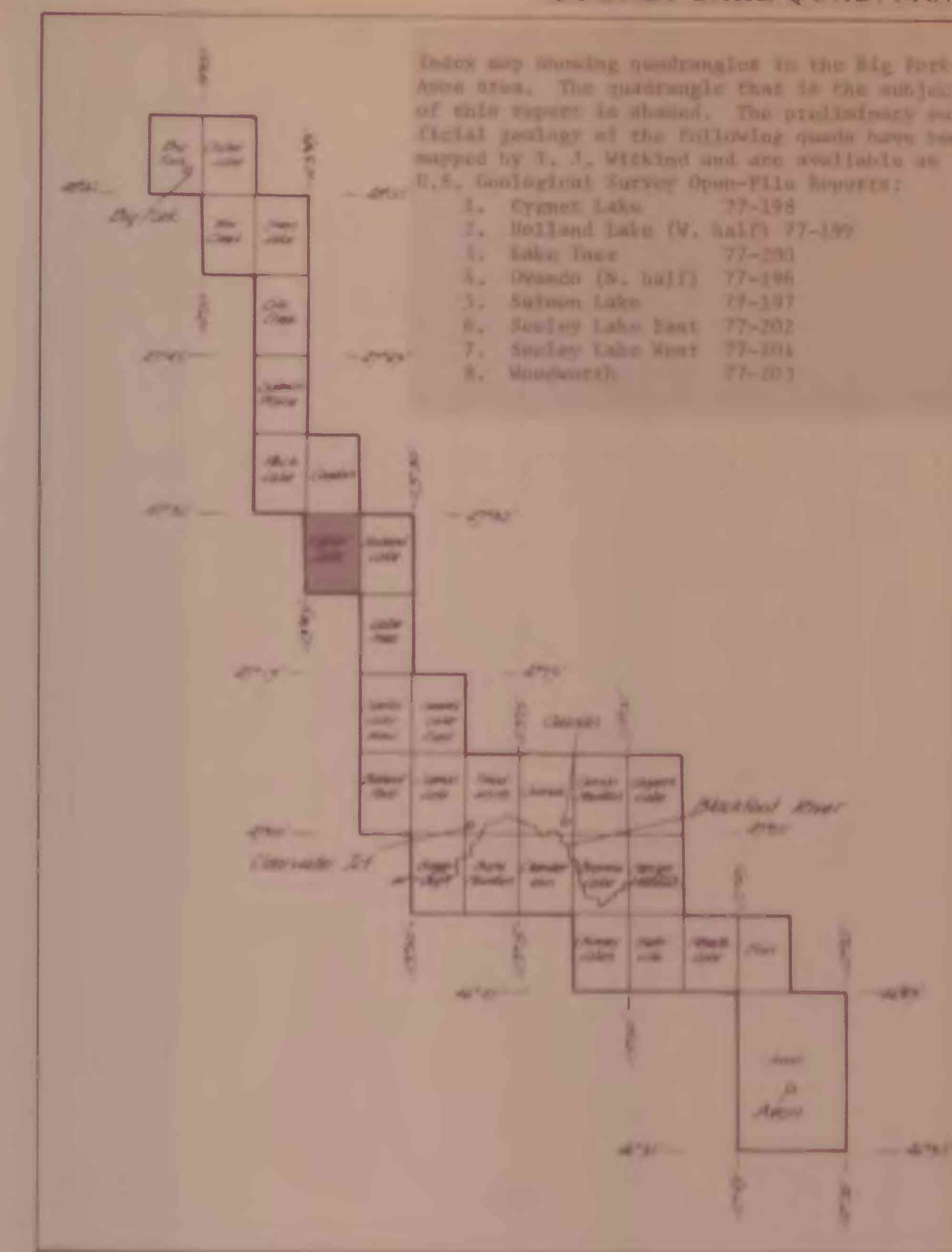
Most of the surficial deposits in the northern part of the Big Fork-Avon area were formed in the latter stages of the last ice age--the Pinedale glaciation of the Pleistocene--during the advance and waste of several large glaciers. These deposits mantle the lower flanks of the mountains and form the valley floors; they have been dissected and eroded somewhat by modern streams, but most still appear much as when they were formed.

For ease of discussion and to avoid the complexities of glacial nomenclature these deposits have been grouped into two categories, older and younger. The "older" deposits were likely formed either during early or middle Pinedale time, and the "younger" deposits during the late Pinedale. It is possible that in some localities deposits of more than one ice advance have been included in one or the other category.

Deposits of the older ice are identified on the map by the letter "o" added to the symbol, thus "Qto," is, "till of the older ice."

Deposits of the younger ice are identified on the map by the letter "y" added to the symbol, thus "Qoy," is, "outwash of the younger ice."

