

Maine Geological Survey  
DEPARTMENT OF CONSERVATION  
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**Title:** Surficial Geology of the Fish River Lake Quadrangle, Maine

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This report is preliminary and has not  
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**Contents:** 6 page report

## INTRODUCTION

The Fish River Lake Quadrangle occupies an area of northern Maine extending from 68° 45' to 69° W. Long., and from 46° 45' to 47° N. Lat. All townships within the quadrangle except T15 R9 are under the jurisdiction of paper companies and are regulated by the North Maine Woods organization. The State of Maine controls T15 R9. Both the Great Northern Paper Co. and International Paper Co. are acknowledged for their assistance in allowing use of their road network and other helpful information. The limited degree of road access and extensive tree cover make mapping difficult; however, all passable roads were traversed either on foot or by truck. Much of the surficial geologic map of the quadrangle was compiled from interpretation of aerial photographs taken in 1968 by the U.S.D.A. Field mapping by the author was conducted during June and July of 1983.

## BEDROCK AND PHYSIOGRAPHY

Three distinct bedrock units crop out in the Fish River Lake Quadrangle. The dominant lithologies are shale and graywacke of the Lower Devonian Seboomook Formation. These rocks cover 90 percent of the quadrangle. Within T15 R9 lies the Deboullie Igneous Complex (Boone, 1958), consisting of granodiorite, syenite, and quartz monzonite. The surrounding hornfels supports the highest topography in the quadrangle, the highest point being Deboullie Mountain at 604 m.a.s.l. (1981 ft.). The third rock unit, cutting across the southeast corner of the quadrangle, is the Fish River Lake Formation (Boone, 1958). These rocks consist of sandstones, siltstones, conglomerates, and mafic and felsic volcanics. The Fish River Lake Formation forms the low lying topography near Fish River Lake.

The southeast portion of the quadrangle drains into the northward flowing Fish River. Small tributaries occupy large east-west trending valleys with steep southern faces and gentle northern faces. Boone (1958) attributes these valleys to surface planation and subsequent stream development along bedrock joint patterns. The northwest quarter of the area drains west into the Allagash River Basin.

## UNIT DESCRIPTIONS

The Quaternary sediments in the Fish River Lake area comprise several units, which can be described within the framework established by the Maine Geological Survey's reconnaissance-level surficial map series. The reader should refer to the map legend for a description of those units. One of the units found in the Fish River Lake Quadrangle is common in northern Maine, but has not been described from the southern part of the State. This is stagnation moraine, which is designated by the symbol "Qsm". Drift mapped as this unit includes a mixture of basal till, ablation till, and ice-contact stratified drift. Topographically, stagnation moraine occupies low-lying poorly drained areas and forms subdued hummocks. Deposition of this unit resulted from the melting of large, stagnating ice masses.

## DISTRIBUTION OF UNITS

Exposed Bedrock (rk). The only extensive rock exposures in the quadrangle occur in the Deboullie district. In this region, cliffs of granodiorite and syenite flank the shores of many ponds. Talus slopes, the largest in northwest Maine, occur along the north shore of Deboullie and Gardiner ponds and on the west shore of Galilee and Denny Ponds. Most of these talus slopes are not presently active; however, the largest slope (on the north shore of Deboullie Pond) is still active and unstable. The trail to the Deboullie Mountain fire tower crosses this talus deposit.

Till (Qt). The surficial deposits in the Fish River Lake Quadrangle are dominated by till, with the thicker deposits more common in the stream valleys and low-lying areas. In general, however, the till only forms a thin blanket. The thickest deposits observed in the field were 5 m exposures along Big Brook in the eastern portion of the area. These sections show a single gray basal till with a thin ablation mantle that has been altered by soil-forming processes. A few exposures within the stream valleys of Chase, Smith, North Fox and South Fox Brooks show 1 to 2 m of till overlying striated bedrock. The remaining areas have no exposure from which to judge drift thickness. The till is usually compact, gray-brown in color (Munsell color 5Y 5/3 to 2.5Y 5/3) and has a clayey texture. Textural analysis of till samples from the Cox horizon of test pits in the quadrangle average 34% sand, 24% silt and 42% clay.

Above the stream valleys, on the northwest-southeast trending bedrock ridges, the till thins. At a point where the bedrock structure can be observed through the till, the unit has been overprinted with a thin-drift pattern (ruled lines) on the surficial map. This thin till cover is the most widespread unit within the quadrangle. Bedrock knobs commonly poke through the till cover, and road bulldozing has exposed numerous small outcrops. The unit is generally thin enough that alteration has affected its entire thickness.

Ice-Contact Deposits and Stagnation Moraine (Qg and Qsm). Only one kame deposit was mapped during this survey; it lies just west of the south end of Fish River Lake. In plan view it has a terrace form and is partly exposed in an excavation for sand and gravel along the main Portage Haul Road. The deposit occurs high on the valley side and follows the 920 ft. contour.

Several areas of stagnation moraine are present in the quadrangle. One is located south of Fish River Lake; others occur in the northern part of the map area. These deposits were formed in association with meltwater channels in the surrounding uplands.

Other Fluvial deposits (Qal and Qgd). Larger stream valleys (Chase Brook, Smith Brook, Fox Brook, Big Brook, and Fish River) contain mappable stream alluvium (Qal). No deep exposures exist, and the unit is most likely thin. Deltas (Qgd) have formed where streams flow into Fish River Lake. Chase and Smith Brooks, along with the Fish River, have large, partially to completely abandoned deltas, which are far out of proportion with present stream discharges. Modern streams flow through these delta complexes 2-3

meters below the level of the highest delta deposits, suggesting a base level that was once higher than the present-day stream level. Gravel pits in the delta complex at Chase and Smith Brooks reveal approximately 3 m of topset beds. The delta complex at Smith Brook rests directly on striated bedrock. These deltas may have been formed during Holocene time rather than during Late Wisconsin deglaciation.

