

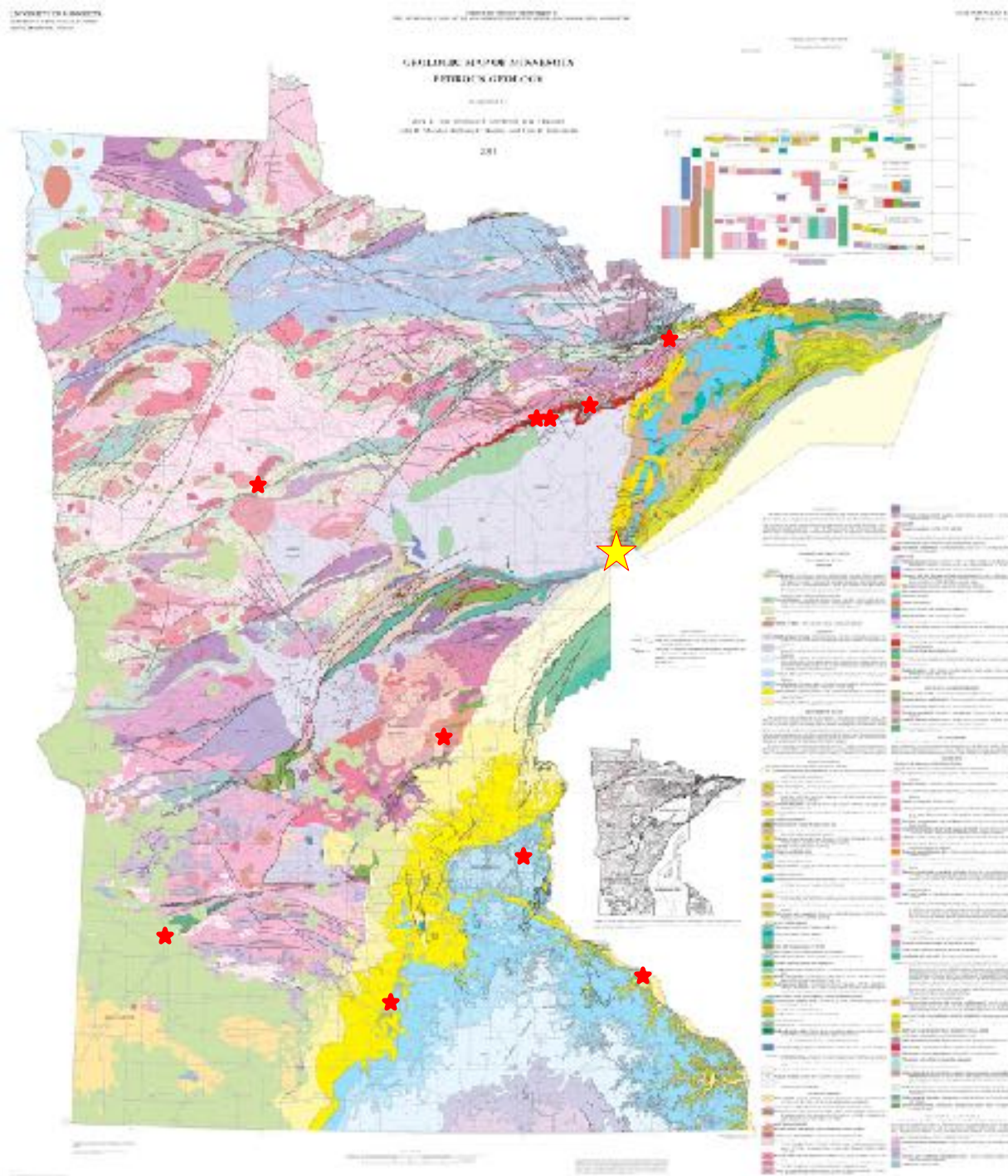
DULUTH 2015

# 18<sup>th</sup> Annual Minnesota Minerals Education Workshop



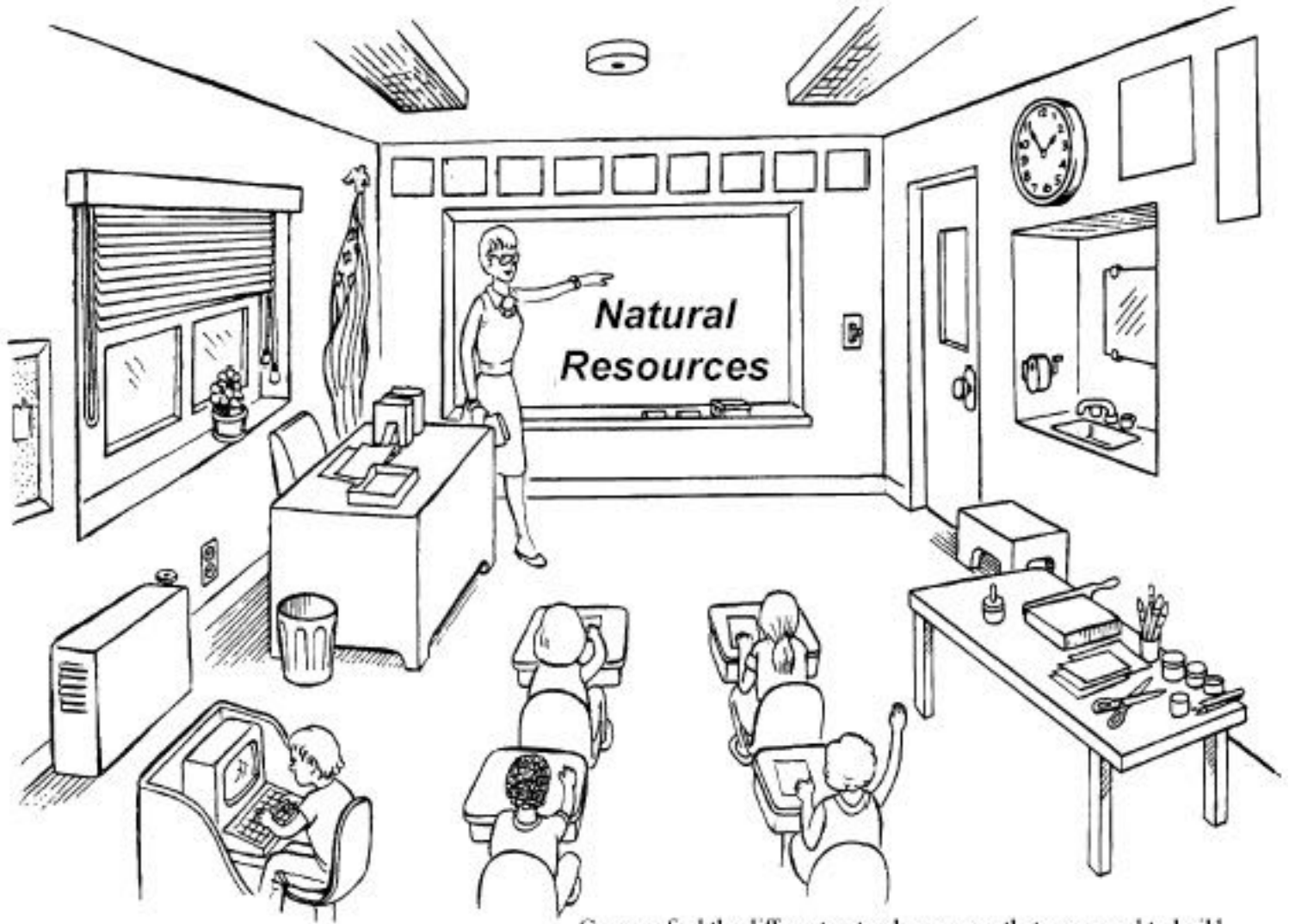
June 16-18, 2015  
University of Minnesota Duluth  
Duluth, Minnesota

DULUTH 2015



# Geology of Minnesota

MGS State Map S-21  
Jirsa et al. (2011)



Can you find the different natural resources that were used to build your classroom? Remember, if it wasn't grown, it had to be mined.

