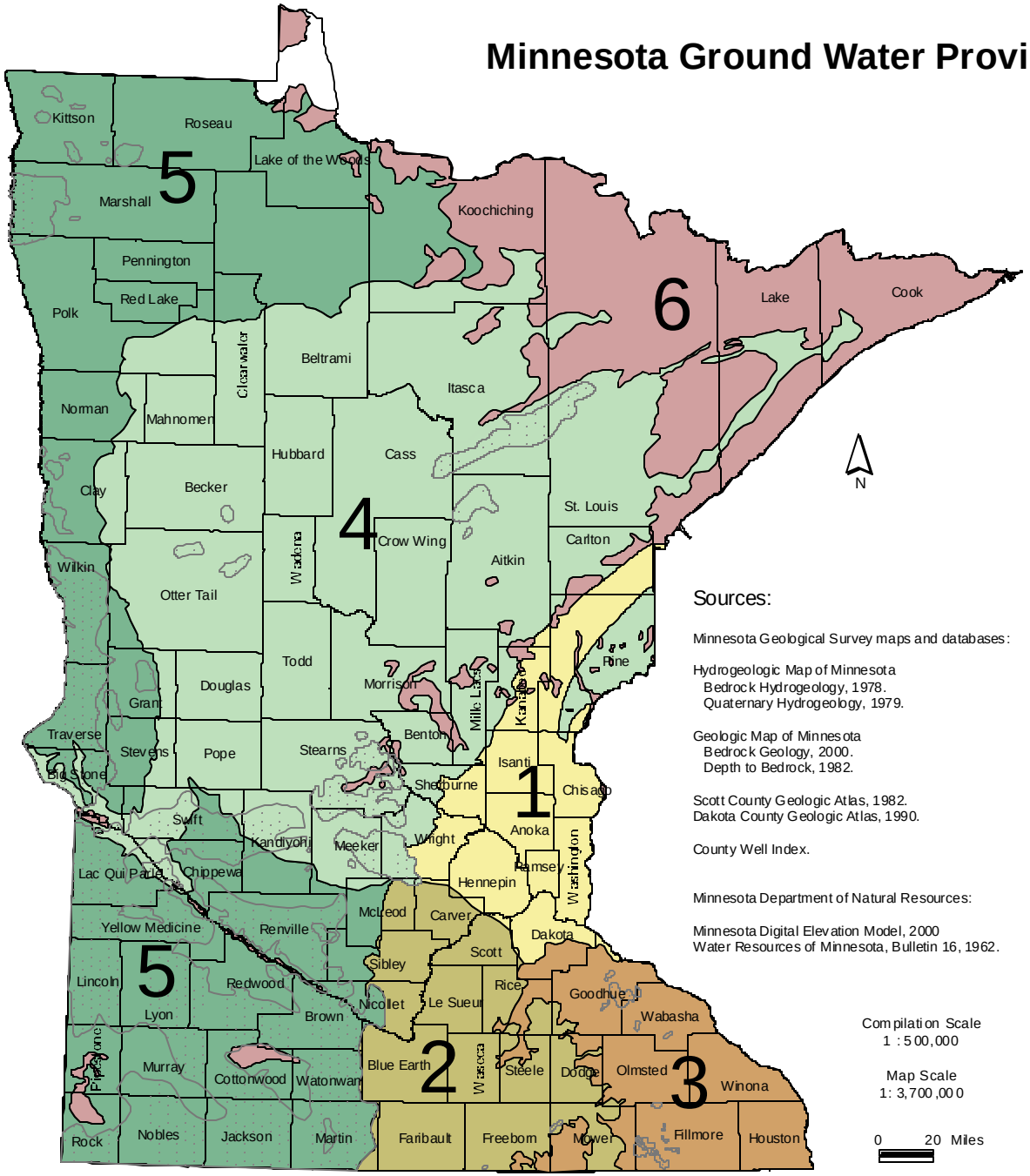
Minnesota Ground Water Provinces



Province Characteristics

1 Metro Province

Sand aquifers in generally thick (greater than 100 feet) sandy and clayey glacial drift overlying Precambrian sandstone and Paleozoic sandstone, limestone, and dolostone aquifers.

2 South-Central Province

Thick clayey glacial drift with limited extent sand aquifers overlying Paleozoic sandstone, limestone, and dolostone aquifers

3 Southeastern Province

Thin (less than 100 feet) clayey glacial drift overlying Paleozoic sandstone, limestone, and dolostone aquifers. Karst characteristics are common in limestone and dolostone bedrock.

