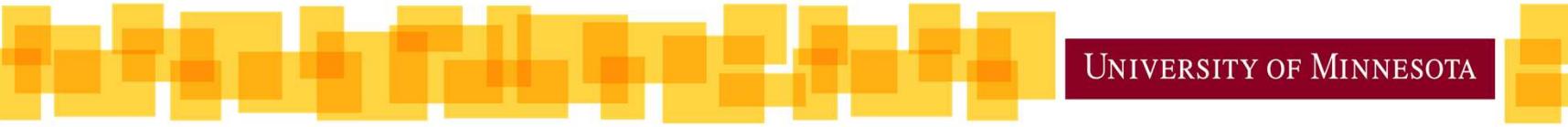


Minnesota Geological Survey and the Great Lakes Geologic Mapping Coalition

- **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



UNIVERSITY OF MINNESOTA

**Prepared and Published with the Support of
THE MCLEOD COUNTY BOARD OF COMMISSIONERS AND
THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATERS**

**UNIVERSITY OF MINNESOTA
MINNESOTA GEOLOGICAL SURVEY
Harvey Thorleifson, Director**

**COUNTY ATLAS SERIES
ATLAS C-26 PART A
Plate 4—Surficial Geology**

McLeod County Geologic Atlas
Links to PDF images of published maps, Part A

SURFICIAL GEOLOGY
By
Barbara A. Lusardi and Carrie E. Jennings
2009

CORRELATION OF MAP UNITS

notes: The older deposits were derived from a more weathering source and thus contain abundant crystalline rocks (sand and granite) and various amounts of talus and glaciogenic till. These are described as "Rusty Provenance". These weathered, older deposits were sampled only as drill holes and therefore do not show on the map. They are treated by younger deposits of the Dev Moines till (which is derived from a more weathered source) as a weathering source for younger deposits and not as a weathering source for the cross sections (Plate 5). The younger deposits are derived from a more weathered source and therefore contain abundant cobbles and no boulders. Shale clasts generally comprise from 1 to 10 percent of the till. Shale clasts are described as "Waupech provenance". This is similar to shale-bearing tills described above. It was deposited by ice advancing from the southwest. It is derived from the Waupech Till (Plate 5) or a layer of ice earlier advance depositing sand (Fig. 1). This unit occurs in subsurface only in the southern and eastern portion of the county. Surface maps and cross sections are not available for this unit. The McLeod County Plans may be referred to in advance. This unit was sampled at depth in several locations.

