



THE GEOLOGICAL SOCIETY OF MINNESOTA

News

Presidents Message

Volunteer opportunities, field trips, lectures, and public service, since 1938

Do You Have Any Comments?

We conducted a survey at the recent Spring banquet and received interesting results. The survey had to do with how members prefer to receive the GSM newsletter and the survey results are presented in a separate article, elsewhere in this newsletter. What was interesting to me were some of the comments we received that were not related to the survey, like: "Fix the fair booth" and "Please have field trips in all seasons". These comments make me wonder what else is on the minds of the GSM members. My questions to the GSM membership are:

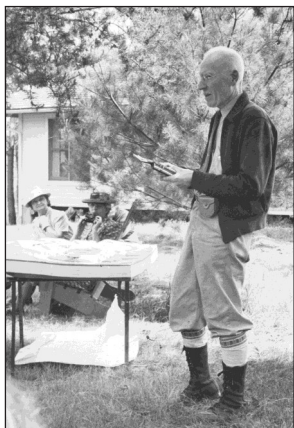
- How can we improve the GSM?
- What do we do well and what can we do better?
- Would you like more field trips
- Do we need a better booth?

- Should we do the auction/ recognition banquet some other month than January or less often?
- What else?

If you have ideas and comments please send me your input by using the "Contact" tab in the GSM website (select "Message to President" in the Category field).

See you at the State Fair,

Dick Bottenberg
President GSM



GSA Ticket Raffle at the Fall Banquet and Lecture

Three tickets to the GSA Conference Exhibition Hall will be raffled in September at the Fall Banquet (value \$200 ea). You must be a member of the GSM and you must be present to win.

See you there!

Upper photograph: GSM field trip to Minnehaha Falls, July 12, 1942; Lower photograph: Edward Parris Burch, GSM field trip, Kenyon, Mn. August 1940..

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Welcome New Members

Jim Hollnagel

Curt and Janet Lange

Daniel Schivone

Lawrence Waite

GSM News

Officers:

Dick Bottenberg, President
 Janine Atchison, Vice President
 Sherry Keesey, Treasurer
 Allen Bowles, Secretary

Board Members: Darrell Mytty; Alan Smith; Harvey Thorleifson; and Theresa Tweet.

Editor: Harvey Thorleifson

The Geological Society of Minnesota is a 501(c)3 nonprofit organization. The purpose of this newsletter is to inform members and friends of activities of interest to the Geological Society of Minnesota.

Send all GSM membership dues, change of address cards, and renewals to:

GSM Membership Chair
 P.O. Box 390555
 Edina, MN 55439-0555

Membership dues are: \$10 Full-time students; \$20 Individuals; \$30 Families

GSM News is published four times a year: **February 15, May 15, August 15, and November 15.** Deadline for article submission is the first of the month, before the date of publication. Send all material to:

Harvey Thorleifson,
thorleif@umn.edu

Results of the Newsletter Survey

At the Spring Banquet we surveyed those present to determine how the membership would like to receive future newsletters: via e-Mail, US Mail

or GSM website. We also asked if any of these methods were seen an unacceptable. The reasons to consider alternate methods of newsletter delivery are simply to save cost and time. The cost to print and mail the GSM newsletters runs around \$350 per issue and significant volunteer time is involved in the stamping and mailing. The GSM board will review these results at the 16 June Board meeting and decide how to go forward. If you have ideas and comments please send me your input by using the "Contact" tab in the GSM website (select "Message to President" in the Category field). The survey results follow:

Which is your preferred delivery method?

- e-Mail 35 votes
- US Mail 9 votes
- GSM website 8 votes

Are any unacceptable to you?

- e-Mail 4 votes
- US Mail 3 votes
- GSM website 9 votes

Additional comments received:

Make e-Mail newsletter an option. What's the point of being a member if you get the newsletter free on the website?
 Send US Mail only if specifically requested.
 Saving money is good idea.
 Make each an option.
 Fix the fair booth.
 Please have field trips in all seasons.

GSM Field Trips!

Watch for emails and web site updates regarding our upcoming field trips – plans call for a field trip to the Keweenaw Peninsula in Michigan in August, including a mineral show; also a one day field trip to Cannon Falls and Crystal Cave – sounds great!

Kimball Memorial Banquet

The GSM Spring Banquet and Lecture, on May 2 at Grand City Buffet, was a great success. Tim Cowdery M.Sc., Hydrogeologist, Minnesota Water-Science Center, USGS, gave a superb talk on 'Glacial Ridge National Wildlife Refuge: Water-budget Changes from Precipitation Variability'.

