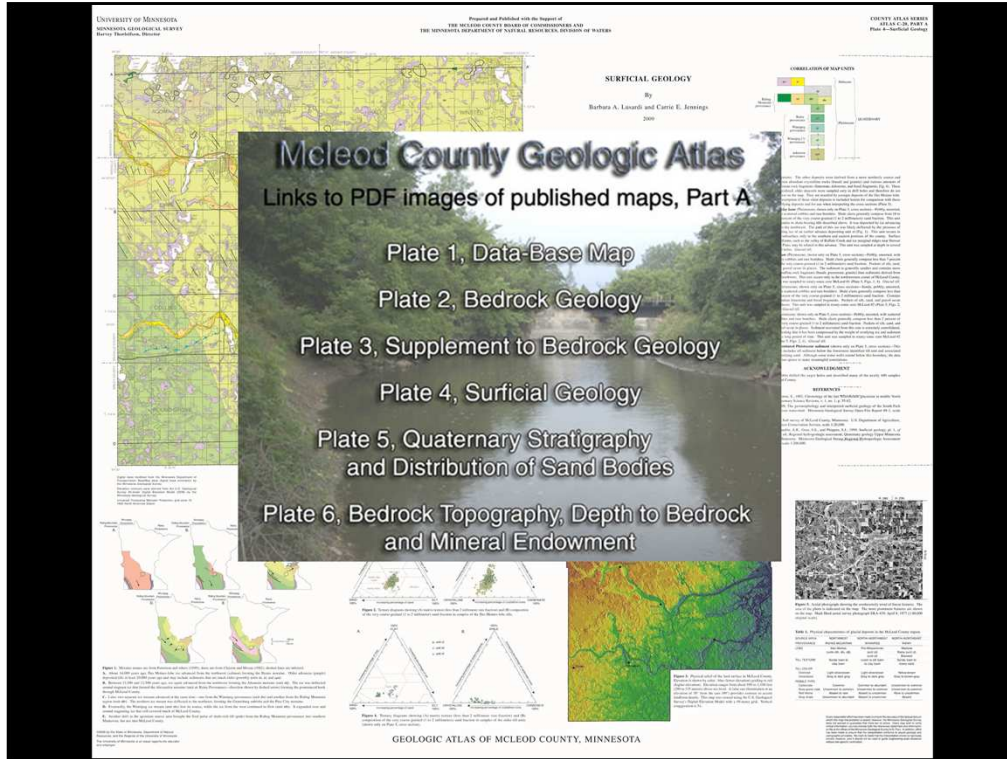


Minnesota Geological Survey and the Great Lakes Geologic Mapping Coalition

- **Previous** (2011-2012)
 - Subsurface Quaternary geology of Anoka County – cost-share with LCCMR
- **Current** (2012-2013)
 - Subsurface Quaternary geology of Morrison and Sherburne Counties – cost-share with LCCMR
- **Proposed**
 - Enhancement of databases to support subsurface Quaternary geological mapping



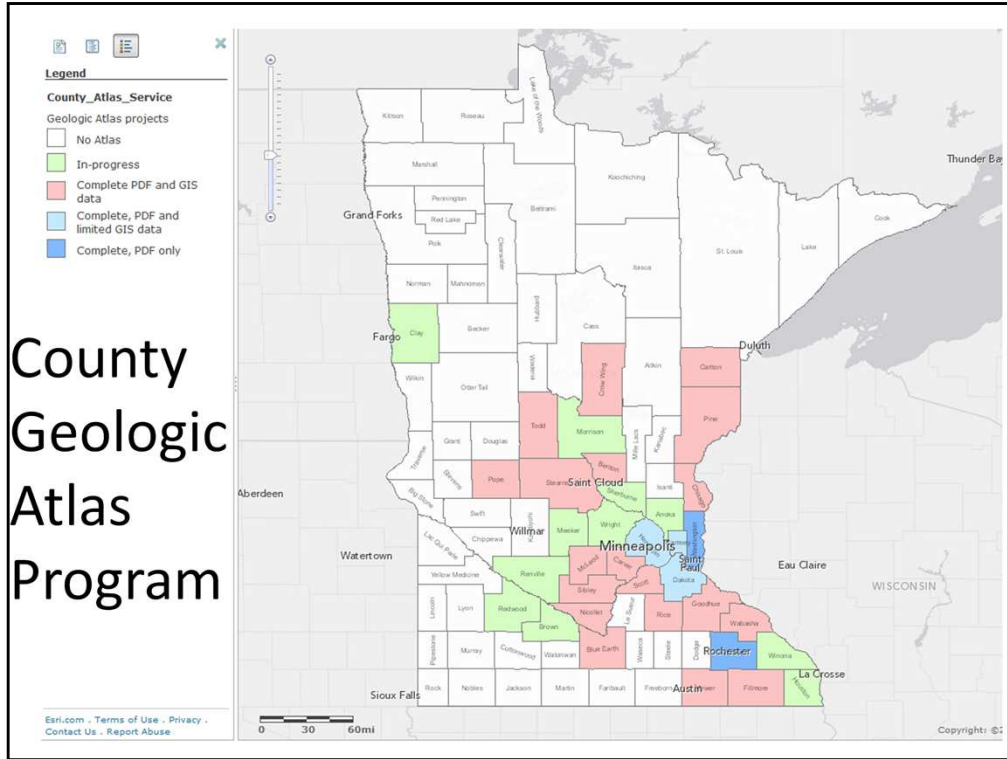
Cornerstone of Minnesota Geological Survey mapping program—County Geologic Atlas.