# 18 Years of MMEW

- 1997 – Ironworld Discovery Center, Chisholm (47)
- 1998 – Minnesota State University, Mankato (65)
- 1999 – University of Minnesota Duluth (83)
- 2000 – St. Cloud State University, St. Cloud (80)
- 2001 – Mesabi Range Technical College, Virginia (72)
- 2002 – University of St. Thomas, St. Paul (66)
- 2003 – Hibbing Community College, Hibbing (52)
- 2004 – Winona State University, Winona (62)
- 2005 – Minnesota State University, Mankato (69)
- 2006 – University of Minnesota, Duluth (81)
- 2007 – Bemidji State University, Bemidji (47)
- 2008 – Vermilion Community College, Ely (64)
- 2010 – Macalester College, St. Paul (64)
- 2011 – Mesabi Range CTC, Eveleth (76)
- 2012 – Winona State University, Winona (96)
- 2013 – Hibbing Comm. College, Hibbing (75)
- 2014 - Southwest Minnesota State Univ., Marshall (69)
- 2015 – University of Minnesota, Duluth (87)



Executive Committee

Chairman – Jim Miller, University of Minnesota Duluth

Vice Chair for Finance – Craig Pagel, Iron Mining Association

Vice Chair for Administration/Treasurer – Mike Hultgren, AIPG-MN Chapter

Vice Chair for Operations – Hannah Friedrich, MN Dept. of Natural Resources

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Fred Corrigan - Aggregate & Ready Mix Association of MN

Dennis Martin – MN Dept. of Natural Resources, Division of Lands and Minerals

George Hudak – UMD Natural Resources Research Institute

Cheryl Sill – Minnesota Earth Science Teachers Association

Julie Marinucci– SEH Engineering

# 2015 MMEW Instructors and Volunteers

<u>Name</u>	<u>Affiliation</u>	<u>Role</u>
Antoniazzi, Louise	Children's Centre of Thunder Bay	Registration
Berndt, Michael	MN Dept. of Natural Resources	Instructor
Breckenridge, Andrew	U of Wisconsin-Superior	Instructor
Clevenstine, Pete	MN Dept. of Natural Resources	Instructor
Doyle, Mike	U of Minnesota Duluth	Field Trip Assistance
Fix, Paul	U of Minnesota Duluth	Field Trip Assistance
Friedrich, Hannah	MN Dept. of Natural Resources	MMEW Co-Chair
Green, John	U of Minnesota Duluth	Field Trip Leader
Grosser, Aaron	Barr Engineering	Instructor
Hamilton, Jacqueline	Minnesota Geological Survey	Instructor
Hovis, Steve	Rio Tinto/Kennecott Exploration	Instructor, Field Trip Leader
Hubbard, Chuck	Braun Intertec Corporation	Instructor
Miller, Jim	U of Minnesota Duluth	MMEW Co-Chair, Instructor, Field Trip Leader
Moosavi, Dean	Rochester Comm. College	Instructor
Ojakangas, Dick	U of Minnesota Duluth (ret.)	Instructor
Olsen, Bruce	MN Dept. of Health (ret.)	Instructor
Swanson, Ryan	Ulland Bros. Inc.	Field Trip Leader
Reed, Andrea	MN Dept. of Natural Resources	Instructor
Reid, Ken	U of Minnesota Twin Cities (ret.)	Instructor
Schardt, Christian	U of Minnesota Duluth	Instructor
Severson, Mark	Teck American	Field Trip Leader
Sill, Cheryl	North Branch HS	Teacher Resources
Small, Kristin	Cliffs Natural Resources	Field Trip Leader
Solseng, Phil	Barr Engineering	Instructor
Soule, Rich	MN Dept. of Health	Instructor
Weiblen, Paul	U of Minnesota Twin Cities (ret.)	Instructor