Quaternary

Rusty provenance

Waupech provenance

Dev Moines provenance

Waupech C1

Waupech C2

Waupech C3

Waupech C4

Waupech C5

Waupech C6

Waupech C7

Waupech C8

Waupech C9

Waupech C10

Waupech C11

Waupech C12

Waupech C13

Waupech C14

Waupech C15

Waupech C16

Waupech C17

Waupech C18

Waupech C19

Waupech C20

Waupech C21

Waupech C22

Waupech C23

Waupech C24

Waupech C25

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Waupech C35

Waupech C36

Waupech C37

Waupech C38

Waupech C39

Waupech C40

Waupech C41

Waupech C42

Waupech C43

Waupech C44

Waupech C45

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Waupech C636

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Waupech C638

Waupech C639

Wau

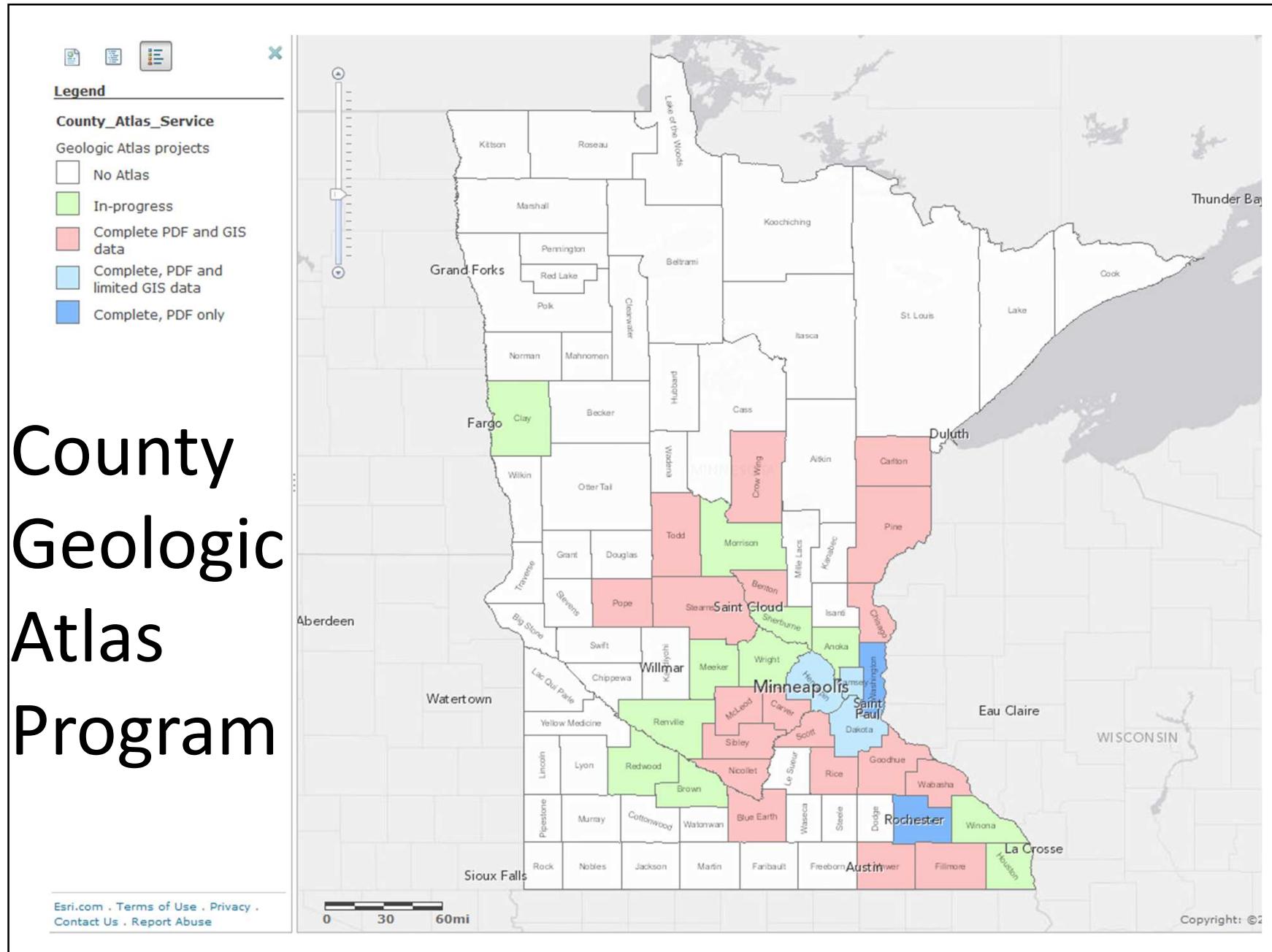
What is a County Geologic Atlas?

