UNIVERSITY OF MINNESOTA DULUTH
PRECAMBRIAN RESEARCH CENTER, FIELD CAMP
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PRECAMBRIAN RESEARCH CENTER MAP SERIES
PRC/MAP-2009-03
Bedrock Geology, Tait Lake Quadrangle

Bedrock Geology of the Tait Lake Quadrangle, Cook County, Minnesota

BY

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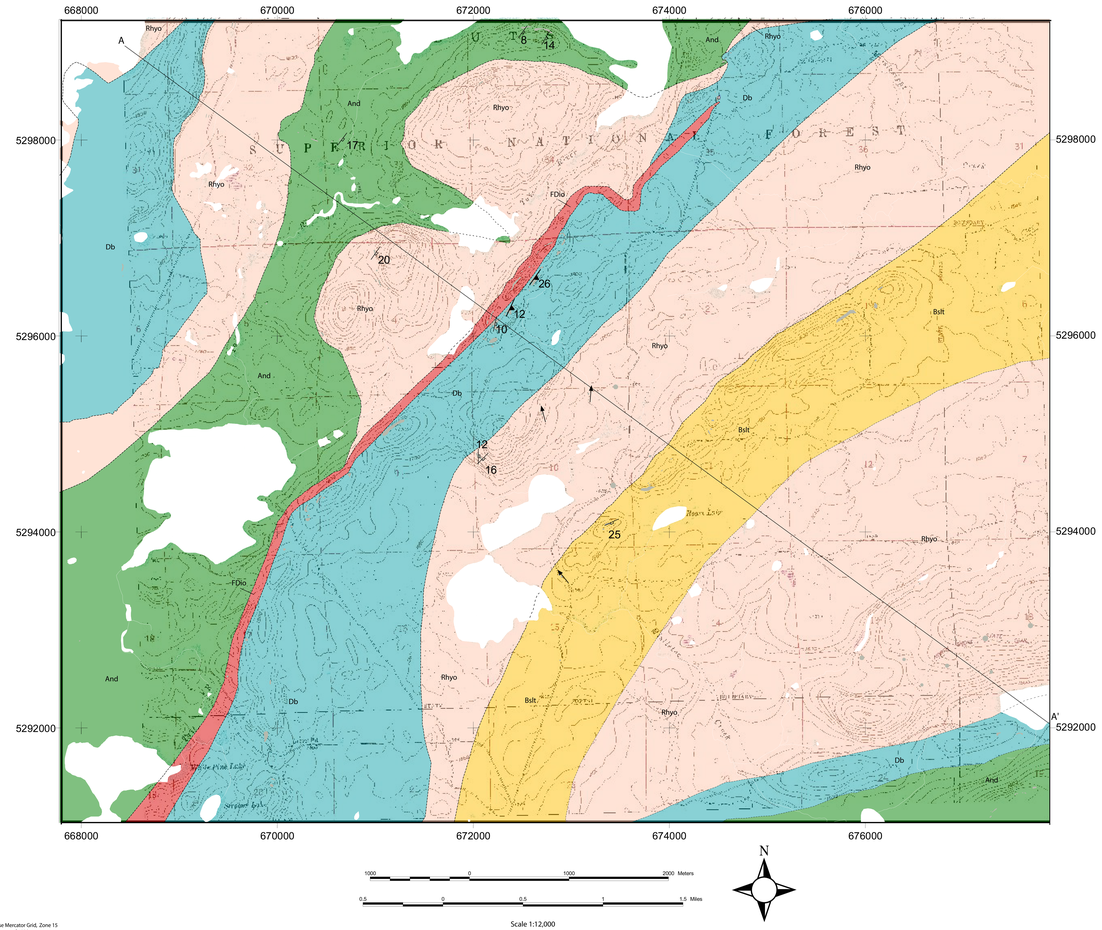
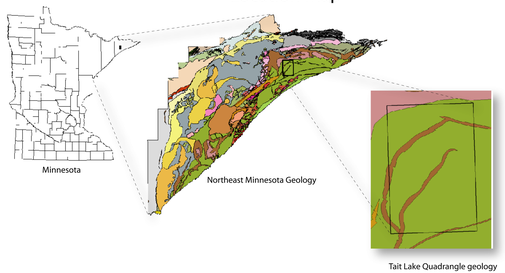


Universal Transverse Mercator Grid, Zone 15
North American Datum of 1983
Base Map from the Minnesota Tait Lake Quadrangle U.S.G.S. 7.5' Series