# 2015 MMEW Sponsors

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Cliffs Natural Resources

Ulland Brothers

City of Duluth

# 2015 MMEW Lodging Scholarship Donors





# Today's Schedule

DULUTH 2015

	A	B	C	D
7:00-8:30	Breakfast - UMD Dining Center/ Registration - Heller Hall 1 <sup>st</sup> Floor			
8:30-8:50	Welcome/Introductions - Life Sciences 175			
Session 1 9:00-10:15	<b>Modeling Plate Tectonics</b> <i>Dean Moosavi</i> UM-Rochester Heller Hall 120	<b>Earth's Glaciations: Present and Ancient</b> <i>Dick Djokargas</i> UMD Chem 206	<b>GIS and Geology</b> <i>Jaqueline Hamilton</i> MGS <del>Heller Hall 105</del> <b>Heller Hall 114</b>	<b>Rock and Mineral Identification</b> <i>Andrea Reed</i> DNR Chem 207
10:15-10:30	Mid-morning Coffee Break – Heller Hall 1 <sup>st</sup> Floor			
Session 2 10:30-11:45	<b>Igneous Rocks of the North Shore</b> <i>Jim Miller</i> UMD Heller Hall 120	<b>Global Climate Change</b> <i>Andy Breckenridge</i> UW-Superior Chem 206	<b>Groundwater Basics</b> <i>Rich Soule &amp; Jim Lundy</i> MN Dept. of Health Heller Hall 114	<b>How Rocks Weather</b> <i>Christian Schardt</i> UMD Chem 207
11:50-12:45	Lunch – UMD Dining Center			
12:50-1:30	Noon Hour Presentation - Life Science 175 LaTisha Gietzen, Director of Public and Governmental Affairs, PolyMet Mining Talk Title: <i>Diversify the Economy AND Protect the Environment</i>			
Session 3 1:45-3:00	<b>Rocks to Metals</b> <i>Paul Weiblen</i> UM-TC Chem 207	<b>Mineral Exploration Best Practices</b> <i>Steve Hauls</i> Kennecott Expl. Chem 206	<b>Protecting Groundwater in Mining Areas</b> <i>Bruce Olson</i> MN Dept. of Health Heller Hall 114	<b>What's a Tailing Basin?</b> <i>Phil Salseng/Aaron Grosser</i> Barr Engineering Heller Hall 120
3:00-3:15	Afternoon Snack Break - Heller Hall 1 <sup>st</sup> Floor			
Session 4 3:15-4:30	<b>Mineral Resources Occurrences &amp; Uses</b> <i>Ken Reid</i> UM-TC Chem 206	<b>Economic Impact of Taconite Mining</b> <i>Pete Clevestine</i> MN-DNR Heller Hall 114	<b>Taconite Mining, Sulfate &amp; St. Louis R.</b> <i>Mike Berndt</i> MN-DNR Chem 207	<b>Mineland Reclamation</b> <i>Chuck Hubbard</i> Braun Engineering Heller Hall 120
4:30-5:30	Teacher Resource Pick-up/Field Trip Overview - Life Science 175			
6:00-9:00	Picnic Dinner at Lester River Park Tour of 2012 Flood Damage Areas in Duluth with Chris Kleist, Hydrologist, City of Duluth			