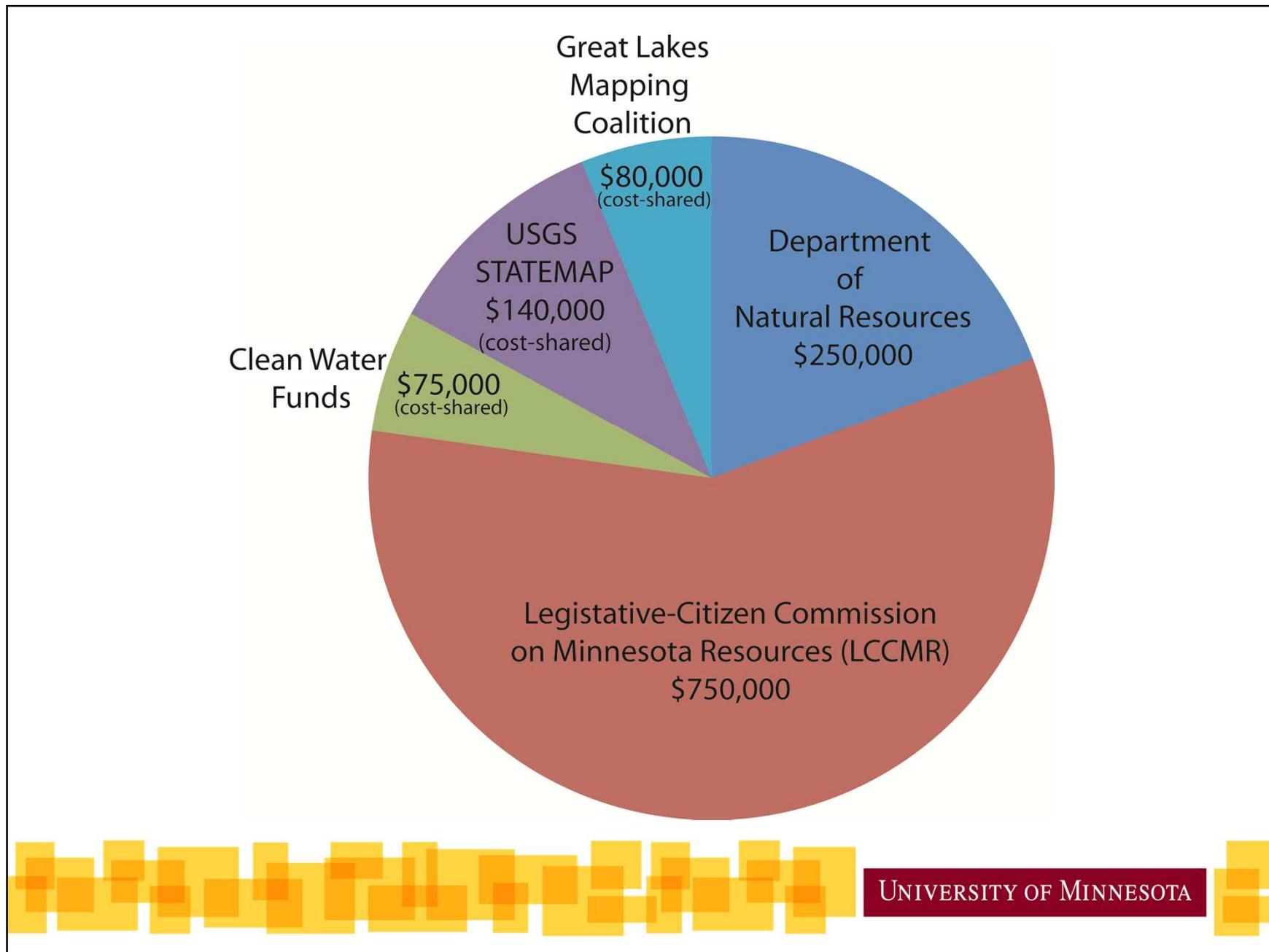
- A study of the geology and ground water resources of a county
 - MGS investigates the geology
 - DNR investigates chemistry, quantity, aquifer levels, and pollution sensitivity of the ground water
- Used for planning, resource management, environmental protection, and education
- Maps, databases, and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

