



# The Maine Geologist

NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MAINE

October 2023

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## PRESIDENT'S MESSAGE

Greetings GSM Members and Happy Fall! I hope everyone had an enjoyable summer despite the persistent rain. Thank you to all the organizers and participants of this summer's GSM field trip. In case you were unable to attend, like myself, you'll find a trip summary within this newsletter. It is never too early to start thinking about where next year's field trip will be held. I heard rumor of another possible trip to the coast? I encourage members to voice their recommendations.

Fall is off to a busy start for me personally as I am in the final push to install a temporary exhibit about Lithium at the MMGM that I've been developing for the past three years. The exhibit will introduce visitors to the element, showcase some of the 123 minerals in which it is an essential component, highlight where it is extracted economically around the world, and shed light on the complex global supply chain that has developed to produce lithium-ion batteries. It's a timely topic, and I hope members will get an opportunity to view the installation. It's planned to remain in place for about three years.

Another personal aside, but still related to geology, my colleague at Lithium Americas supplied me with some actual salar brine from the evaporation ponds at their Cauchari-Olaroz location in Argentina. During the summer, my daughter and I tried evaporating the liquid with much success. We were able to grow some fairly large halite crystals from the evaporating brine liquid. Cool stuff! See the pictures to the right.

I'm looking forward to this year's fall meeting focusing on the PFAS situation in Maine. We have a great slate of speakers lined up that will illuminate us on the status of this issue and how it is being handled in our state (see the list of presenters within this

newsletter). This year we will resume the typical in-person style meeting to which we are accustomed, with a social hour planned after the presentations. I know it can be difficult for students (and professors) to take an afternoon of classes off, but we hope professors might encourage their students to join us for the meeting. I owe a big thanks to our EC members for helping to organize this year's meeting!

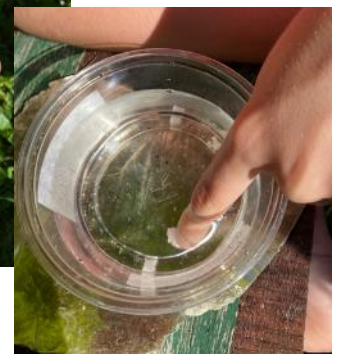
Looking ahead to spring, Bowdoin College has graciously agreed to host our annual spring meeting. I hope we will see strong student participation and that professors will encourage their students to develop a poster or oral presentation to showcase their work. It's a great follow-up for those students already participating in NEGSA.

Best Regards,  
Myles Felch

President, GSM

Curator, Maine Mineral & Gem Museum

[mfelch@mainemineralmuseum.org](mailto:mfelch@mainemineralmuseum.org)



## NEWS FROM THE STATE GEOLOGIST

The Maine Geological Survey is wrapping up another field season of impressive surficial and bedrock mapping with USGS support through the STATEMAP program. This effort is a collaboration with academic and “retired” geologists. This winter, the MGS will produce new maps with accompanying Level-3 compliant GeMS databases which will be released on the MGS website in spring 2024.

The collaborative field program worked across Maine with many partners. Lindsay Theis (MGS) and Patti Millette (Mount Blue H.S.) focused on surficial geologic mapping in the Farmington Falls 24K quadrangle. Extra work was done in the Wilton quadrangle, but excessive rainfall and flash flooding in June led to extensive road washouts that unfortunately limited access all summer. Bedrock mapping in the Lincoln 100K area by Allan Ludman (Queens College, CUNY emeritus) benefited from new igneous and zircon geochronology. This region was also the focus of the GSM Summer 2023 field trip led by Allan Ludman and Steve Pollock (USM emeritus) and related three terranes across a critical part of central Maine. In northern Maine, Chunzeng Wang (UM-Presque Isle) completed work on the Spider Lake 24K bedrock map. In central Maine, Amber Whittaker (MGS) mapped bedrock in the Lake Auburn East 24K quadrangle. The complex bedrock of Islesboro Island (Islesboro 24K quadrangle) was mapped by a team consisting of Justin Strauss (Dartmouth), Doug Reusch (UM-Farmington), Taury Smith (consulting geologist), and graduate student Luis Torres (Dartmouth). Dyk Eusden (Bates College emeritus) mapped bedrock in parts of the Friendship and Monhegan 24K quadrangles in the mid-coast. In southern Maine, Dave West (Middlebury College) mapped bedrock in the Limerick 24K quadrangle. In total, there are nine maps in production to add to the 353 existing geologic maps available from the MGS.