What is a County Geologic Atlas?

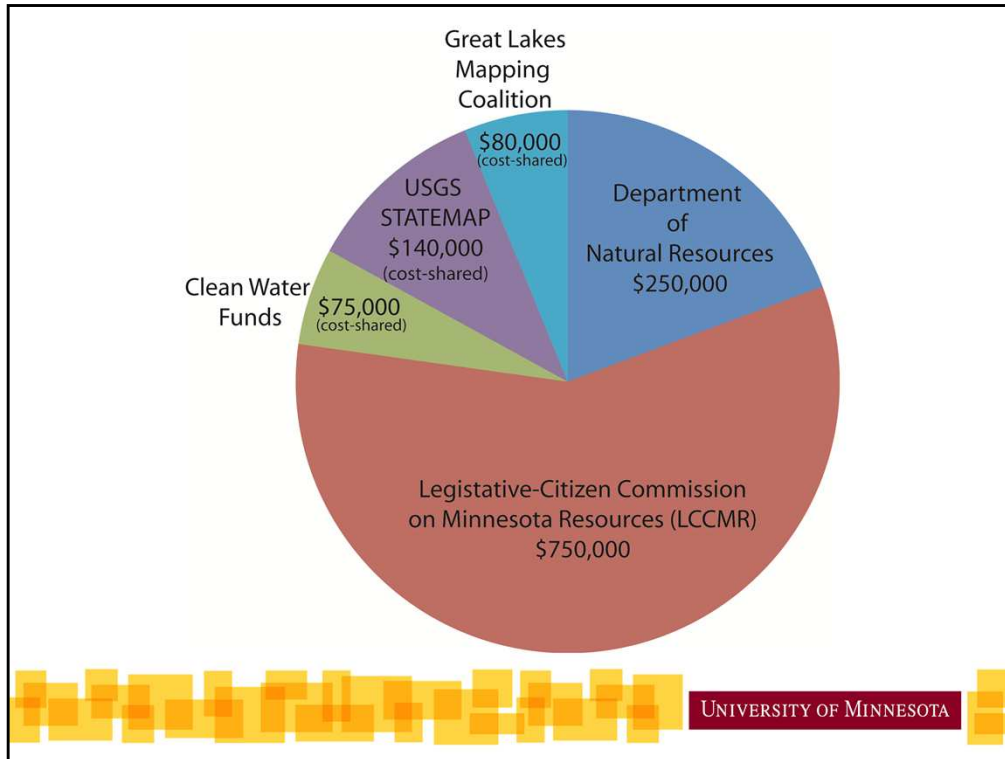
- A study of the geology and ground water resources of a county
 - MGS investigates the geology
 - DNR investigates chemistry, quantity, aquifer levels, and pollution sensitivity of the ground water
- Used for planning, resource management, environmental protection, and education
- Maps, databases, and illustrations formatted for a wide range of users