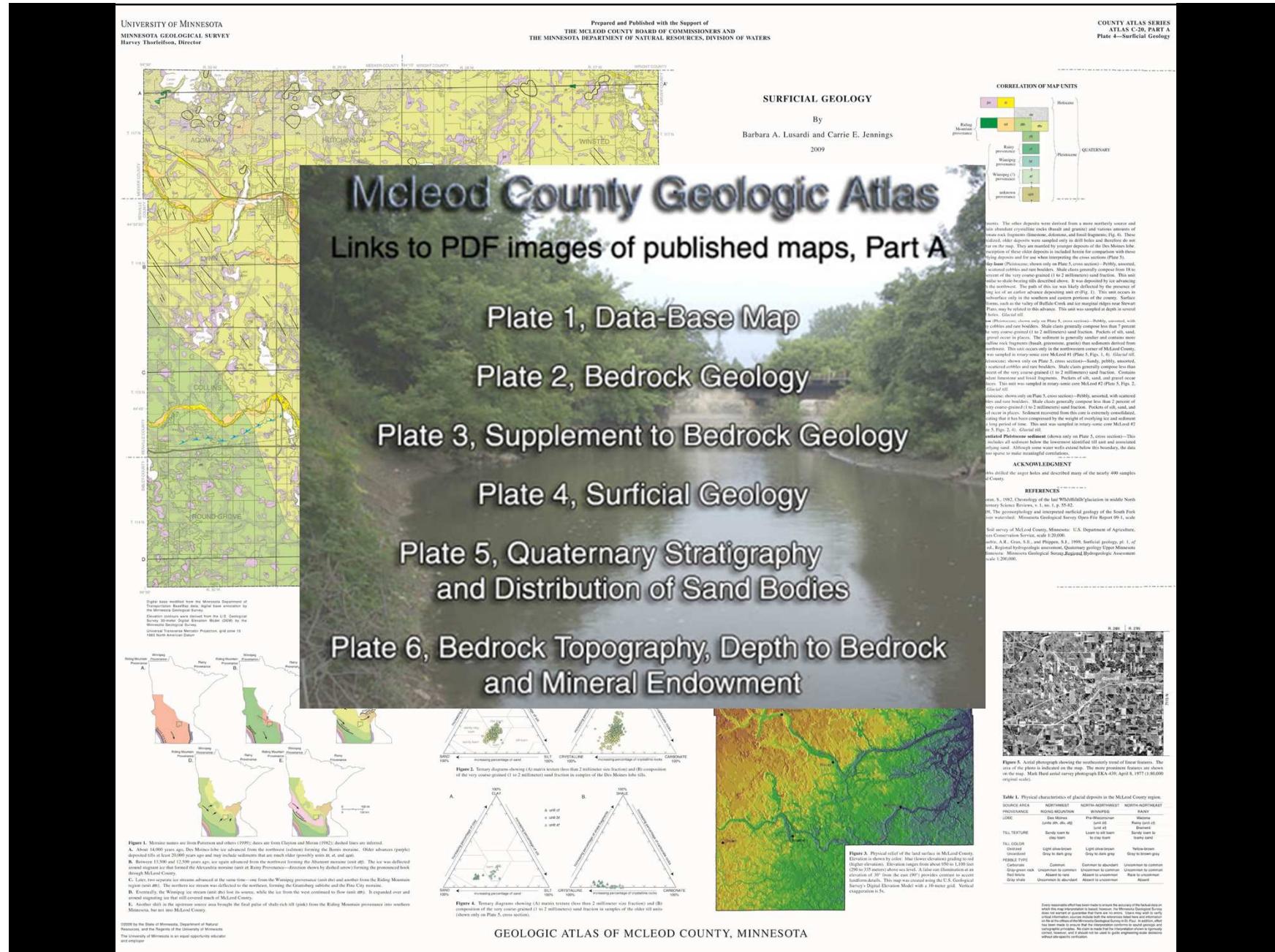


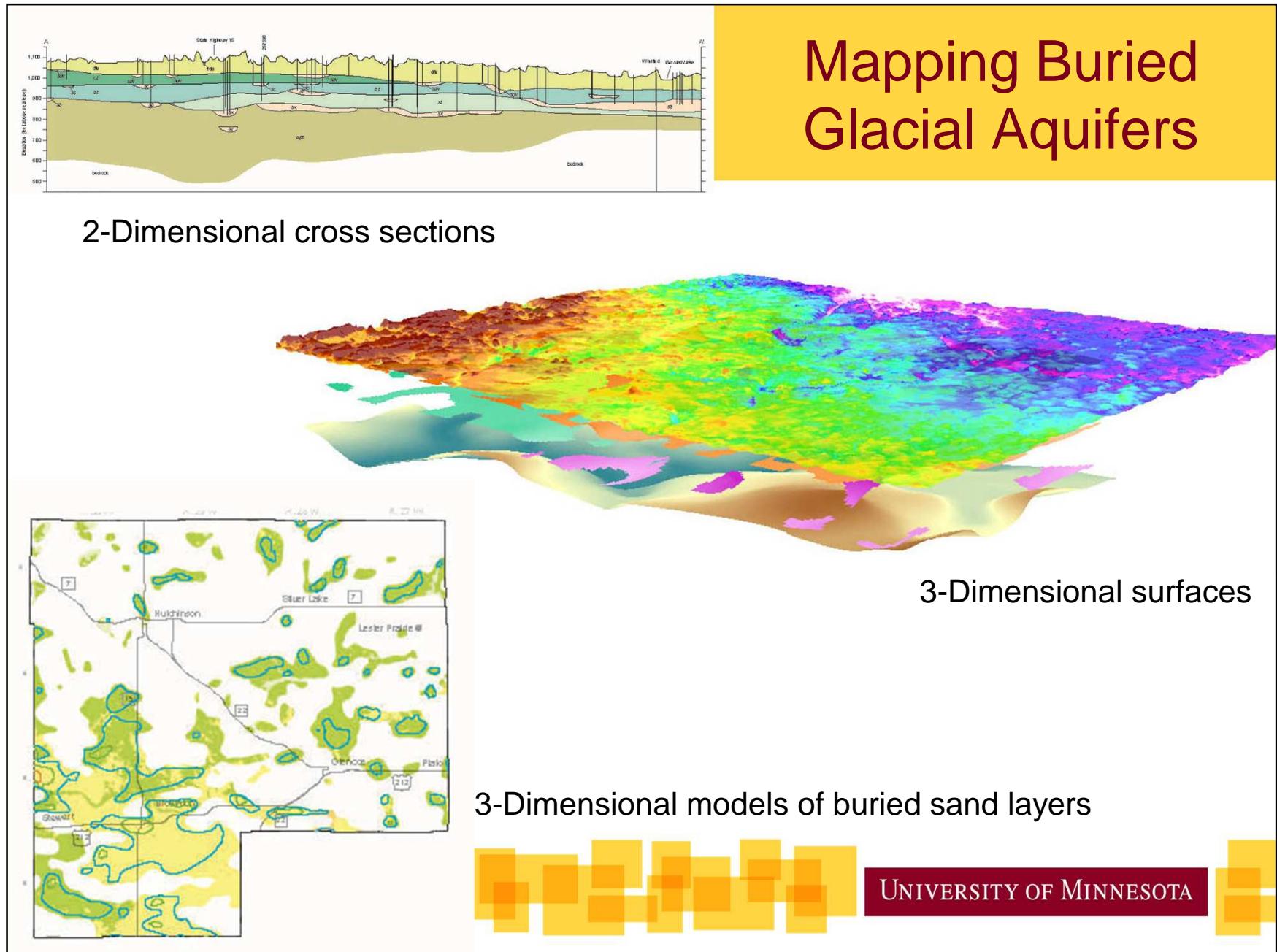
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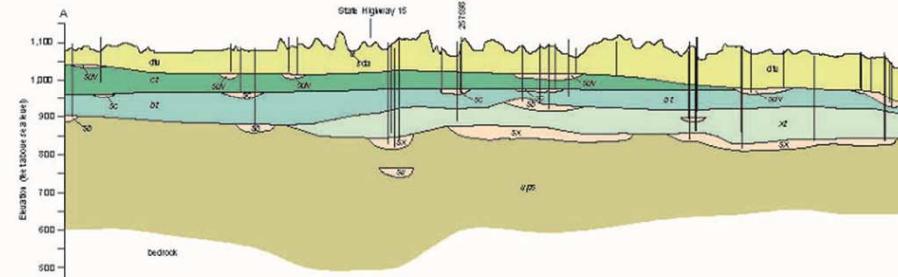