Separate funding from the USGS through the Earth MRI program supports a three-year bedrock investigation into manganese-bearing rocks in eastern Aroostook County. This project is led by Amber Whittaker and includes UM-Orono graduate work by Lauren Madsen, isotope work in Alicia

Cruz-Uribe’s lab, and mapping by Chunzeng Wang with field and lab assistance from UM-Presque Isle students. Additional laboratory and geochronology work has been done through the University of Arizona and Chronosurveys (Portugal) as well as USGS laboratories.

With one-time funding from the Maine Legislature, the MGS was able to purchase 16 water level sensors to help expand the National Groundwater Monitoring Network. Ryan Gordon and new MGS hydrogeologist Jessica Meeks began to install equipment in wells this summer. Six of the sensors will also collect salinity data to study saltwater intrusion from sea level rise. In collaboration with Colby College, a coastal well was instrumented on Benner Island five miles south of Port Clyde in the Gulf of Maine. Water levels and salinity are telemetered ashore daily and will be archived and released by the MGS. Flash droughts in recent years and the excessively wet June, July, and August in the summer of 2023 show hydrologic cycle variability and the need to better understand its impacts on groundwater.

Sea-level rise, storm erosion, and flooding continue to be a focus area at the MGS. Peter Slovinsky maintains a sea level rise dashboard on the MGS website with monthly updates of verified tide levels. For most of 2023, tides have been well above the 110-year average in Portland. June, July, and August all set records along the five Maine tide gauges. In June, tides were running nine inches above the 1912-2022 average. Over the last 30 years, the rate of sea level rise has increased by 80% to 3.5 mm/year (1.16 ft/century). Sierra Guite (Colby College) worked as the MGS coastal geology intern and mapped all the large sand beaches, and her shoreline change data are already posted on the MGS website. She also began an analysis of sand elevations in front of seawalls to better understand their influence on beach profiles. In August, Nicholas Whiteman joined the MGS as a marine geologist and will address multiple issues such as shoreline restoration, beach nourishment, harbor dredging, coastal development, and hazard assessments.

Through an initiative started by former State Geologist Robert Marvinney, Henry Berry and Chris Halsted of the MGS led a collaborative effort with geologists across New England with cooperative funding from the USGS (thank you Greg Walsh and others). The New England States Geologic Mapping Coalition (six keywords to search) posts ongoing efforts to identify stratigraphic problems across the states and to prioritize future research and mapping needs. Bedrock in the northeast is nothing short of complex. Over 200 years of investigations have resulted in the need to unify units, reconcile contacts, and understand metamorphism and deformation in three dimensions that evolved over hundreds of millions of years. To grapple with that complexity, Chris Halsted built a web application that allows efficient collaboration and data sharing, and may serve as a model for addressing other complex synthesis work in the geosciences. Collaborators include Amber Whittaker (MGS); Ben DeJong, Jon Kim, and Peter Strand (VT); Shane Csiki, Josh Keeley, and Jean Schwab (NH); Steve Mabee, Serena Dameron, and Ian Hillenbrand (MA); Megan Seremet and Rebekah Kennedy (CT); and regional all-stars Wally Bothner, Chris Hepburn, Bob Marvinney, Dan Murray, Peter Thompson, and Bob Wintsch.