His abstract read as follows: Surface waters and surficial groundwaters form one integrated dynamic hydrologic system at the Glacial Ridge National Wildlife Refuge near Crookston, in northwestern Minnesota. Surficial aquifers in this area are composed of beaches deposited on the eastern shores of Glacial Lake Agassiz during 13,600 to 10,600 years before the present. Glacial Lake Agassiz was an enormous meltwater lake that repeatedly formed on the southwestern side of the Laurentian ice sheet during the Pleistocene when ice blocked drainage to the Arctic and North Atlantic Oceans. During those times, all of the water melting from the western side of the ice sheet flowed into this glacial lake, down Glacial River Warren (the valley of which is currently occupied by the underfit Minnesota River), and down the Mississippi River to the Gulf of Mexico. The U.S. Geological Survey measured or estimated the amount of water flowing through each part of the hydrologic system in the Refuge during 2003–5. Results indicate that the hydrologic system responded very quickly (within a year) to the total amount of precipitation that fell in the area. The differences in precipitation between years caused changes in flow between surface waters and groundwaters with groundwater flows buffering surface-water flows. During a year of near-normal precipitation (2005), 53 percent (%) of the water that fell in the area was returned to the atmosphere as evapotranspiration, 37% recharged groundwater, and 10% ran off to ditches. That same year, the direct runoff combined (39%) with groundwater discharge (61%) to produce surface-water flow through channels that were about

25% of precipitation.

Tim Cowdery is a hydrogeologist with the U.S. Geological Survey in Mounds View, Minnesota. He currently serves as chief for several projects at the Water-Science Center in Minnesota. He earned a master's degree from the University of Minnesota in groundwater geology in 1997. His research interests include groundwater/surface-water interactions, numerical groundwater modeling, glacial geology, and groundwater recharge analysis. Tim joined the USGS in 1992 as the groundwater specialist for the Red River of the North National Water-Quality Assessment, conducting groundwater-quality research at many spatial scales in that basin. He has designed and executed two groundwater modeling studies at local and regional scales in southwestern Minnesota and in the southern Twin Cities Metropolitan area. He has developed systems for automated groundwater data collection, telemetry, and processing and has used these data to estimate the spatial and temporal variability of groundwater recharge. Since 2002, Tim has managed the Glacial Ridge Hydrologic assessment, a groundwater/surface water interaction study that documents changes in the hydrology of a large area in northwestern Minnesota undergoing extensive wetland and prairie restorations. He continues to manage several other projects involving groundwater modeling, water-quality sampling, and groundwater recharge.

Spring Lectures

Excellent lectures presented since those mentioned in the Spring Newsletter were as follows:

Alfred H. Pekarek, Ph.D., St. Cloud State, Monday, March 21, 2011, The Future of Petroleum; Does the Concept of "Peak Oil" have meaning?

Abstract: The concept of "Peak Oil" has been around since the first estimate of the size of the petroleum

Upcoming Meetings

Geological Society of America (GSA) Annual Meeting, Minneapolis Convention Center, October 9 – 12, 2011

resource. To date, all resource projections have been hopelessly pessimistic. Estimates, including “Hubbert’s curve” will be discussed along with the current state of petroleum exploration with special emphasis on the resource base and conversion of the resource base into producible reserves. Shale oil (not oil shale) is a very important new addition to the reserve base. The Bakken Formation of the Williston Basin of North Dakota is being successfully developed and serves as a model for many similar formations. Considering the many prospective, but undeveloped areas in the USA and throughout the world, “Peak Oil” is not an immediate concern unless we chose to make it so.

Biography: Alfred H. Pekarek, Ph.D.; Assistant Professor of Earth and Atmospheric Sciences; B.A. 1965, University of Minnesota-Twin Cities; Ph.D. 1974, University of Wyoming; Specialty: Stratigraphy, tectonics, earth history; Alfred (Al) Pekarek received a B.A. degree (geology) from the University of Minnesota at Minneapolis and a Ph.D. degree (geology) from the University of Wyoming. Al has more than 35 years of experience in petroleum exploration, primarily in frontier areas of the Rocky Mountains and the Basin and Range. He has worked for several companies and as an independent consultant. Currently Dr. Pekarek is an Associate Professor of geology at St. Cloud State University and will retire this spring. He will then work full time in petroleum exploration.