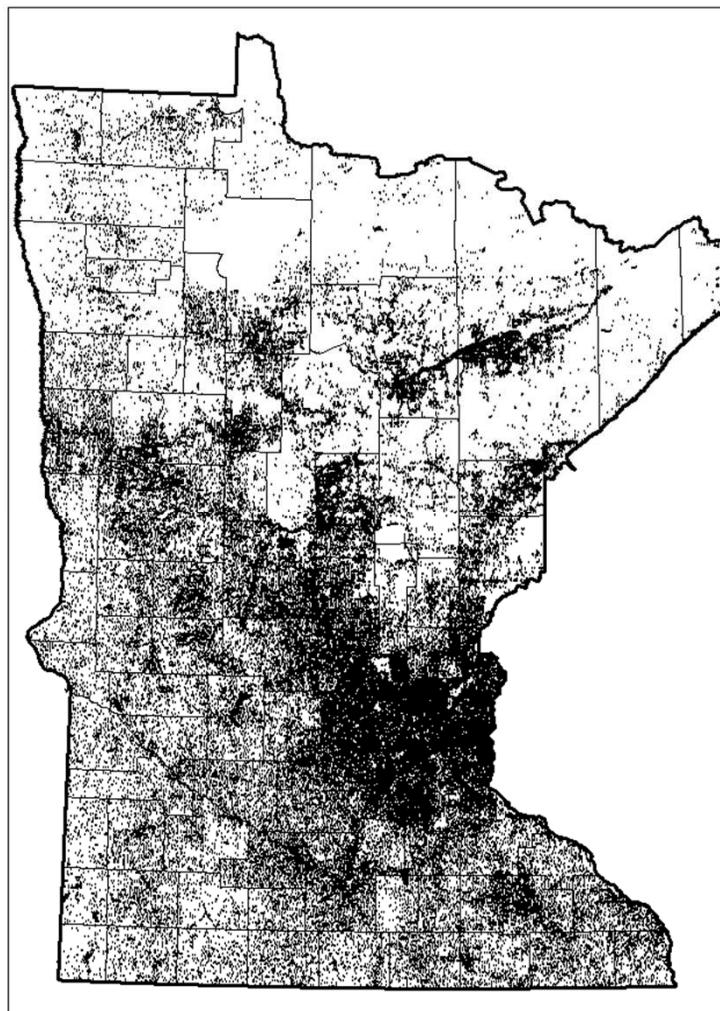
Cross Sections



Minnesota Unique Well No.				County	Anoka	Entry Date	09/27/2011
779325				Quad	Nowthen	Update Date	12/27/2011
				Quad ID	136C	Received Date	07/07/2011
Well Name STENKE, DOUG				Well Depth	940 ft.	Depth Completed	177 ft.
Township Range Dir Section Subsections Elevation				Calc from NED	(Natl.Elev.Dataset-30m)	Date Well Completed	07/07/2011
33	25	W	16	CAADDC	Elevation Method	Drilling Method	Non-specified Rotary
Well Address 20701 NOWTHEN BL MN 55303				Drilling Fluid	Bentonite	Well Hydrofractured?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
				From Ft. to Ft.		Use Domestic	
				Casing Type	Plastic	Joint Glued	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Above/Below ft.
				Casing Diameter	Weight	Hole Diameter	
				4 in. to 129 ft.	lbs./ft.	8 in. to 130 ft.	
				Open Hole	from 130 ft. to 177 ft.		
				Screen NO	Make	Type	
				Diameter	Slot/Gauze	Length	Set Between
REMARKS COULD NOT FIND THE CITY OF NOWTHEN FOR WELL ADDRESS				Static Water Level 1' ft. from Land surface Date Measured 07/07/2011 PUMPING LEVEL (below land surface) 20 ft. after 6 hrs pumping 75 g.p.m.			
				Well Head Completion Pitless adapter manufacturer AQUASEAL Model T SERIES <input type="checkbox"/> Casing Protection <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)			
				Grouting Information Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Grout Material: Neat Cement from 119 to 129 ft. 3 bags			