The Maine Climate Council has resumed its work in earnest. You can follow multiple concurrent tracks of work and find opportunities to participate and contribute through their website. The Scientific and Technical Subcommittee is summarizing the most recent climate change science relevant to Maine. The Equity Subcommittee is engaging a broad audience of stakeholders across all topics including many who had less opportunity to participate in the last round. Six Working Groups cover (a) transportation, (b) natural and working lands, (c) coastal and marine, (d) buildings, infrastructure, and housing, (e) energy, and (f) community resilience planning, public health, and emergency management. The [Maine Climate Science Dashboard](#) is a source of more data and trends as is the Maine Climate Office.

In closing, there is a lot of collaboration happening to bring relevant geology and related sciences to the people of Maine and beyond. To the young, early-career geoscientists – there is much

more to map, describe, and discover. I am particularly grateful for the work of many senior geoscientists who continue to contribute expertise to create a better understanding of Maine geology. Thank you.

Stephen M. Dickson, Ph.D.  
State Geologist

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## NEWS FROM THE CAMPUSES

### University of Maine at Presque Isle

#### NEIGC Recap

During October 6-8, the University of Maine at Presque Isle (UMPI) hosted [NEIGC 2023](#), organized by Chunzeng Wang of UMPI and David Lentz of the University of New Brunswick (UNB). The theme was *The Geology, Tectonic Evolution, Critical Minerals, and Glaciation of the Appalachians in Northern Maine and Western New Brunswick* with trip topics covering bedrock, economic (with abundant focus on critical minerals), and quaternary geology. There were 12 trips in total, with three in western New Brunswick and nine in northern Maine, making the conference an international event. Trip leaders included Allan Ludman of Queens College; Leah Page of Wolfden Resources; Bryan Way of Canadian Manganese Company; David Lentz and Fazilat Yousefi of UNB; Kathleen Thorne, Leslie Fyffe, and James Walke of the New Brunswick Geological Survey; Aaron Putnam and Lauren Madsen of the University of Maine-Orono; Chunzeng Wang and David Putnam of UMPI; Robert Marvinney, Lindsay Theis, and Robert Johnston of the Maine Geological Survey; and Adam Schoonmaker of Utica University.

The NEIGC 2023 was dedicated to Dr. Gary Boone and Dr. Robert Marvinney. The event also honored three other groundbreaking geologists who have made significant contributions to the study of geology in northern Maine: Bill Forbes, Brad Hall, and David Roy. Dr. Boone, who passed away on August 1, was a pioneering geologist for northern Maine. He conducted bedrock mapping in the Deboullie and Fish River Lake areas in the early

1950s while a doctorate student at Yale. When he was a professor of geology at Syracuse University, he would spend his summers as a research geologist with the Maine Geological Survey, and in 1985, he became one of three editors for the Bedrock Geologic Map of Maine.

Dr. Marvinney, one of Dr. Boone's doctorate students at Syracuse, served for 34 years with the Maine Geological Survey, 26 of those years as the Maine State Geologist. He also served as Director of the Bureau of Resources and Land Use Planning. In recent years, Dr. Marvinney played a critical leadership role in the USGS-funded STATEMAP and Earth MRI bedrock geologic mapping and airborne geophysical survey projects in northern Maine. That work has led to breakthroughs in the study of Maine Northern Appalachian geology and tectonics, and the critical mineral resource discovery at Pennington Mountain.

More than 175 participants came from all over the U.S. and Canada - as far as Alberta, Oregon, and Montana, though mostly from New England and the Maritime Provinces. More than half of the attendees were college graduate and undergraduate students. The largest trip was B3 to the areas of Portage, Fish River Lake, Winterville, and Pennington Mountain, with 70 participants!