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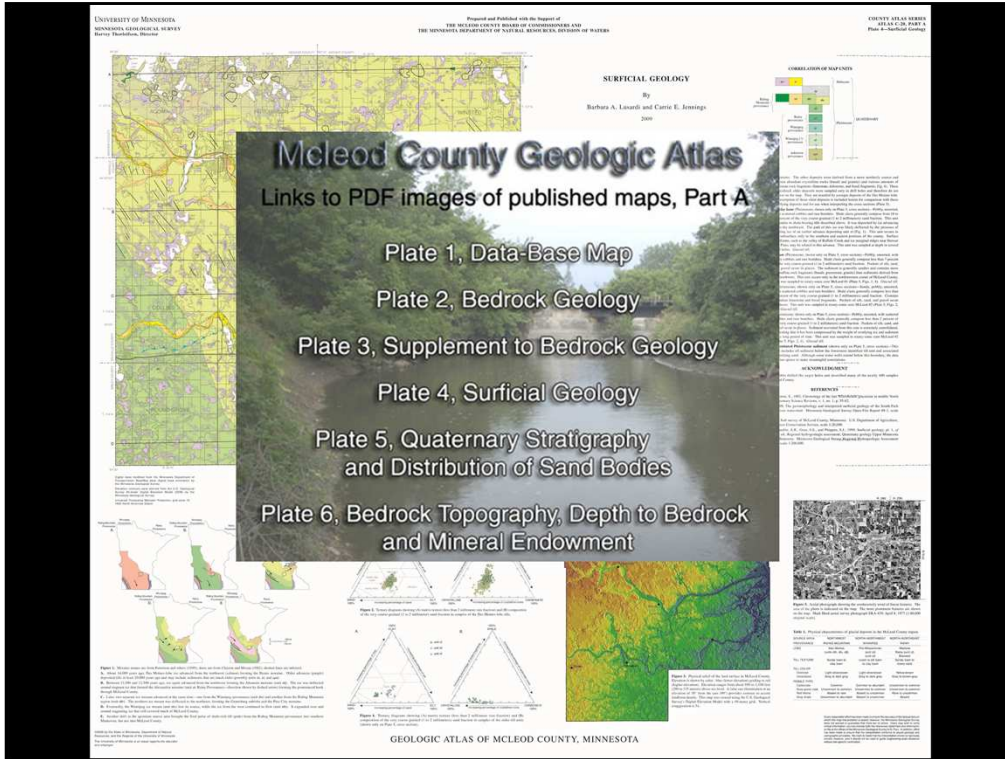
The CGA program provides comprehensive geologic framework for each county.



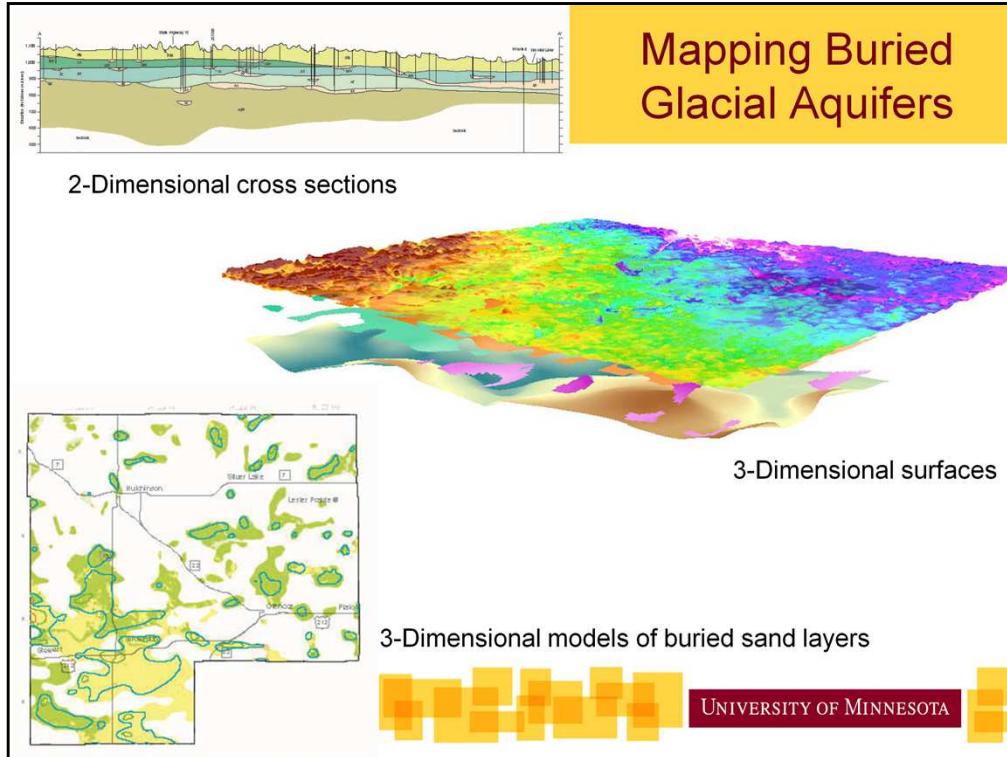
The first atlas was completed in 1982. Since then, MGS has completed atlases for 23 more counties and projects are under way in 11 more counties.