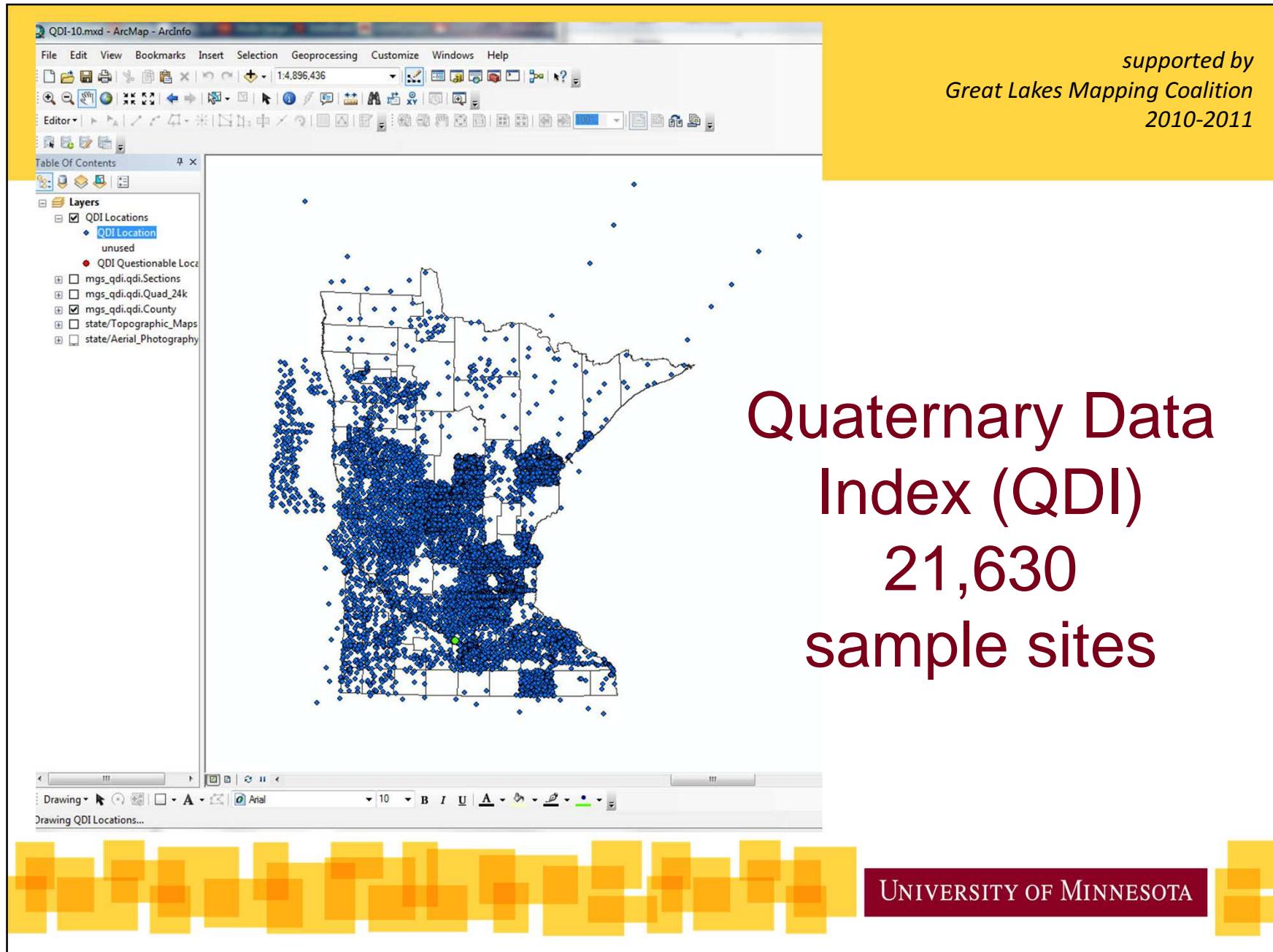


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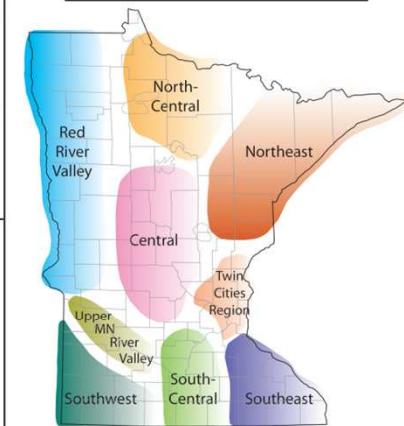
County Well
Index (CWI)
472,048
water-well logs
statewide