Chunzeng Wang



*Trip A3 to the Woodstock area (led by Bryan Way; photo courtesy of Saeid Baghban).*



*Trip A4 to the Munsungun inlier (led by Chunzeng Wang; photo courtesy of Chunzeng Wang).*



*Trip A1 to the Greenfield area (led by Allan Ludman; photo courtesy of Lindsay Theis).*



*Trip B2 to the Deboullie Lakes Public Reserved Land (led by Aaron and Dave Putnam; photo courtesy of Julia Daly).*



*Trip B3 to the Pennington Mountain area (led by Chunzeng Wang; photo courtesy of Chunzeng Wang).*



*Saturday evening banquet at UMPI with dedication to northern Maine geologists.*



*Trip B4 to the South Branch Ponds and North Traveler Mountain area (led by Bob Johnston and Lindsay Theis; photo courtesy of Amber Whittaker).*



*Trip C4 to the Maple-Hovey manganese deposit (led by Chunzeng Wang and Lauren Madsen; photo courtesy of Chunzeng Wang).*

### **Unity Environmental University, Hybrid Learning**

As of July 1<sup>st</sup>, 2023, Unity College officially became Unity Environmental University in recognition of the growing enrollment and graduate programs in the Distance Education arm of the enterprise. Our in-person programs and courses will continue, as before, and we recently welcomed students back to the Unity campus after the summer break.

In mid-September, four students (Madeliene Wallace, Julian Gonzalez, Ryan Joyce, and Alex Sheehan) led a project at the Unity campus to collect hourly rainfall samples from post-tropical cyclone Lee as it swept through on the 16<sup>th</sup> (photos on next page). Ultimately, they experienced more wind than rain but nevertheless worked across a 24-hour period to obtain plenty of samples. The group will be taking their samples up to the Stable Isotope Laboratory at the University of Maine at Orono at the end of October for analysis. Best wishes from Unity!

Tom Whittaker



*Madeliene and Julian measuring the volume of an hourly rainfall sample.*



*The whole crew (left to right): Alex, Madeliene, Ryan, and Julian.*

## THE EDITOR'S MESSAGE

The newsletter is distributed through email in PDF format. Anyone with special needs should contact the Editor. Please send items of interest and photographs of GSM activities to:

Lindsay Theis, Newsletter Editor  
[lindsay.theis@maine.gov](mailto:lindsay.theis@maine.gov)

**GSM WEBSITE:** [www.gsmmaine.org](http://www.gsmmaine.org)  
**FACEBOOK:** [facebook.com/GSMMaine](https://facebook.com/GSMMaine)

## GSM FALL MEETING

**November 17, 2023, Augusta Civic Center**

The GSM fall meeting will return to its traditional location at the Augusta Civic Center. This year the timely theme will be **PFAS in Maine**, with a range of talks covering the basics of PFAS, research, remediation, and social impacts. The business meeting will begin at 1 pm, followed by talks from 2-5 pm, and social hour from 5-6 pm.

### Schedule:

11:30 am – 12 pm: Setup  
12 - 1 pm: Executive Council Meeting  
1 – 1:30 pm: GSM Business Meeting  
1:30 – 2 pm: Announcements and opening remarks  
2 – 5 pm: Invited Presentations  
5 – 6 pm: Social Hour

### Tentative Speakers and Presentation Titles (Order TBD):

**Louise Roy**, DEP Environmental Hydrogeology Specialist: *PFAS Introduction/primer and the fate and transport of PFAS in soil and groundwater*

**Molly King**, DEP Division Director, Technical Services: *DEP recent initiatives and legislation regarding PFAS*

**Dan Nessly**, DEP Environmental Hydrogeologist: *The behavior of PFAS in soil*

**Chris Evans**, DEP Sr. Environmental Hydrogeologist: *DEP PFAS leaching study and research*

**Meagan Hennessey**, DACF PFAS Response Program Director: *Maine's Approach to Addressing PFAS in Agriculture*

**Beth Valentine**, DACF PFAS Fund Director: *Goals of the PFAS Fund: direct support, land purchases, research, and health initiatives*

## GSM SUMMER TRIP RECAP

The 2023 GSM summer field trip was held on Saturday and Sunday, July 22-23, with ideal weather and an enthusiastic group of about 30 professional geologists, academics, graduate students, and high school teachers. Allan Ludman led the Saturday trip, focusing on pre-Silurian volcanic rocks of the Cambro-Ordovician Miramichi terrane in the Greenfield area. Stephen Pollock led the Sunday trip through the Bangor area, describing the latest stratigraphic and structural interpretations of local Central Maine basin Silurian stratigraphy. The group gathered Saturday evening for a picnic dinner at the Old Town Riverfront Park Gazebo, fueled by sandwiches from a local Orono deli, and filled with camaraderie and lively conversations. Many thanks to Allan and Steve for leading this trip and sharing your decades of knowledge.