Michael Middleton, Ph.D., University of Wisconsin, River Falls, Monday, April 4, 2011, The Geology of Wisconsin; An overview and highlights

Abstract: How is Wisconsin's geology different from Minnesota's? We'll travel

across the state and look at some of the rock units and localities that have given Wisconsin its unique character. And I promise not to mention the Packers.

Biography: Dr. Mike Middleton teaches geology and paleontology courses at the University of Wisconsin-River Falls. A graduate of Dartmouth College and the University of Colorado, Mike moved to the upper Midwest 27 years ago. He's been learning about its geology ever since. He enjoys traveling and birdwatching in his spare time.

William Phinney, Ph.D., Monday, April 18, 2011; Origin and Evolution of the Moon

Abstract: We have come a long way from the days when the Moon was hypothesized to consist of oceans and mountains with people living there (200 BC) or to be an ejected chunk of Earth from the Pacific Ocean (1882). It has been nearly 40 years since the Apollo Program provided us with actual data from both surface and orbital instruments as well as returned samples from the Moon. From geophysical, geochemical, petrologic, geochronologic, and photogeologic studies of the instrument data and the samples there has been a continually developing picture of the Moon's origin and evolution. Its thermal history, internal structure, dates of major events, surface history, and petrologic development from an early molten sphere have provided us with information not only about lunar history but also significant inputs to the early evolution of the solar system as well as the Earth. The study of samples and structures produced by lunar impact events has greatly improved our recognition and knowledge of terrestrial impact products. The impetus for distinguishing the products of impact melts from truly igneous melts was a re-

from the archives



GSM field trip, North Shore of Lake Superior, Cascade River Falls, July 1940.

sult of lunar sample studies. Dating of impact melts indicates a significant spike in meteorite flux in the solar system around 4.0 to 3.9 billion years ago. Extension of supercomputer codes for nuclear explosions to meteorite impacts has provided a basis for models of the Moon's origin and its relation to Earth. The training of astronauts to conduct geostudies of the lunar surface required monthly field training for nearly 2 years for each Apollo crew from Apollo 13 through Apollo 17. The details of that training may be surprising to most Earth Scientists.