The average cost for Part A (geology) is about \$350,000. The Dept. of Natural Resources will follow up on our work with Part B (groundwater).

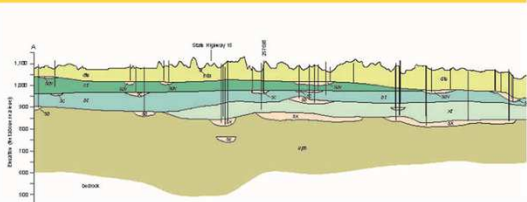


Emphasis is now on groundwater resources and mapping buried glacial aquifers (plate 5).



Mapping includes 2-dimensional cross-sections, which are converted to 3-dimensional modeled surfaces and depicted as depth-to-surface and thickness-of-unit maps.

Cross Sections



Minnesota Dept. of Health
779325

Minnesota Department of Health
WELL AND BORING RECORD

Well Name: STECKE, DOUG
 Township Range Sec Section: 33 20 14 CLAUDIC
 Elevation Method: 484.00
 Well Address: 20701 SOUTHWEST BL
 556 85553

Well Depth: 177 ft.
 Date Well Completed: 07/07/2011

Drilling Method: See Log/Notes
 Drilling Fluid: None
 Well Hydrocarbon? No
 Flow: 1/2 in.
 Casing Type: Plastic
 Casing Diameter: 4 in. to 120 ft.
 Hole Diameter: 8 in. to 130 ft.
 Open Hole: 110 ft. to 177 ft.
 Screen Type: None

Geological Material	Color	Hardness	From	To
CLAY	BROWN	SOFT	0	58
GRAVEL	BROWN	SOFT	58	61
CLAY-ROCKS	BROWN	MEDIUM	61	130
SHALE-SANDROCK	BROWN	MEDIUM	130	168
SANDSTONE	WHITE	MEDIUM	168	177

Static Water Level: 112 ft. above land surface Date Measured: 07/07/2011
 PUMPING LEVEL: 100 ft. above land surface
 20 ft. above 1/2 in. opening to 177 ft.

Well Head Completion: Filter screen manufacturer: AQUASOL Model: T 183223
 Casing Protection 1/2 in. above grade
 At-grade Environmental Well and Boring (2012)

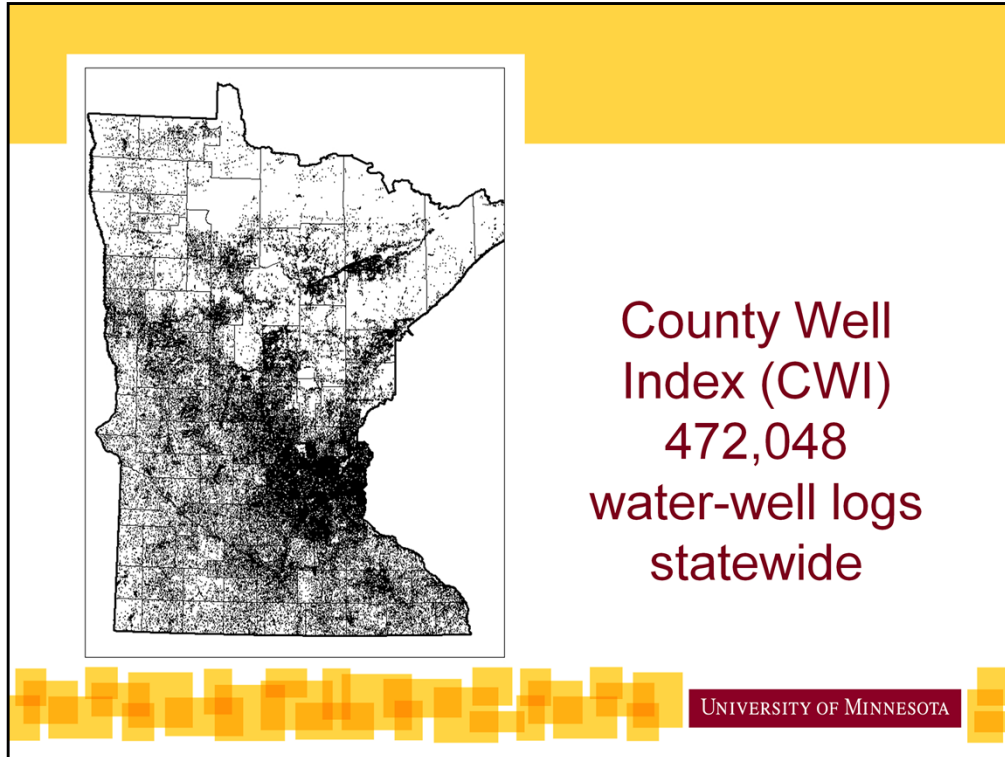
Grouting Information: Well Grouted? No
 Grout Material: Neat Cement from 110 to 120 ft. 3 bags