*GSM summer field trip group (photo courtesy of Henry Berry).*

backs up Lake Powell. The trip ends 188 miles and seven days later at Whitmore Wash, where we will be evacuated by helicopter to the Bar-10 Ranch and airstrip. From there, small commuter planes return us to Marble Canyon near Lee's Ferry or to Las Vegas.

While the primary focus of the trip is the unparalleled opportunity to learn about the geology of the Grand Canyon from the early Proterozoic to the Holocene including a 1.2 billion-year gap in the Proterozoic record called the "Great Unconformity," there is more than geology to enjoy: side canyons with waterfalls, anthropological sites, wild life including condors, desert Bighorn sheep, bold ravens, dark skies, brilliant stars, and a chance to be out of range of cell towers for a few days. Emergency communication is only available with satellite phones carried by the boatmen.

The outfitter we use is Hatch River Expeditions, one of the oldest of the 16 companies licensed to raft through Grand Canyon National Park. They provide everything for the trip including sleeping bags, sheets, pillows, cots, folding chairs and great food. Something different is prepared for dinner by the three boatmen each day. In short, this is a luxury trip which also includes many rapids. Most are small to medium but there are a few exciting "big ones" as the many Maine geologists who have made this trip in the past will attest. If interested in going next summer, contact either Fred Beck ([fmbeck@fmbeck.net](mailto:fmbeck@fmbeck.net)) or Alison Jones ([ajones@geo-logic.com](mailto:ajones@geo-logic.com)). We will send you further details, including travel options, costs, reading materials, etc.

Fred Beck and Alison Jones

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## GRAND CANYON RAFTING TRIP 2024

Once again, Alison Jones and Fred Beck will be organizing and leading a trip down the Colorado River through the Grand Canyon. This trip will be for seven days over July 8-14, 2024. Fred and Alison have been hosting this trip since 2008, missing only a few years due to Covid or other obligations. The "rafts" used are two 34-foot inflatable boats powered by 30-HP outboards which are used for locomotion in the flat-water areas and steering in the rapids. The trip begins at Lee's Ferry, about 15 miles downstream from the Glen Canyon Dam which



*Grand Canyon South Rim (photo: MGS archives).*

## SECRETARY'S REPORT

The GSM held no formal business meeting since the last Secretary's Report, provided in June 2023. There are no minutes to report at this time.

The Executive Council (EC) met by Zoom in September 2023 to discuss plans for the 2023 fall meeting, EC nominations for 2023, and the 2024 spring meeting.

The next GSM business meeting will be held during our fall meeting, November 17, 2023.

### Geological Society of Maine Executive Council Meeting Minutes

September 8, 2023 10:00 am via Zoom

Executive Council Members present: Myles Felch, Chris Halstead, Lisa Jacob, Lindsay Theis

Unable to attend: Rich Campbell, Sarah Hall, Bruce Hunter, Joe Kelley, Keith Taylor

1. Welcome to all, and welcome Chris Halstead to the EC.
2. Fall meeting planning
  - a. Date options: Thursday 11/9, Friday 11/17, Thursday 11/16.
  - b. Myles will check in with Bruce to see about Civic Center availability.
  - c. Topic – PFAS
    - i. Policy, cleanup considerations, case study, remediation technologies.
    - ii. BDN reporter coverage – overview from journalist perspective on PFAS in the state.
    - iii. Possible speakers: Molly King, Luis Roy, Dan Nestle.
  - d. Myles will send email to EC with the general plan for day (number of speakers, in-person format), call for ideas for topics/speakers.
  - e. We will need to share planning and coordination tasks for the fall meeting.
3. Fall newsletter

a. Timing for delivery about one month ahead of the fall meeting.