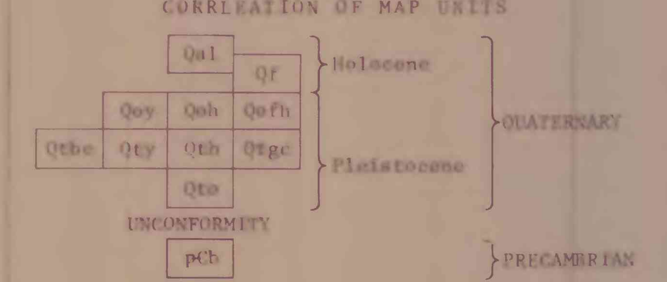
Locally, along the length of the Swan Valley, deposits of former small tributary glaciers extend into the main valley. These deposits have been mapped separately and are identified by appropriate symbols, thus "Qth," is, "till of the Holland Lake ice."



Index map showing quadrangles in the Big Fork-Avon Area. The quadrangle that is the subject of this report is shaded. The preliminary surficial geology of the following quads have been mapped by I. J. Witkind and are available as U.S. Geological Survey Open-File Reports:

1. Cygnet Lake 77-198
2. Holland Lake (W. half) 77-199
3. Lake Inez 77-200
4. Ovando (N. half) 77-196
5. Salmon Lake 77-197
6. Seeley Lake East 77-202
7. Seeley Lake West 77-201
8. Woodworth 77-203

CORRLEATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qal ALLUVIUM (HOLOCENE)--Stream-deposited unconsolidated silt, sand, and gravel. Commonly forms the floor of major stream valleys, as well as of the now-abandoned meltwater channels of former glaciers. Locally includes small deposits of colluvium and other mass-wasting debris. Overlies and normally masks outwash sand and gravel deposited by meltwaters of the wasting glaciers

Qf ALLUVIAL FAN (HOLOCENE)--Low, broad, cone-shaped, gently sloping, light-brown to brown deposit of unconsolidated to semi-consolidated moderately sorted silt, sand, and gravel formed at valley mouth. Locally contains thin sheets of gravel 1/3-2/3 m (1-2 ft) thick

PINEDALE GLACIATION (PLEISTOCENE)

Qoy Outwash deposited by younger ice--Patches of light-brown to brown, unconsolidated, moderately well sorted silt, sand, and gravel, flooring Glacier Creek, and some 3-18 m (10-60 ft) above the alluvial floor of the Swan River. Locally covered by a veneer of very fine grained sand, 5-15 cm (2-6 in.) thick. Clasts range in shape from subangular to subrounded; most are subrounded. In general, about 65 percent of unit is composed of clasts that range in size from about 5 mm to about 76 mm (1/4-3 in.); about 30 percent consists of a fine to coarse sand with included small pebbles as much as 5 mm; and the remaining 5 percent is silt. Green, gray, and purple argillite clasts strongly dominate deposit; tan quartzite and sandstone clasts are minor constituents. Well rounded cobbles are common. Few large subangular to subrounded boulders, 30-36 cm (12-14 in.), scattered through deposit. Patches along Swan River are relicts of a once-continuous outwash deposit originally formed by north-flowing meltwaters of a wasting trunk glacier which occupied Swan Valley

Qoh Outwash deposited by Holland Lake ice--Even-surfaced deposit of unconsolidated, moderately well sorted silt, sand, and gravel flooring ice-marginal and outwash channels of the Holland Lake glacier. In many places covered by a thin layer of alluvium. Clasts range in shape from angular to well rounded; most are rounded. In general, about 64 percent of unit is composed of clasts that range in size from about 5 mm to about 76 mm (1/4-3 in.); about 33 percent consists of a fine to coarse sand with included small pebbles as much as 5 mm; and the remaining 3 percent is silt. Includes many well rounded cobbles, 8-20 cm (3-8 in.) in diameter, and a few subrounded to rounded boulders 25-46 cm (10-18 in.). Clasts of green, gray, and purple argillite dominate; tan quartzite and sandstone clasts are minor components. Outwash laps onto and locally encloses knolls and hillocks of the terminal and recessional moraines formed during the waste of the Holland Lake glacier

Qofh Outwash fan deposited by Holland Lake ice--Fan-shaped deposit of unconsolidated, moderately well sorted silt, sand, and gravel at the valley mouth of South Fork Barber Creek. Locally covered by a thin layer of alluvium. Clasts range in shape from angular to well rounded; most are rounded. In general, about 61 percent of unit is composed of clasts that range in size from about 5 mm to about 76 mm (1/4-3 in.); about 34 percent consists of a fine to coarse sand with included small pebbles as much as 5 mm; and the remaining 5 percent is silt. Includes many well rounded cobbles, 8-20 cm (3-8 in.), and a few subrounded to rounded boulders 25-46 cm (10-18 in.). Clasts of green, gray, and purple argillite dominate; tan quartzite and sandstone clasts are minor constituents. Formed by meltwaters that flowed westward through an ice-marginal channel (now occupied by the South Fork Barber Creek) which developed along the north edge of the wasting Holland Lake glacier