REMARKS: OBSERVATION FROM THE CITY OF SOUTHWEST FOR WELL ADDRESS

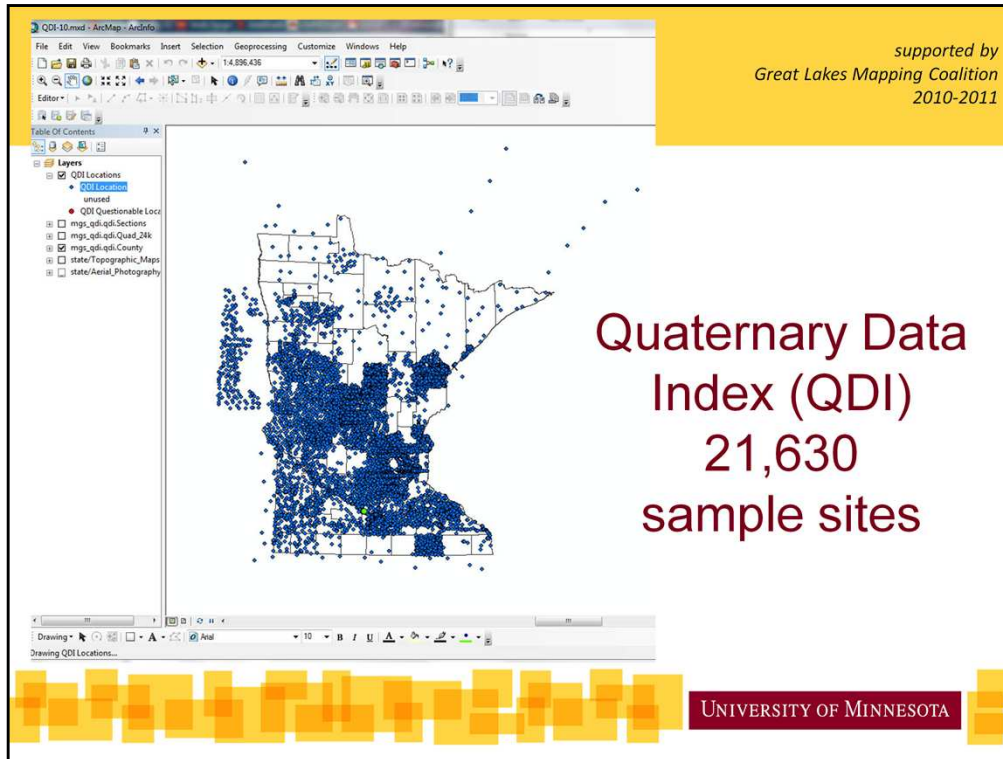


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Cross sections are drawn using water well and drilling records.