b. Content

- i. Field trip recap.
- ii. Fall meeting information.
- iii. Standard content (GSM President letter, State Geologist message, Treasurer and Secretary reports, campus news).
- iv. 2024 meetings

4. EC recruiting for fall meeting elections: We should consider possible candidates to fill two Councilor positions (one 2-year and one 3-year term).
5. 2024 spring meeting will be held at Bowdoin.
6. Bruce and Chris have been in communication about the membership management platform on GSM website, more to follow on this.
7. It would be good to have a way to clean up the email list and transition some of the functions that Bruce has been handling during his years as Treasurer.

Respectfully submitted,

Lisa Jacob, Secretary  
ljj@smemaine.com  
207-829-5016



Howe Brook, Baxter State Park (photo: Lindsay Theis).



**TREASURER'S REPORT**

**August 1, 2022 to July 31, 2023**

**Actual**

**Income:**

Dues Paid	\$4,230.00
Donations received by the Anderson Fund	\$600.00
Donations received by the Kevin McCartney Fund	\$1,325.00
Summer Field Trip Registrations	\$330.00

**Subtotal: \$6,485.00**

**Expenses:**

*Meeting Expenses*

Fall Meeting	-\$1,254.00
Spring Meeting Student Awards	-\$100.00
Summer Field Trip	-\$1,296.80

*Awards for Field Trips and Research*

Research-Central Maine Basin-Piper Kramer	-\$1,000.00
Research-Geochemistry Plumbago	-\$1,000.00
North Lithium Deposit-Will Robert Assistance to Patti Millette to bus her students to the Spring Meeting	-\$660.00

*GSM Website*

Annual hosting plan cost	-\$280.40
Online payment processing costs	-\$531.56

**Subtotal: -\$6,122.76**

**Net Increase: \$362.24**

**Annual Asset Summary July 31, 2023**

Account	Sub-Account	July 31, 2023
<b>General Fund</b>	<b>Maine State Credit Union</b>	
	Business Savings	\$26.84
	Checking	\$5,576.19
	<b>Sub-Total:</b>	<b>\$5,603.03</b>
<b>EAPD fund (previously the Anderson Fund)</b>	<b>Bath Savings Trust</b>	
	Managed Account	\$39,435.09
	<b>Sub-Total:</b>	<b>\$39,435.09</b>
<b>Kevin McCartney Fund</b>	<b>Maine State Credit Union</b>	
	Business Savings	\$1,320.49
	13-month CD 5.250 %	\$14,786.80
	<b>Sub-Total:</b>	<b>\$16,107.49</b>
<b>All Funds:</b>	<b>Total Assets:</b>	<b>\$61,145.61</b>

Respectfully submitted,  
Bruce E. Hunter, Treasurer

## UPCOMING EVENTS

<u>Date</u>	<u>Event</u>	<u>Location</u>	<u>Organizer</u>
November 17, 2023	GSM Fall Meeting: PFAS in Maine	Augusta Civic Center	GSM
December 11-15, 2023	<a href="#">American Geophysical Union Annual Meeting</a>	San Francisco, CA	American Geophysical Union
March 17-19, 2024	<a href="#">Northeast Section of the Geological Society of America Meeting</a>	Manchester, NH	Geological Society of America
March/April (TBD) 2024	GSM Spring Meeting	Bowdoin College	GSM
July 8-14, 2024	Grand Canyon Rafting Trip	Lee's Ferry, AZ	Fred Beck and Alison Jones

Please submit events to include on the calendar to the Newsletter Editor: [lindsay.theis@maine.gov](mailto:lindsay.theis@maine.gov)

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<https://www.gsmmaine.org/join-gsm/>

**If you do not already have a membership account, click on the Membership Form button on the above page to get started.**