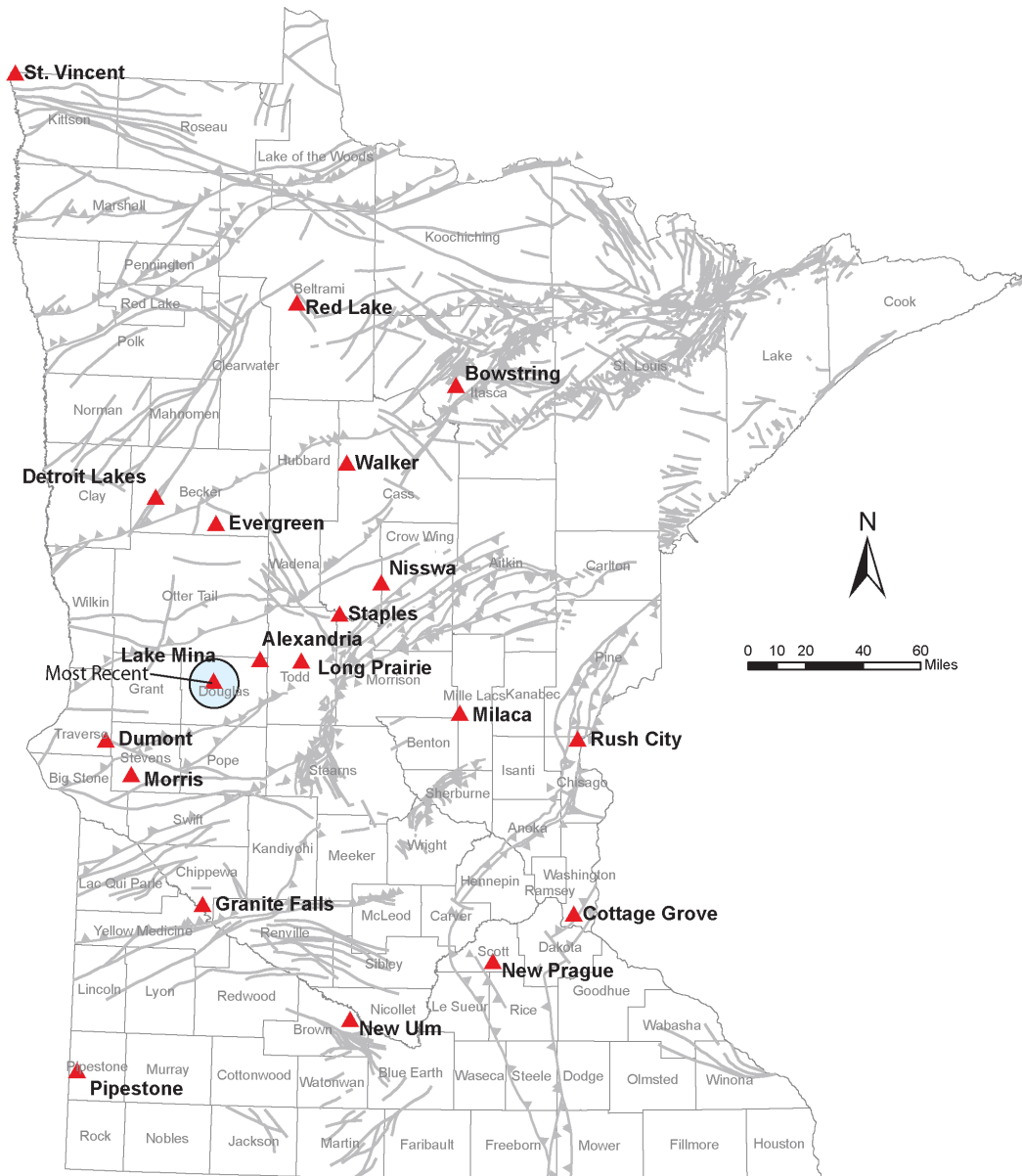
Biography: William Phinney, PhD MIT 1959, Professor, University of Minnesota, 1959-1970, Field work for MN Geol. Surv. on Duluth complex, summers 1961-1970; Research on igneous & metamorphic petrology: 1960-1970; Chief of Planetary Science Branch, NASA Johnson Space Center: 1970-1992; Coordinator of science training for Apollo Astronauts: 1970-1972; Research on lunar samples, terrestrial meteorite craters, & early Earth geology 1970-1994; Assoc Curator for Lunar Samples, NASA Johnson Space Center 1992-1994; Retired 1994; Over 180 published papers & abstracts.

MGWA Spring 2011 Conference

The theme of the Minnesota Ground Water Association Spring 2011 Conference on May 4, 2011 at the Continuing Education and Conference Center, University of Minnesota, St Paul, was 'Toward Sustainable Water Use in Minnesota; Where we are, Where we are going, and How we are going to get there'. According to MGWA, conference speakers highlighted some of the important sustainable water use planning efforts in Minnesota and showcased successful examples of sustainable water use planning and permitting in other states and regions of the country. In addition, speakers summarized current local sustainable water use implementation activities, and presented new technologies that may be useful or instrumental to furthering our sustainable water use goals. Rep Paul Torkelson, MN House of Representatives, spoke on Water Sustainability, Clean Water, Land and Legacy Amendment, while Princessa VanBuren Hansen, MN Environmental Quality Board, spoke on 2010 Minnesota Water Plan. Dr. Deborah Swackhamer, University of MN Water Resources Center, summed up

the Minnesota Water Sustainability Framework. Jay Frischman, MN Department of Natural Resources, described a plan to develop a groundwater level monitoring network for the 11-County Metropolitan Area. Dr. Jeanette Leete, MN Department of Natural Resources, discussed a process to define groundwater management areas, while Lanya Ross, Metropolitan Council, spoke on Twin Cities Water Supply Planning and Use of the Metro Model. Troy Hall, Moorhead Public Service, addressed the Buffalo Aquifer Management Plan, and Linda Hutchins, MA Department of Conservation and Recreation, spoke on Sustainable Yield Estimator in Massachusetts Water Management.