4 Central Province

Sand aquifers in generally thick sandy and clayey glacial drift overlying Precambrian and Cretaceous bedrock. Fractured and weathered Precambrian bedrock is used locally as a water source. The Biwabik Formation, an iron ore deposit found in Itasca and St. Louis counties, can have good aquifer properties.

5 Western Province

Clayey glacial drift overlying Cretaceous and Precambrian bedrock. Glacial drift and Cretaceous bedrock contain limited extent sand and sandstone aquifers, respectively.

6 Arrowhead Province

Precambrian rocks are exposed at the surface or drift overlying Precambrian rocks is very thin (less than 30 feet). Ground water typically found locally in faults and fractures. Areas with similar aquifer characteristics exist in Provinces 4 and 5.

Cretaceous Bedrock

Sandstone layers that are interbedded with thick layers of shale are used locally as water sources. Occurs beneath glacial drift but above older bedrock.

Sources:

Minnesota Geological Survey maps and databases:

Hydrogeologic Map of Minnesota
Bedrock Hydrogeology, 1978.
Quaternary Hydrogeology, 1979.

Geologic Map of Minnesota
Bedrock Geology, 2000.
Depth to Bedrock, 1982.

Scott County Geologic Atlas, 1982.
Dakota County Geologic Atlas, 1990.

County Well Index.

Minnesota Department of Natural Resources:

Minnesota Digital Elevation Model, 2000
Water Resources of Minnesota, Bulletin 16, 1962.