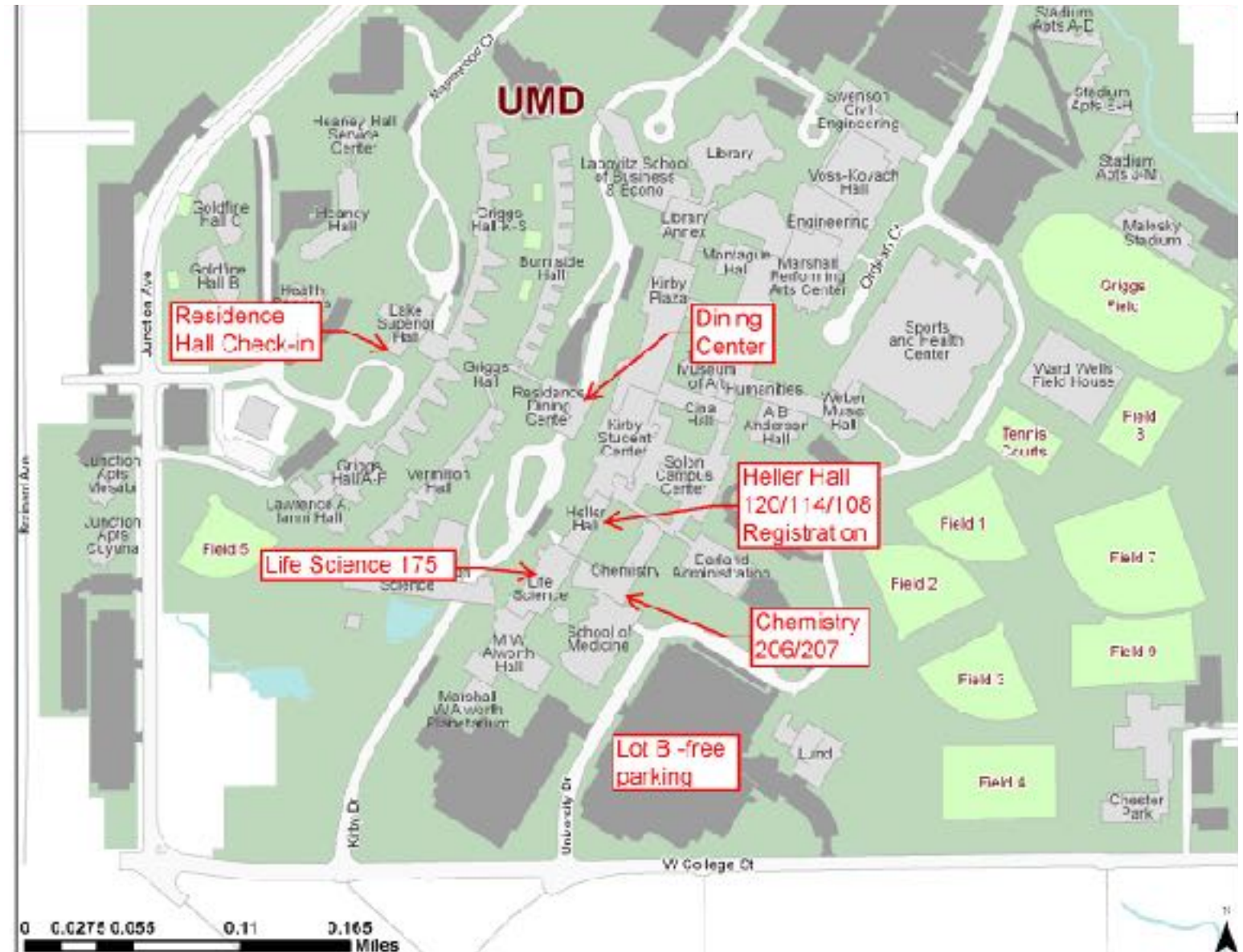
# Course Assignments

DULUTH 2015

#	Last Name	First Name	SESSION 1: 1:00-10:15					SESSION 2: 10:30-11:45					SESSION 3: 1:30-2:45					SESSION 4: 3:00-4:15								
			Class	Text	Clao	GSE	ID	Ign	Clm	GWJ	WEX	Int	MirEMD	GWMA	Telling	MirFes	Eron	Sulfab	Declim							
			INSTRUCTOR	LA	B	JH	AK	JM	AP	FD	LA	FM	BS	BJ	MS/MS	AA	KJ	GC	CB							
			Room	11110	Chem 202	11110	Chem 207	11110	Chem 202	11111	Chem 202	Chem 207	Chem 204	11111	11110	Chem 206	11114	Chem 207	11102							
1	Allen	Brian	C-D				1	2	A-D	1				2	A-D	1			2	C-B		2	1			
2	Arthro	JosyKey	A-B						A-C		1				A-B		1				A-C			1		
3	Asch	Thomas	B-D						A-A		1				A-C		1				A-A				1	
4	Kate	Tragan	C-R				1		A-C			1			A-A			1			A-A				1	
5	Berg	Ann	A-C	1				2	A-C		1			2	A-C	1			2		C-B		2		1	
6	Bojland	Rissan	A-D	1				2	A-C		1			2	A-B	1					A-B	1	2			
7	Braun	Nancy	B-C				1		A-B		1	2			A-B	1					A-D	1				2
8	Bubitz	Dana	B-A				1	2	C-A		2			1	C-D				1	2	C-B		2		1	
9	Chapman	Juanita	A-C	1					A-A					1	C-A				1	2	C-A				1	
10	Chalk	Rita	A-B	1					A-D		1			2	A-B			1	2		C-B			1		
11	Claw	Cherlene	B-C				1		A-D		1			2	A-C	1					C-A				1	
12	Cowan	Bush	B-C				1	2	D-C				2	1	A-D	1				2	C-B		2		1	
13	Craig	Pat	A-B	1	2				A-A		2	1			A-C	1			2		C-A		2		1	
14	Craig	David	C-B				1		D-B			2			A-B	1			3		C-D				1	2
15	Dahms	Nardow	B-A	2	1				A-A		2	1			D-B			3		1	A-C	1			2	
16	Dane	Tim	C-B				1		A-C		1			2	A-C	1			2		C-B		2		1	
17	DeWitt	Quinn	B-C				1	2	D-B			1			A-B	1			1		A-A				1	
18	DeWitt	Erin	B-C				1	2	D-B			1			A-B	1			1		A-A				1	
19	Filardi	Ryan	A-F	1					A-B		1	2			A-B	1			1		A-F				1	2