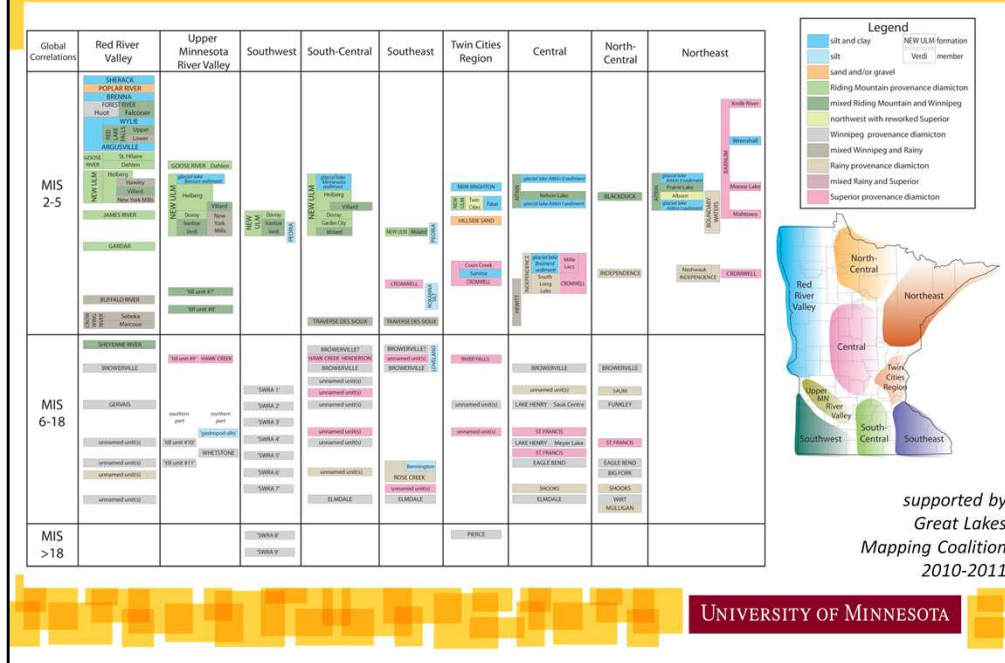


Minnesota's County Well Index is the digital database for all water wells drilled since 1975. Nearly 500,000 wells are located. Wells are located for each CGA project.

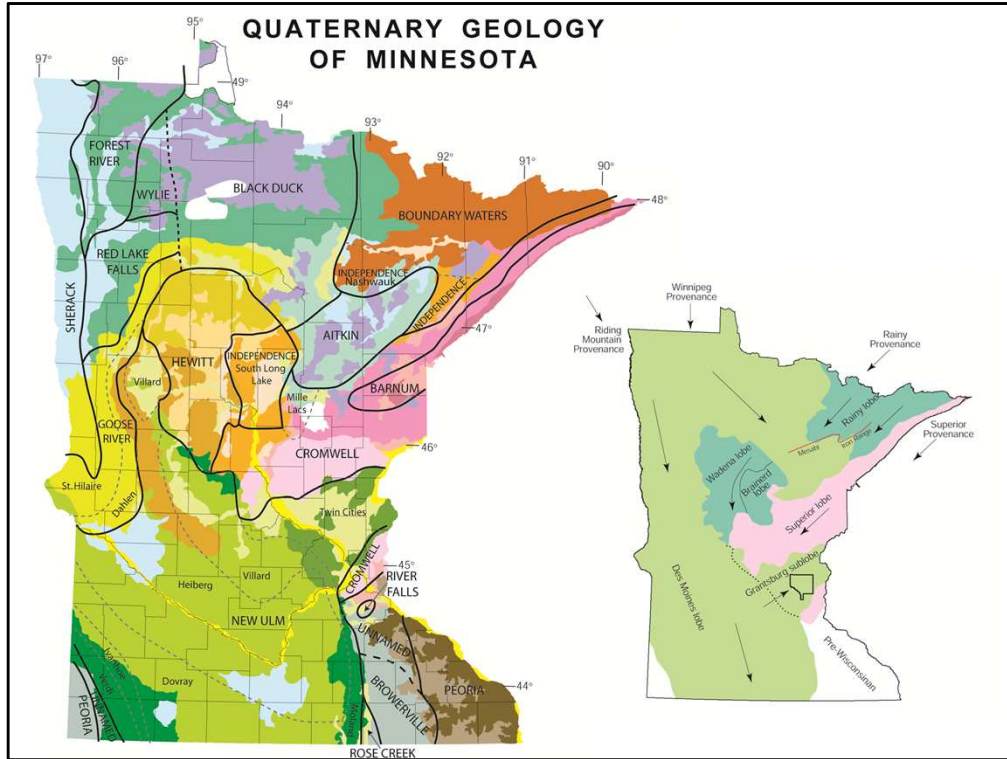


The Quaternary Data Index includes near-surface samples from outcrops, gravel pits, Giddings and rotary sonic drilling.