Compilation Scale
1 : 500,000

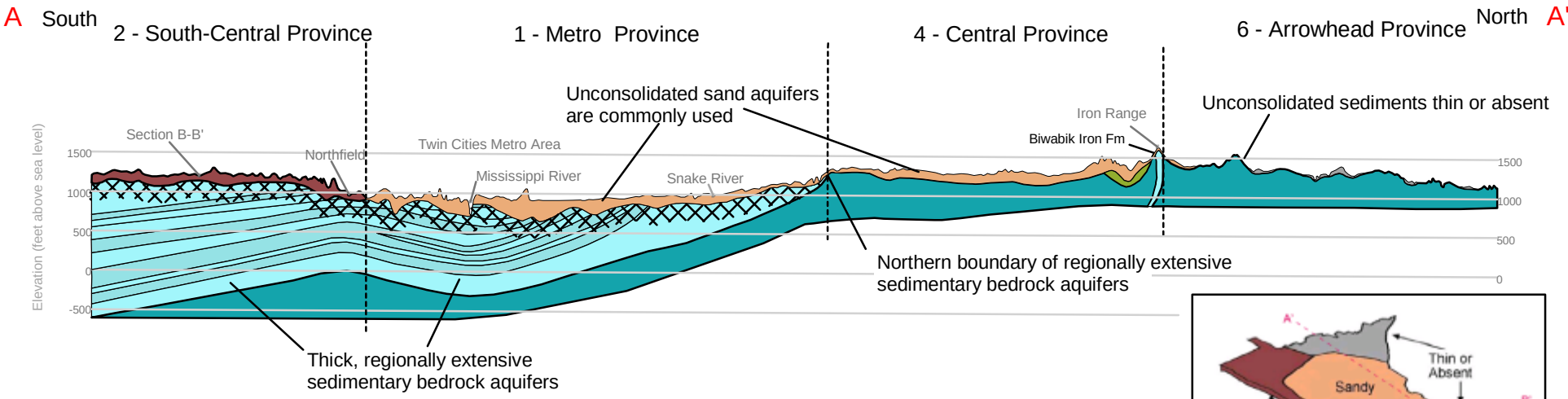
Map Scale
1: 3,700,000

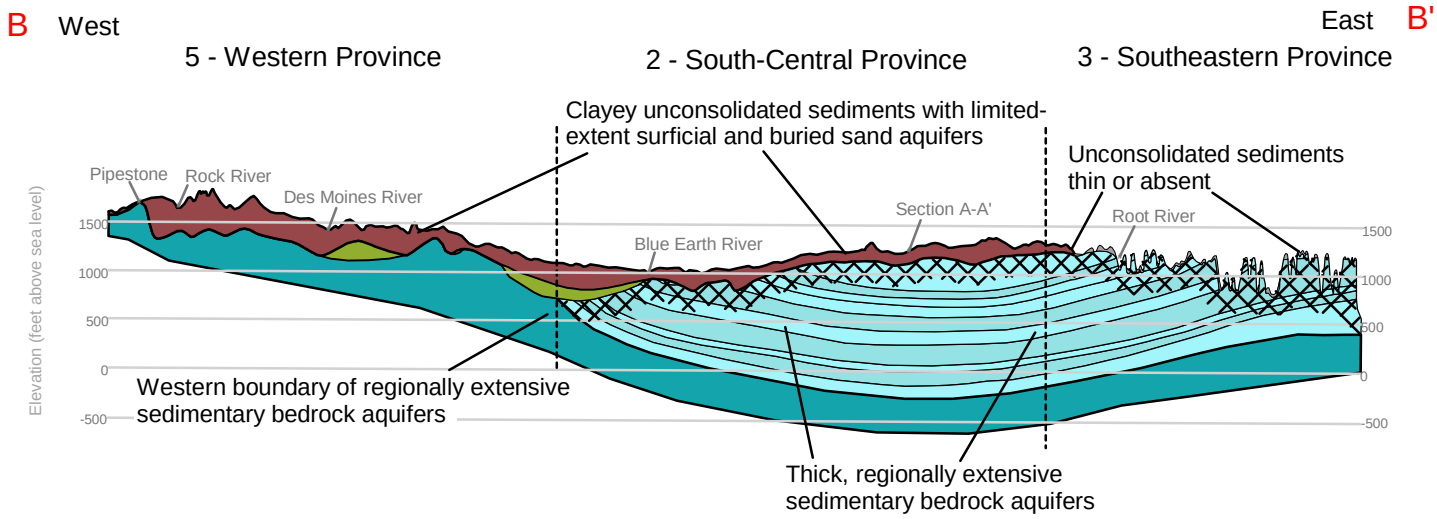
0 20 Miles

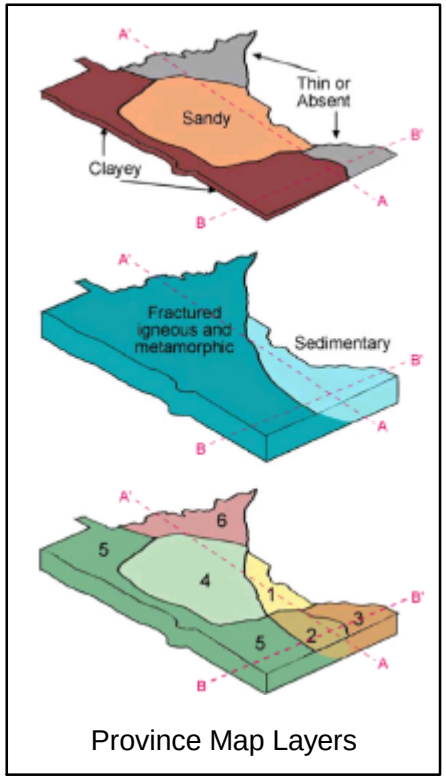
Minnesota DNR Waters
Helping people ensure the future of our water resources

May 2001

Minnesota Ground Water Provinces - Generalized Cross Sections







Province Map Layers

Explanation

- Clayey unconsolidated sediments with limited-extent sand aquifers (Quaternary)
- Sandy unconsolidated sediments; sand aquifers common (Quaternary)
- Thin, unconsolidated sediments with the exception of sand aquifers (Quaternary) in major river valleys that are frequently used
- Cretaceous shale and sandstone; used locally as water source
- Precambrian bedrock; can provide ground water locally from fractures

Regional sedimentary bedrock

- Bedrock aquifers*
- Confining units*

* Aquifer and confining unit characteristics can vary regionally, locally, and according to depth as described below.

- "Shallow" bedrock conditions - Secondary porosity may be enhanced in both aquifer and confining units as much as 200 feet below top of bedrock.

Sources: Kanivetsky, Roman, 1978, Hydrogeologic Map of Minnesota, Bedrock Hydrogeology, Minnesota Geological Survey, State Map Series S-2, Sheet 2.
Mossler, John H., 1983, Paleozoic Lithostratigraphy of Southeastern Minnesota, Minnesota Geological Survey, Miscelleneous Map Series Map M-51.
Runkel, A.C. et al., 2001, Hydrogeology of the Paleozoic Bedrock in Southeastern Minnesota, Minnesota Geological Survey (in progress).