20	Flierl	Seanna	B-D				1	2	A-A		2	1			A-B	1			1		A-D	1			2	
21	Geeth	Gregory	C-B				1		D-B			2		1	A-C	1			2		C-D				1	2
22	Geertz	Suzie	D-A	2				1	A-C		1			2	C-A	2			1		A-C	1			2	
23	Griffith	Colleen	B-D				1		A-A		2	1			A-C	1			2		A-C			1	2	
24	Irishy	Sally	C-B				1		B-D			1		2	C-B			1	2		C-D				1	2
25	Kushong	Joni	B-C				1	2	D-B			1			D-B			1		1	A-C			1	2	
26	Quaden	Keri	B-A				1		A-D		1				C-A			1			A-C				1	2
27	Harriston	Nick	C-B				1		A-B		1	2			C-A	2			1		C-B		2		1	
28	Harrington	Brandee	B-A	2	1				A-D		1			2	C-A	2			1		A-C			1	2	
29	Hod	Greta	C-B				1		C-B			2		1	D-C				2	1	A-C				2	1
30	Hod	Naris	C-B				1		C-B			2		1	D-C				2	1	A-C				2	1
31	Hoglund	Dick	C-R				1		A-A		2	1			A-B	1			2		C-D				1	2
32	Isaacson	Monika	A-B	1	2				A-B		1	1			A-C			1	2		A-A		1		2	
33	Isa	Jan	B-D				1		A-D		1			2	A-A			1			A-C		1		2	
34	Jurek	Christy	B-D				1		A-B		1	2			C-A			1		2	C-B			1	2	
35	Itinich	Frank	A-D	1				2	A-D		1			2	A-C	1			2		A-C	1			2	
36	Johnson	Nate	C-B				1		A-D		1			2	A-B	1			2		A-C			1	2	
37	Johnson	Sally	C-B				1		A-D		1			2	A-B	1			2		A-C			1	2	
38	Kedzowski	Jim	D-B				1		A-C		1			2	A-C				1		C-B			1	2	
39	Kepner	Red	C-B				1		A-A		1	2			A-B	1			3		A-B		1	2		
40	Kuzina	Ann	C-B				1		A-B		1	1			A-B	1			1		C-A				1	
41	Kuyper	Deanna	C-B				1		A-B		1	2			A-C			1	2		C-A				1	
42	Kuyper	Ernie	D-B				1		A-C			1		2	C-D				1	2	C-B			1	2	
43	Koenig	Kathy	D-C				1		A-C		1			2	C-D				1	2	A-C	1			2	
44	Koenig	Pat	B-D				1		A-B		1	2			A-C			1	2		C-D				1	2
45	Kozi	Tim	A-B	1	2				A-D			1			A-C			1	2		A-D	1				2
46	Kotick	Kath	B-A	2	1				A-D		1			2	A-B				1	1	C-B		2		1	2
47	Kuzina	Kary	D-B				1		A-C				2	1	C-B				1	2	C-D				1	2