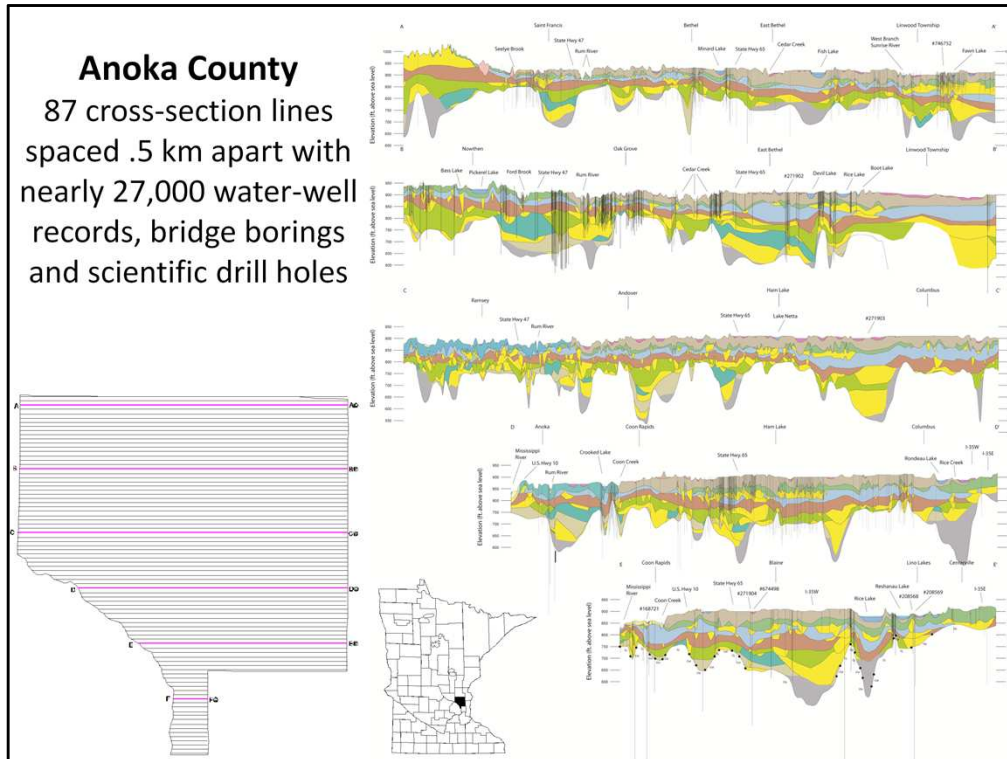
Minnesota Quaternary Lithostratigraphy



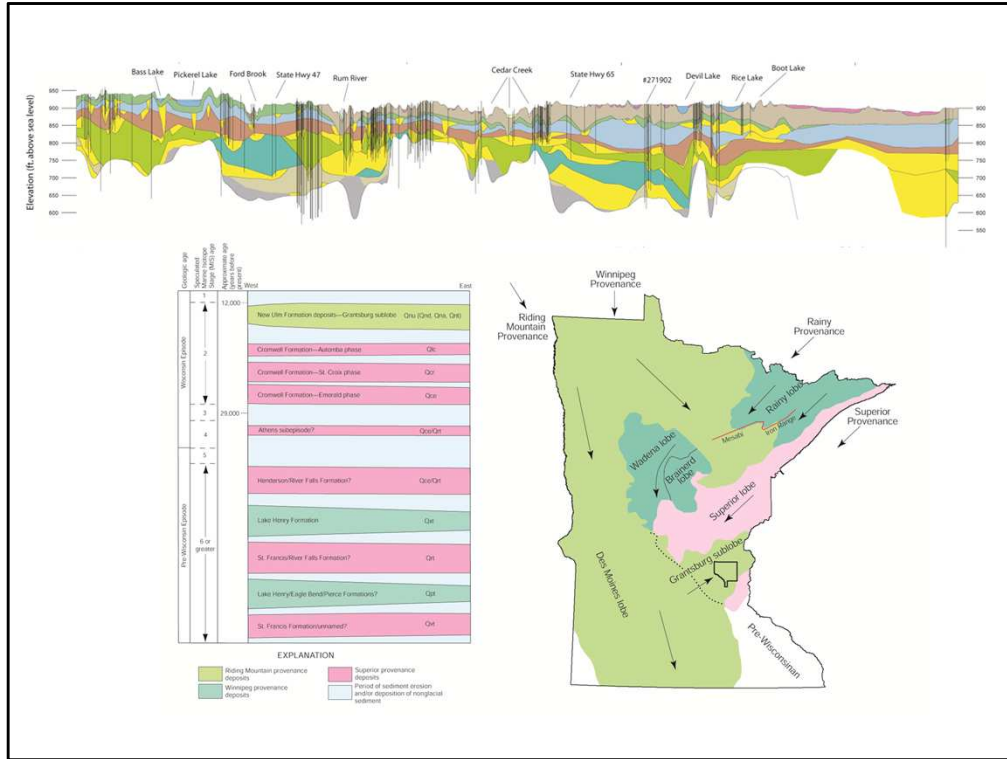
The lithostratigraphic model allows us to define, interpret, and predict the glacial units that we might encounter across the state.