Location Map

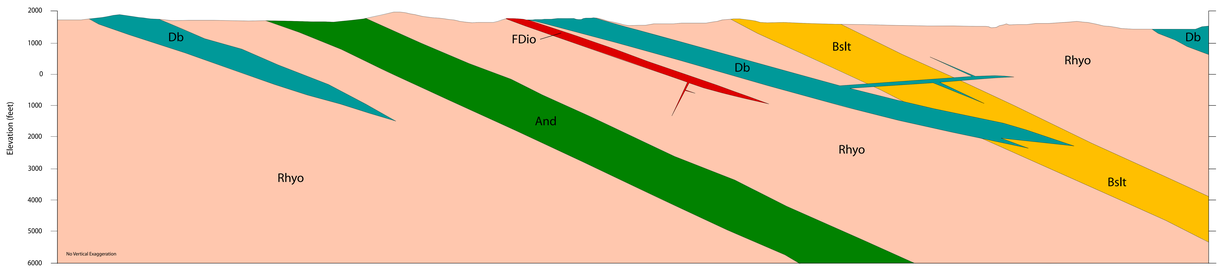


Map Symbols

- Outcrop
- Lakes and Streams
- Contact
- Inferred Contact
- Magnetic Inferred Contact
- Cross Section Line
- Glacial Striation
- Foliation
- Modal Layering

Correlation of Map Units

Cross Section of Tait Lake Geology



Description of Map Units

DULUTH COMPLEX - The Duluth Complex and the associated intrusions of Keweenawan age (~1.1 billion years) in northeastern Minnesota constitute one of the largest mafic intrusive complexes in the world, second only to the Bushveld Complex of South Africa (Miller et al., 2002). These rocks cover a 2,200 square mile area which can be traced geophysically from exposures in the Lake Superior region along a 1250 mile long, segmented, arcuate path to Kansas and Lower Michigan. In genetic terms, the Duluth Complex is composed of multiple discrete intrusions of mafic to felsic tholeiitic magmas that were episodically emplaced into the base of a comagmatic volcanic edifice between 1108 and 1098 Ma.

Tait Lake Quadrangle - The Tait lake quad in Cook County in northeastern Minnesota is largely unmapped in detail. It was described as containing undifferentiated volcanics, rybolite, basalt, and diabase intrusions by Miller (2002) based on geophysics and scattered exposure. The purpose of this work was to provide detailed mapping for the west central portion of the Tait Lake quad.

KEWEENAWAN (~ 1.1 BILLION)

Lake Clara Diabase - Olivine diabase is locally plagioclase phyric, possibly continuous with Monker Lake diabase. (Miller et. al. 2002)

Db — ***Oxide-Olivine Diabase -*** Black to grey, fine- to medium-grained. Ophitic to sub-ophitic, moderately to strongly magnetic; locally displays weak modal layering. Ophites range in size from 1-4 cm, and in form from high-density clots to low-density, sub-prismatic to subophitic grains. Magnetite ranges in concentration from approximately 1% to 7% and locally forms discontinuous bands.

FDio — ***Ferrodiorite -*** Orange to brown medium- to coarse- grained weakly magnetic. Contains lath-shaped plagioclase grains up to 2 cm in length, and sub-centimeter prismatic hornblende or altered augite, along with 0.5 to 1 cm altered olivine. Granophyric mesostasis and trace amounts of apatite along with rare small miarolitic cavitites lined with quartz and feldspar crystals were locally noted.

North Shore Volcanic Group

Upper Northeast Sequence – Basaltic to intermediate normal polarity lava flows with greater than 50% Rhyolite exposed from Hovland to Good Harbor Bay. U-Pb zircon dated at about 1100 ma (Davis & Green, 1997)

Bslt — ***Basalt -*** Black to burgundy massive fine-grained felty intergranular. Weak sheet jointing and rarely seen near vertical 0.5 cm fractures filled with sandstone. Contains plagioclase phenocrysts ranging from 0.5 to 1 cm.

And — ***Andesite –*** Brown, fine- to medium- grained, rarely vesicular, weakly porphyritic. Quartz filled vesicles are approximately 0.5-1 cm with a largely massive matrix. There is some localized flow parting as well as phenocrysts of plagioclase up to 1 cm in length.

Rhyo — ***Porphyritic Rhyolite -*** Pink to brown fine- grained. Contains 0.5-1 mm euhedral plagioclase and quartz phenocrysts. Localized flow banding in approximately a north-south strike.