# University of Minnesota Duluth

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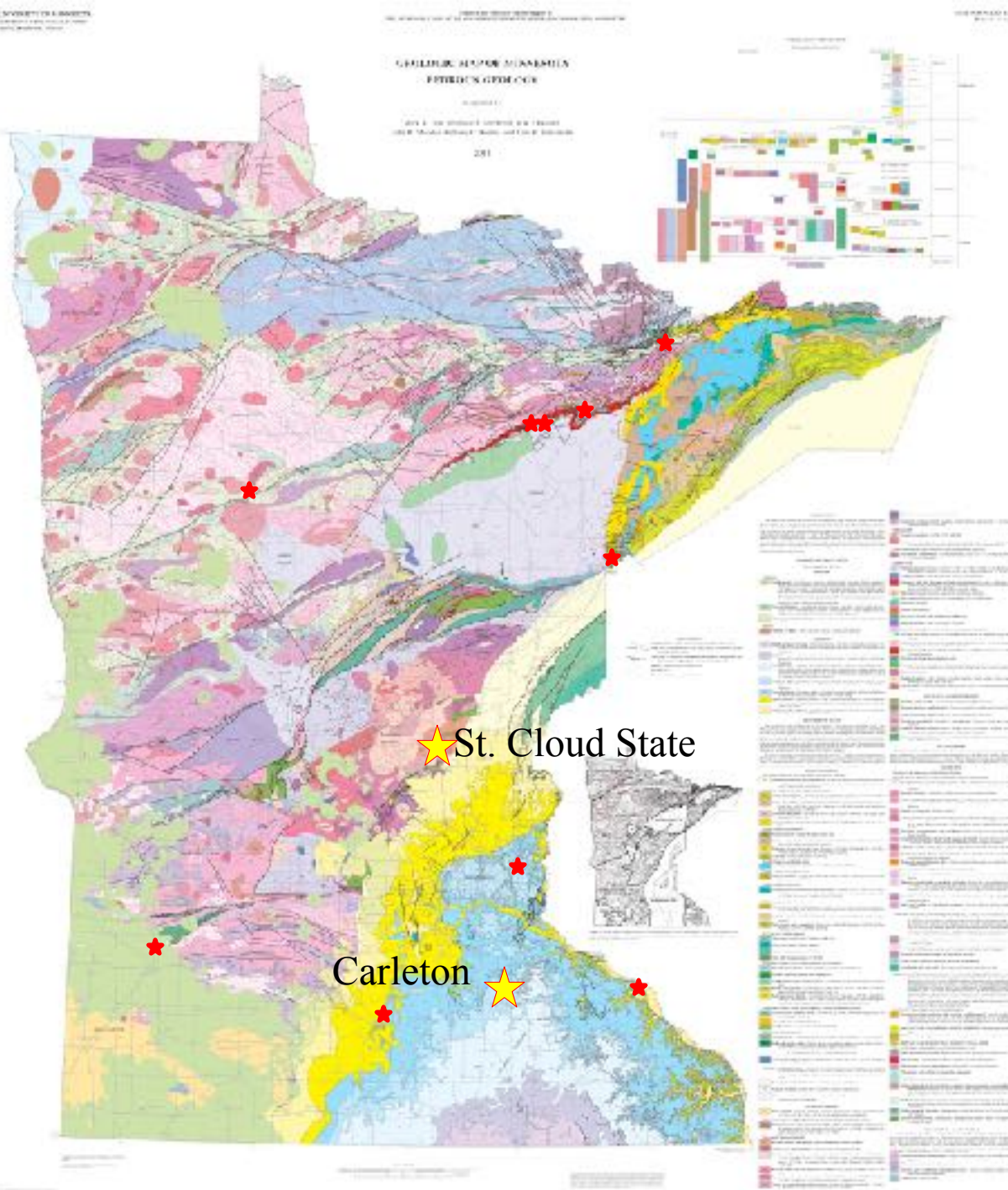
# 2015 Evaluation Surveys

Survey Monkey - on-line survey

Will E-mail to participants  
Tonight

Upon receipt of completed  
surveys, participation certificates  
will be e-mailed

DULUTH 2015



2016  
MMEW?

MGS State Map S-21  
Jirsa et al. (2011)

Housekeeping

Wi-Fi – UMD-Guest-Wireless

Restrooms

Questions?