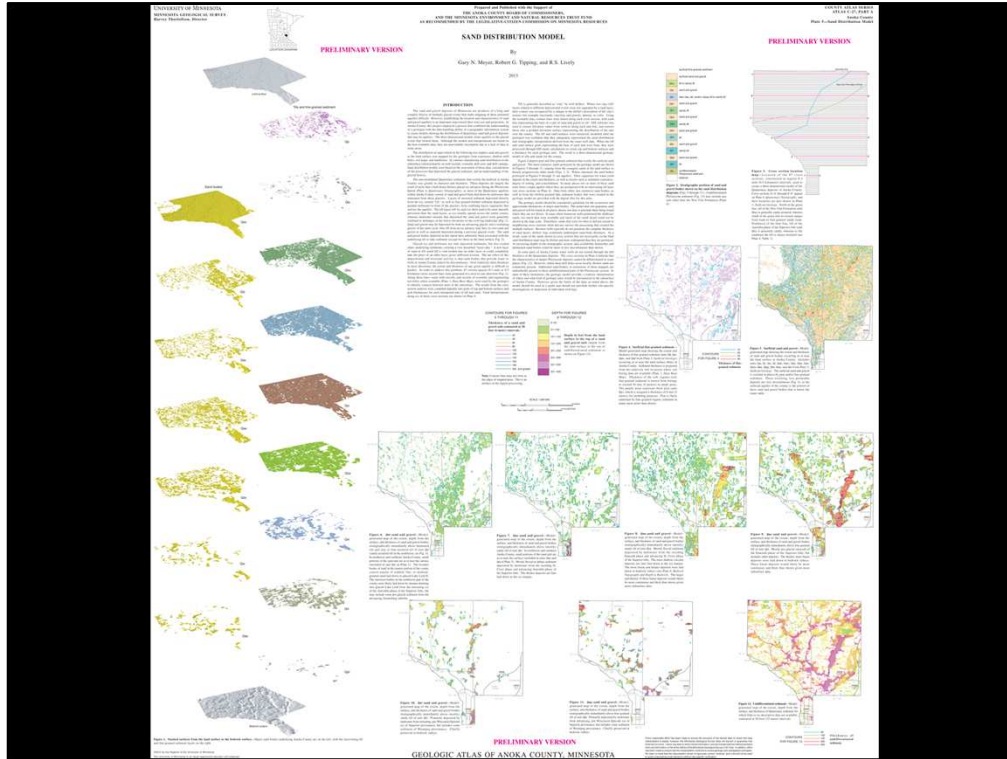
Anoka County is located in east-central Minnesota. It is part of the Anoka sandplain, a large outwash/lacustrine plain associated with the Grantsburg sublobe of the Des Moines lobe.



Examples of cross-sections drawn for Anoka County. With so many data points, section lines, normally drawn at 1 km apart, were drawn at ½ km intervals.



Complex stratigraphy includes at least 10 glacial till units from at least 3 different source areas.



Data will be presented as a series of 3-dimensional surfaces and maps depicting the distribution of buried sands. Stratigraphy and cross sections appear on a separate plate.