The Institute on Lake Superior Geology 57th Annual Meeting. Held May 19-20, 2011 in Ashland, Wisconsin. According to the ILSG web site, planned field trips included: 1) Igneous Stratigraphy of the Layered Series at Duluth - Type Intrusion of the Duluth Complex; Leader: Jim Miller (UMD/PRC); This trip will profile the igneous stratigraphy of the Layered Series at Duluth, highlighting its differentiation, layering, and contact relationships. 2) Midcontinent Microcosm; Leaders: Marcia Bjornerud (Lawrence U.) and Bill Cannon (USGS); This trip will examine rocks along the Marengo River in Bayfield County, WI, which record events from late Archean time through closure of the Midcontinent Rift. 3) Geology of the Bayfield Peninsula: Keweenaw Bayfield Group and Pleistocene Deposits; Leaders: Dick Ojakangas (UMD), Drew Cramer, Tom Fitz (Northland College); This trip first examines the sandstones of the Bayfield Group, including exposures at the Douglas Fault, and then visits Quaternary deposits of the Bayfield Peninsula. 4) Geology and remediation at the Ashland/Northern States Power Site; Leaders: Jamie Dunn (WI DNR); A tour of the Ashland Lakefront Manufactured Gas Plant site and discussion of the geology, the contaminants, and plans for major remediation work. 5) Bad River Watershed Culvert Restoration Program; Leader: Michele Wheeler (Bad River Watershed Association), and Cassie Bodette (Northland College); Learn about local on-the-ground adaptive management strategies to restore fish passage and prevent sedimentation at restored road stream crossings. 6) Geology of Copper Falls State Park; Leaders: Allison Mills, Drew Cramer, and Tom Fitz (Northland College); Hike approximately



Earthquake in Minnesota!

The first felt quake in Minnesota since 1994, a magnitude 2.5 event according to USGS, occurred on Friday, April 29, 2011 at 02:20:13 AM local time, 64 km (39 miles) SE of Fergus Falls, Minnesota, prompting over two dozen calls to police according to the Star Tribune. The map shows where the latest earthquake occurred and the locations of previous ones along with mapped faults from the new MGS State Geologic Map (S-21) that was shown in the Spring News. For more information, check-out Minnesota at a Glance, [Earthquakes in Minnesota](#) from the MGS web site.

2 miles through Copper Falls Park to see Keweenawan volcanic and sedimentary rocks as well as the scenic Copper Falls gorge. 7) Geology of the Montreal River Monocline; Leader: Bill Cannon (USGS); This trip is a traverse through 25 km of crust, from the Mesoproterozoic Freda Sandstone to Archean metavolcanic rocks. 8) The Archean/Paleoproterozoic unconformity near Denham, Minnesota; Leaders: Terry Boerboom (Minnesota Geol. Survey) and Dan Holm (Kent State U.); This trip will examine evidence that deeply weathered Archean crust provided sediment to the overlying Paleoproterozoic strata of a marginal rift, and will also examine the Thomson Formation. 9) Granitic, gabbroic, and ultramafic rocks of the Keweenawan Mellen Intrusive Complex; Leader: Tom Fitz (Northland College); Examine the ma-
www.gsmn.org

ior rock types and relationships within the Keweenawan Intrusive Mellen Complex.

SME Twin Cities Subsection 2011 Annual Conference

On Thursday, October 27th at Holiday Inn Metrodome in Minneapolis, the Society for Mining, Metallurgy, and Exploration (SME) Twin Cities Subsection we will host a full day conference on the mineral industry in Minnesota. Speakers from industry associations, government agencies, and university institutions will address the industry's contribution and potential, its regulation, as well as the information and research that support it.

GSA Field Trips!

Planning for the Geological Society of America Annual Meeting this October in Minneapolis is going superbly. Although the price of admission is several hundred dollars or more, GSM members may be interested in knowing about the 45 planned field trips, as follows. Detailed information is provided on the GSA web site.

Classic Volcanogenic Massive Sulfide Deposits of the Southern Canadian Shield

Structural Geology of the Subprovince Boundaries in the Archean Superior Province of Northern Minnesota and Adjacent Ontario; Cosponsor

An Excursion to the Classic Bedrock Localities of Northern Minnesota with a Focus on Teaching and Learning in the Field

Cu-Ni-PGE Deposits of the Duluth Complex; Leaders
Pedagogical Strategies for Introductory Geology Field Trips through an Examination of the Mississippi River Valley in the Twin Cities

3.5 Billion Years of Geologic History: A Teachers' Guide to the Rocks of Southern Minnesota

Late Paleoproterozoic Deformational, Metamorphic, and Magmatic History of East-Central Minnesota

Southern Outlet and Basin of Glacial Lake Agassiz

Classic Precambrian Geology of Northeastern Minnesota

The History of Glacial Lake Benson

Glacial Record Spanning the Pleistocene in Southern Minnesota

Groundwater and Surface Water of the Northern Highlands Lake District of Northern Wisconsin: 30 Years of Research in the Trout Lake Watershed