UNIVERSITY OF MINNESOTA



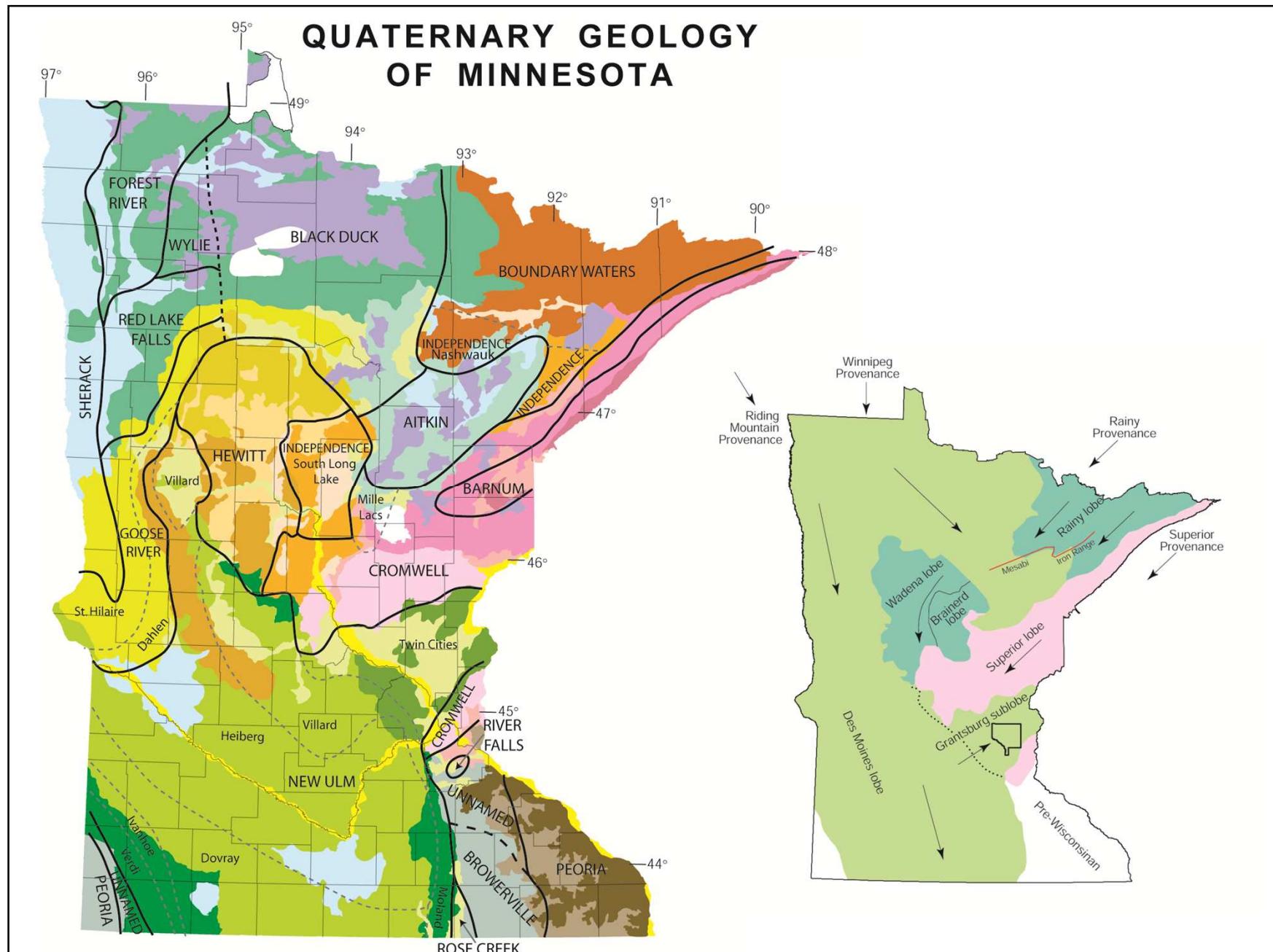
Minnesota Quaternary Lithostratigraphy

Global Correlations	Red River Valley	Upper Minnesota River Valley	Southwest	South-Central	Southeast	Twin Cities Region	Central	North-Central	Northeast
MIS 2-5	<ul style="list-style-type: none"> SHERACK POPLAR RIVER BRENNNA FOREST RIVER Huet Falconer WYLIE RED LAKE FALLS Upper Lower ARGUSVILLE GOOSE RIVER St. Hilaire Dahlens NEW ULM Heberg Hawley Villard New York Mills JAMES RIVER GARDAR BUFFALO RIVER Crow Wing River Sebeke Marcoux 	<ul style="list-style-type: none"> GOOSE RIVER Dahlens Heberg glacial lake Benson sediment Villard NEW ULM Dovray Ivahoe Verdi New York Mills 'till unit #7' 'till unit #8' 	<ul style="list-style-type: none"> NEW ULM Dovray Ivahoe Verdi 	<ul style="list-style-type: none"> NEW ULM Heberg glacial lake Mankato sediment Villard Dovray Garden City Moland 	<ul style="list-style-type: none"> NEW ULM Moland 	<ul style="list-style-type: none"> NEW BRIGHTON NEW ULM Twin Cities Falun HILLSIDE SAND PEORIA CROMWELL ROCKAWAY Silt TRVERSE DES SIOUX 	<ul style="list-style-type: none"> ATKIN NEW BRIGHTON Nelson Lake Coon Creek Sunrise CROMWELL HEWITT INDEPENDENCE RIVER FALLS 	<ul style="list-style-type: none"> BLACKDUCK ATRON Prairie Lake Alborn glacial lake Aitkin II sediment Mille Lacs INDINPENCE Nashwauk INDEPENDENCE CROMWELL 	<ul style="list-style-type: none"> Knife River Wrenshall BARNUM Moose Lake Mahtowa
MIS 6-18	<ul style="list-style-type: none"> SHIYENNE RIVER BROWERVILLE GERVAIS unnamed unit(s) unnamed unit(s) unnamed unit(s) 	<ul style="list-style-type: none"> 'till unit #9' HAWK CREEK southern part northern part 'till unit #10' 'till unit #11' 'gastropod silts' WHETSTONE 	<ul style="list-style-type: none"> 'SWRA 1' 'SWRA 2' 'SWRA 3' 'SWRA 4' 'SWRA 5' 'SWRA 6' 'SWRA 7' 	<ul style="list-style-type: none"> BROWERVILLE? HAWK CREEK HENDERSON BROWERVILLE? unnamed unit(s) unnamed unit(s) unnamed unit(s) ROSE CREEK unnamed unit(s) ELMDALE 	<ul style="list-style-type: none"> BROWERVILLE? LOVELAND unnamed unit(s) unnamed unit(s) unnamed unit(s) ELMDALE 	<ul style="list-style-type: none"> RIVER FALLS unnamed unit(s) unnamed unit(s) unnamed unit(s) 	<ul style="list-style-type: none"> BROWERVILLE LAKE HENRY SAUK CENTRE ST. FRANCIS LAKE HENRY Meyer Lake ST. FRANCIS EAGLE BEND SHOCKS ELMDALE 	<ul style="list-style-type: none"> BROWERVILLE SALIM FUNKLEY ST. FRANCIS EAGLE BEND BIG FORK SHOCKS WIRT MULLIGAN 	
MIS >18						PIERCE			



supported by
Great Lakes
Mapping Coalition
2010-2011

UNIVERSITY OF MINNESOTA



Anoka County
 87 cross-section lines
 spaced .5 km apart with
 nearly 27,000 water-well
 records, bridge borings
 and scientific drill holes