Swamp deposits are typical of other swamps found throughout northern Maine. No attempt was made in this study to differentiate between the various types of organic accumulations. The largest wetland covers the confluence of Fox Brook, Clayton Stream, and the Fish River.

#### DEPOSITIONAL HISTORY OF DEPOSITS

Only the northwest and southeast quarters of the Fish River Lake Quadrangle show a complex depositional history. The remaining portions of the area are underlain by thin basal till covering bedrock. Drift in the northwest portion of the area is thicker than elsewhere, resulting in a more subdued topography for this portion of the quadrangle. Additionally, ablation till in the northwest portion of the quadrangle is much thicker than elsewhere, with some exposures reaching thicknesses of one meter.

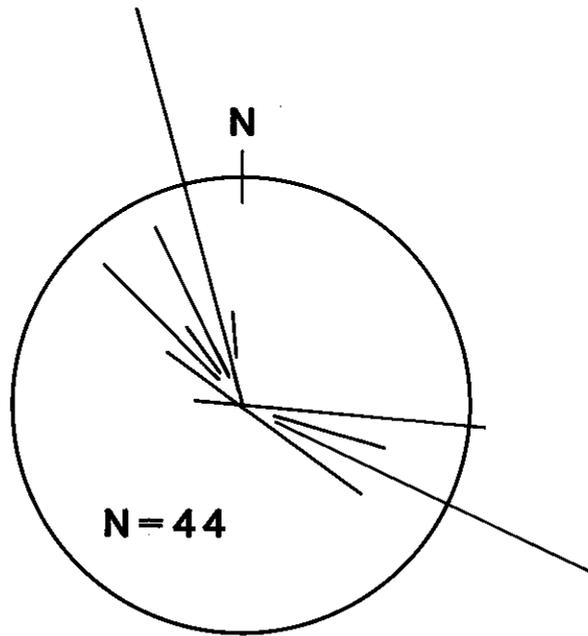
In the southeast corner of the quadrangle, near Fish River Lake, a kame terrace and meltwater channel both lie at the 920 ft. elevation, suggesting a common base-level control. Stagnation moraine deposits also lie below this elevation. Accumulation of delta sediments at the south end of Fish River Lake seem to control the outflow of the present day lake and cause it to drain north over exposed bedrock at Fish River Falls, located east of Round Pond in the Winterville Quadrangle.

An explanation of features in the southeast portion of the quadrangle may require the former existence of a stagnant ice block in the basin during deglaciation. This block gradually downwasted and controlled meltwater outflow from the vicinity of Fish River Lake, first to the south for a short period and then via three low passes to the east of the quadrangle. Boone (1958) reported an age of 5300 yr B. P. on wood recovered from below "till-like sediments" on Zellers Island, Fish River Lake (Boone, 1956, p. 166). This, along with the delta configuration, may suggest a complex and long history of lake-level changes through the Holocene.

#### ICE-FLOW INDICATORS

Ice-flow indicators in the Fish River Lake Quadrangle take the form of erosional marks on bedrock and erratic dispersal patterns. Of the 72 striation localities observed in the area, 43 provided directional criteria; 22 showed age criteria, whereas 10 showed both age and directional criteria.

Directional criteria observed include both rattails and small stoss-and-lee forms, the stoss-and-lee forms being the most common. A rose diagram of striations compiled from the quadrangle is shown in Figure 1. Two main trends can be noted; to the north-northwest (310-355°) and east-southeast (95-125°).



**FISH RIVER LAKE  
QUADRANGLE**

Figure 1. Rose diagram of striations in the Fish River Lake Quadrangle with assignable azimuthal directions. Circle represents 10% of observations.

Typically, striated outcrops show north-northwest flow indicators superposed over east-southeast flow indicators. However, this general trend appears reversed on one outcrop on the main haul road from Portage near North Fox Brook.

Ice-flow in the quadrangle is also reflected in dispersal patterns of erratic stones from the Deboullie igneous complex. Boone (1958) described this dispersal as a fan extending southeast from the complex. Detailed boulder counts conducted in 1983 show a somewhat different pattern (Halter and others, 1984). A total of 49 counts (300 boulders each) provide for improved understanding of erratic distribution.

The strongest displacement is to the east-southeast of the pluton for at least 16 km. A weaker dispersal pattern to the north-northwest extends about 8 km from the pluton. These dispersal patterns match the orientation of striations noted in the quadrangle.

Both striations and dispersal patterns support the concept of northward ice-flow in northern Maine from a Late Wisconsin ice mass (Kite and others, 1982; Halter and others, 1984; Lowell, 1984). This flow appears to have followed a major influx of Laurentide-derived ice.

#### HUMAN DEVELOPMENT AND ECONOMIC POTENTIAL

The Fish River Lake Quadrangle has not been greatly altered by human activity. A series of dirt logging roads and overgrown logging paths criss-cross the area, but no paved routes exist in the quadrangle. Some of the dirt roads require large amounts of artificial fill to reach grade, especially along North Fox Brook. However, none of these fills are extensive enough to show on the surficial map.

In an economical context, some material in the quadrangle is suitable for road development and is currently being exploited. Active sand and gravel pits and rock quarries are indicated on the map, but many small or abandoned pits are not. The extensive igneous rock around Deboullie Mt. could be used for aggregate or possibly dimension stone.

#### REFERENCES CITED

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