Geology under the Surface: Lake Superior and the Research Vessel Blue Heron

Cycling the Mississippi River Gorge

Southeastern Minnesota Karst Hydrogeology: New Insights from Data Loggers, Tracing, LiDAR, and Hydrophysics

Geology of the Ice Age Trail

Application of LiDAR and Geophysics to Archeological Investigations in the Upper Mississippi River Valley

Flaming Meteors, Dark Caves, and Raging Waters - Geological Curiosities of Western Wisconsin

St. Anthony Falls Laboratory: Flumes, Experimental Landscapes, and a Waterfall.;

Interpreting Genetic Origins of Landform Sediment Assemblages within the Upper Mississippi River Valley and Tributaries in the Twin Cities Area of Minnesota

The Wines and Terroir of Southeastern Minnesota

A Hidden Geologic Treasure: A River, A Waterfall, A

City: A Field Trip for Undergraduate and Graduate Students

Subterranean Twin Cities

The Minneapolis Chain of Lakes by Bicycle: Glacial History, Human Modifications, and Paleolimnology of an Urban Natural Environment

Kirk Bryan Field Trip: Holocene Landscape Evolution and Erosional Processes in the Le Sueur River, Central Minnesota

Springs and Waterfalls of the Twin Cities

Crustal Evolution of Archean Rocks from the Minnesota River Valley: Geologic, Geochronologic, and Isotopic Constraints

The Baraboo District - An American Classic

Distal Signatures of Late Ordovician Oceanic Anoxia - New Data and Interpretations of a Classic Eperic Ramp Transect

Stratigraphy, Physical Volcanology, Hydrothermal Alteration, and Mineralization Associated with the Neoproterozoic Vermilion Greenstone Belt, NE Minnesota

The North Shore Volcanic Group: A 9-km-Thick Plateau Lava Sequence in the Mesoproterozoic Midcontinent Rift System

Late Glacial History of the Western Lake Superior Region

Hydrostratigraphy of a Fractured Urban Aquitard

Enhancing Access to Fieldwork: A Participatory Exploration of Cave Geology for Mobility-Impaired Students

Retreat of the Laurentide Ice Sheet: Landforms, Sediments, Timing

Groundwater-Surface-Water Exchange and Geologic Setting of Northern Minnesota's Lakes, Wetlands, and Streams: Modern-Day Relevance of Tom Winter's Legacy

Geology and Sedimentology of the Paleoproterozoic Animikie Group: The Pokegama Formation, the Biwabik Iron Formation, and Virginia Formation of the Eastern Mesabi Iron Range, and the Thomson Formation near Duluth, Northeastern Minnesota

Anatomy of a Mineralized (Cu-Ni-PGE) Mafic System: the South Kawishiwi Intrusion of the Duluth Complex

Sudbury Meteorite Impact Layer in the Western Lake Superior Region

Late Quaternary Landscape Dynamics beyond the Ice Margin in the Upper Mississippi Valley

Copper Deposits of the Western Upper Peninsula, Michigan

Layered Intrusions of the Duluth Complex

Event History and Sequence Architecture of the Middle-Upper Devonian Eperic Carbonate Platform of the Iowa Basin

Minnesota State Fair...Just around the corner.

It's that time again. The GSM will once again have a State Fair information booth. We would like to thank Tom Schoenecker, who headed up the State Fair for the past 10 years! Thanks Tom for a job well done.

The State Fair will be August 27th- May 5th this year. We will need 72 people, each to work a four-hour shift at the booth. Each day is divided into three shifts, 9 a.m. to 1p.m., 1 p.m.-5 p.m., and 5 p.m.- 9 p.m. Two people are required by State Fair Administration for each shift. The booth cannot be unattended during the open hours of the Fair.

You don't need to be a geologist to staff the booth. You just need to be enthusiastic about Minnesota geology! Children are excited about the rocks on display. People will like to talk to you about their special found treasures. If they ask you a question and you don't know the answer, you can invite them to a lecture with talks by experts. There will be lecture schedules for 2011-2012 to hand out.

Even though there are several weeks before the Fair starts, this is a good time to get the shift you want. Call your buddies and work it together. Call Joanie Furlong at 651-731-0458 to claim your spot.

It really is a fun experience and a good way for potential new members to find out about the Geological Society, its lecture series, and field trips.

Joanie Furlong



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