Qtbc Till deposited by Beaver Creek ice--Small, lobate moraine marked by a modified knob-and-kettle topography. Drumlins trend about N. 75° E. Light brown to brown; consists of an unsorted mixture of gravel, cobbles, and boulders in a clayey matrix. Clasts range in shape from angular to subangular; most are subangular. Sizes range from 5 mm to 20 cm (1/4-8 in.). Clasts of green, gray, and purple argillite dominate; tan quartzite and sandstone clasts are minor constitutents. Contains many subangular boulders 0.6-1.2 m (2-4 ft) across. Large glacial erratics, 3-4.5 m (10-15 ft) on a side, are common both in the till and on the surface

Qty Till deposited by younger ice--Hummocky moraine marked by a striking knob-and-kettle topography. In Swan River Valley, east of Lindbergh Lake, pattern of drumlins is both to the southeast and north. Those east and southeast of the lake trend about S. 50° E., those north and northeast of the lake trend about N. 40° W. Farther north, near the north edge of the quadrangle, the drumlins trend almost due north. Brown to reddish brown, very coarse; consists of a heterogeneous mixture of unconsolidated gravel, cobbles, and boulders in a matrix of medium to coarse sand. Clasts range in shape from angular to well rounded; most are rounded. In general, about 62 percent of unit is composed of clasts that range in size from about 5 mm to about 76 mm (1/4-3 in.); about 25 percent consists of a fine to coarse sand with included small pebbles as much as 5 mm; and the remaining 13 percent is silt. Includes many well rounded cobbles, 8-20 cm (3-8 in.) in diameter, and many subrounded to rounded boulders 0.3-1 m (1-3 ft) across. Clasts of green, gray, and purple argillite dominate; tan quartzite and sandstone clasts are minor components. Many large angular to subangular glacial erratics, 2.4-3 m (8-10 ft) across, are scattered through the till and over the surface. Drumlin pattern suggests that a glacier, flowing northeastward from Lindbergh Lake Valley, encountered the mass of the Holland Lake glacier and split into two parts. A small lobe extended southward into the Bertha Creek drainage, even as the bulk of the glacier was deflected northward into the ancestral valley of Swan River

Qth Till deposited by Holland Lake ice--Hummocky moraine characterized in most places by knob-and-kettle topography. Locally the hummocky aspect gives way to a gently rolling terrain. Small isolated knobs aline to form a semicircular terminal moraine, and 2-3 arcuate recessional moraines developed during the gradual waste of the Holland Lake glacier. In most localities till has a distinctive reddish-brown cast. Consists of a heterogeneous mixture of gravel, cobbles, and boulders in a silty to clayey matrix which locally becomes somewhat sandy. A striking characteristic is the paucity of cobbles and boulders which are so abundant in most of the other tills in the area. Clasts range in shape from angular to rounded; most are subrounded. Sizes range from about 5 mm to 20 cm (1/4-8 in.); dominant sizes range from about 13 mm to 5 cm (1/2-2 in.). Clasts of green, gray, and purple argillite dominate; tan quartzite and sandstone clasts are minor constituents. Sparse angular to subangular boulders about 0.6 m (2 ft) across are scattered through the till and on the surface, as are a few large glacial erratics about 1.5 m (5 ft) across

Qtgc Till deposited by Glacier Creek ice--Broad, lobate, hummocky moraine marked by curving, elongate, narrow ridges separated by shallow valleys. Light brown to brown; consists of a heterogeneous mixture of gravel, cobbles, and boulders in a silty to clayey matrix. Locally matrix becomes somewhat sandy. Clasts range in shape from angular to subrounded; most are subangular. Sizes range from 5 mm to 20 cm (1/4-8 in.). Clasts of green, gray, and purple argillite dominate; tan quartzite and sandstone clasts are minor constituents. Contains many cobbles as well as subangular boulders 0.6-1.2 m (2-4 ft) across. Large glacial erratics, 3-4.5 m (10-15 ft) on a side, are common both in the till and on the surface

Qto Till deposited by older ice--Forms a thin to thick veneer over bedrock. Light brown to reddish brown; consists of an unsorted mixture of gravel, cobbles, and boulders in a silty to clayey matrix. Clasts range in shape from angular to well rounded; most are subangular. Most clasts range from 13 mm to 6 cm (1/2-1 1/2 in.) across. Till is dominated by tan to reddish-brown quartzite and sandstone clasts; other prominent types include green, gray, and purple argillite. Fragments of gray diorite of all sizes are widespread. In general, larger material is composed of quartzite and sandstone; smaller fragments are of argillite. Boulders about 1/2 m (2 ft) across are common as are large angular to subangular glacial erratics some 3-4.5 m (10-15 ft) across

pCb OLDER BEDROCK OF BELT SUPERGROUP, UNDIVIDED (PRECAMBRIAN)--Only Mount Shields Formation exposed in this quadrangle. The Mount Shields is composed of argillite and sandstone in varying shades of red, maroon, tan, and gray

CONTACT--Approximately located or inferred. In many places somewhat concealed by debris or dense foliage

FAULT--Dotted where concealed; approximately located or inferred