Scale: 30 Miles

Approximate vertical exaggeration X 100

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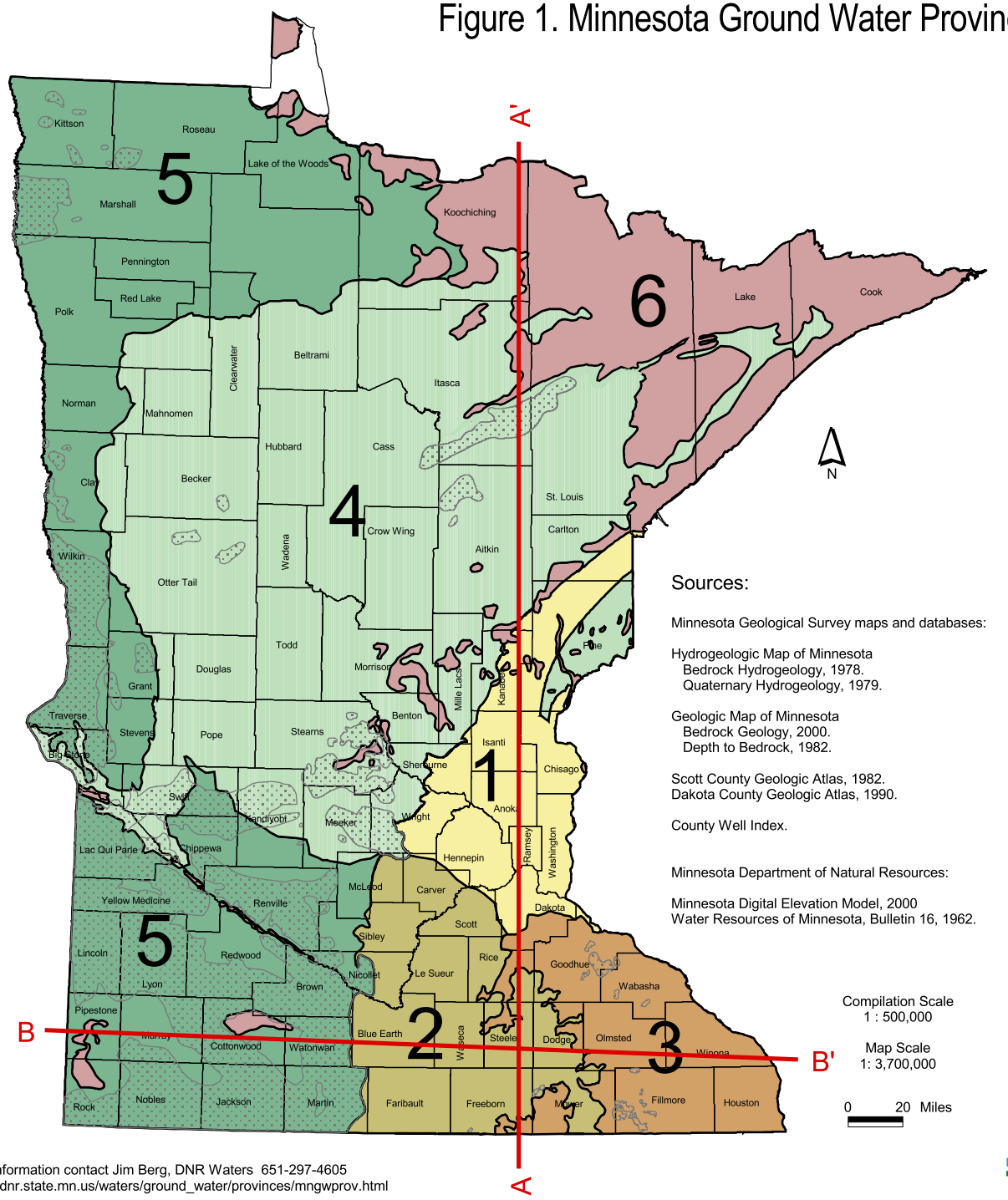
Helping people ensure the future of our water resources

Jim Berg November 2001

Figure 1. Minnesota Ground Water Provinces



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For more information contact Jim Berg, DNR Waters 651-297-4605
http://www.dnr.state.mn.us/waters/ground_water/provinces/mngwprov.html

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