

OPEN-FILE REPORT OFR16-4
Preliminary bedrock geologic map of the Northern Arrowhead area,
Lake and St. Louis Counties, northeastern Minnesota

BEDROCK GEOLOGY

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scale 1:100,000

2018

The content of this Open-File Report has not been thoroughly reviewed and edited to conform to formal publication standards of the Minnesota Geological Survey.

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This part of the Open-File Report contains 2017-2018 data, reports, and GIS files relating to the bedrock geology, and is provided in the following formats:

1. NA_BedrockGeology2018.pdf—Bedrock geologic map in pdf format, scale 1:100,000.
2. ESRI GIS files; Map package NA_BedrockGeology2018.mpk, ESRI map package for all versions of ArcGis 10, placed within OFR16-4 archive in the University of Minnesota Archives (UDC) <http://hdl.handle.net/11299/183258> (contact: Richard Lively, MGS)
3. NA_BedrockGeology_Ancillary_Report--a zipped folder containing pdf documents including: a geochronologic summary; a geophysical summary with select geophysical map imagery and results of modeling to address a specific mapping issue; and a copy of the technical report submitted to USGS that summarizes geologic mapping in the Northern Arrowhead area. The folder also contains georeferenced geophysical map images created specifically for this project.

1. GEOLOGIC MAP

This is the third in the series of 3 bedrock maps that collectively will provide data and interpretations for construction of county geologic atlases of Lake and St. Louis counties. The map covers an irregularly shaped area bounded by the US/Canada border on the north, latitude 47° 30' on the south; the western border of St. Louis County, and the eastern border of Lake County. The south-central part of the area portrays only contact and fault lines derived from mapping in the “Central Arrowhead” area that was published in 2016. This is included to provide continuity of geologic interpretations.

2. GIS FILES

The data and results of the project are provided as ArcGis shape and geodatabase files compiled within an ArcGis 10 project that opens when the map package (mpk) file is downloaded and unpacked. Local copies of the files are automatically created on the local computer (usually in C:\documents\ArcGis\Packages).

All gis files are in UTM coordinates, zone 15N, NAD83 projection.

A list of the files in the map package is given below:

ofr_bg_2018_NA_version.mxd—Arcgis mxd containing the gis files, within the map package

pagg_cnty—polygon outline of the Northern Arrowhead map area, clipped to county boundaries.

arrowhead2018_bgln_0627—line feature class of geologic contacts and faults; main attribute field is Descriptn containing the line types: contact, historic contact, fault, thrust fault, and bndry (boundary)

na_bgpg_table—bedrock geology-polygon feature class of map units; attributes include Map_label, and descriptions. Map labels are explained on the map PDF.

town—point file showing city locations and names within the study area

roads.shp—line file of regional roads and city streets

lakes.shp—polygon file showing locations of lakes

county_bnd—polygon file showing county boundaries within the study area. Polys have labels for each county.

Annotation features for base materials.

Cretaceous_pg—line feature class showing the presumed location of Cretaceous deposits within the study area. Taken from the Mn State Bedrock map, S21 without modification.

outcrop—polygon file showing locations and type of outcrop, attributes include field station, description, and geologist among others.

pitlks_lakes—polygons feature class showing locations and extent of former iron mine pits filled with water. Because water levels in these pit lakes change over time, in part naturally and in part by mining related pumping, some of these polygons may not reflect current geometries.

tacmines_oc—polygon file showing locations of taconite mines on the Mesabi Iron Range within the study area—iron formation bedrock is exposed in much of the area within each polygon; covered locally by water, tailings, or waste-rock.

struct_lines—map symbols using the 'strc_lines' field that lists line types: Dikes— Pd, Folds-anticline, monocline, syncline (in both Mesoproterozoic and Paleoproterozoic rocks);, antiform, synform Lidar foliation and Lidar fracture-features inferred from Lidar topographic imagery in areas of thin sediment veneer, but not confirmed in outcrop, iron-rich lenses, magnetic anomalies.

Subdued_mag_ln—irregular outline showing area with subdued magnetic signature.

3. NA_BEDROCK ANCILLARY CONTENT

- Northern_AH_geophysics_images – georeferenced TIFF images of magnetic and gravity anomaly maps with a short explanation of content (VWC_README.docx).
- Geochronology Summary.pdf –outlining results ages acquired as part of this project, and funded by USGS.
- NA_Geophysical_Report.pdf—summary report on the geophysical maps and modeling in the region.
- Technical Report to USGS.pdf—copy of report submitted to the USGS in 2018.
- This readme file.

Printed copies of the map can be requested from MGS Map Sales--612-626-2969; however, because the map at scale 1:100,000 is very large (~85”X70”), the print will represent a 50% reduction of the pdf image.