



Granite State Geologist

The Newsletter of the Geological Society of New Hampshire,
Fall Edition – September 2016 – Issue No. 94

Newsletter Editor: Wayne.Ives@des.nh.gov

Website: <http://www.gsnh.org/>

2014-2016 GSNH Officers:

President – Wayne Ives
NHDES, Concord, NH
Wayne.Ives@des.nh.gov

Vice President - Council – Tom Fargo
Thomas.Fargo@des.nh.gov

Vice President – Society - Thor Smith
US Geological Survey, Pembroke, NH
tesmith@usgs.gov

Secretary – Lea Anne Atwell
LeaAnne.Atwell@des.nh.gov

Treasurer – Bill Abrahams-Dematte
AECOM, Wilton, NH
geosocnh@gmail.com

Past-President – Julie Spencer
AECOM, Chelmsford, MA
julie.spencer@comcast.net

Member-at-Large - Doug Allen
Haley & Aldrich, Inc., Bedford, NH
dallen@HaleyAldrich.com

Member-at-Large -Erin Kirby,
Geosyntec Consultants, Inc., Bedford,
NH
EKirby@Geosyntec.com

Member-at-Large – Abby Fopiano -
Epping Well & Pump, Epping, NH
abby@eppingwell.com

Membership - Doug Allen
Haley and Aldrich, Bedford, NH
dallen@HaleyAldrich.com

Education and Outreach
Tina Cotton – jtcotton80@gmail.com
Lee Wilder - geology@des.nh.gov

Elections / Nominations
Abby Fopiano - abby@eppingwell.com
Thor Smith - tesmith@usgs.gov

Website webmaster@gsnh.org
Abby Fopiano - abby@eppingwell.com

Newsletter Editor
Wayne Ives
Wayne.Ives@des.nh.gov

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MESSAGE FROM THE PRESIDENT

First I want to thank the people who coordinated and lead this summer's field trip up Mount Washington including Lee Wilder, Lea Anne Atwell, P. Thom Davis, Brian Fowler, Dyk Eusden and the folks at the Mt. Washington Auto Road and the Mt. Washington Observatory. There are some pictures later for anyone who missed it. The trip was well attended and the participants were well fed. That's what I call a successful trip.

Additional thanks should be extend from each of us for the years of service to the Society by Lea Ann Atwell, who is stepping down after two terms as a member of the Society's Board of Directors and Board Secretary. Lea Ann presence, insights and service will be missed at future Board meetings.

That's a fitting segue into the elections at this year's Annual Meeting as part of the October dinner meeting. The candidates biographies are posted inside. There will be some new faces and some old faces on the next board. If you want to vote, or just want to attend the next dinner meeting—pay attention now!

The usual meeting night is changed to Wednesday, October 12. (No, it's not just to see if you read this newsletter.) The Wednesday meeting will avoid crimping travel schedules for those who plan to attend the 2016 NEIGC meeting in Maine Friday morning. (NEIGC will be October 14-16 and registration deadline is September 27.) With the earlier meeting night, it is even more important that you make your reservation on time—or even a little early to help us plan enough meals and seats. The meeting will be at Makris in Concord. A little news about reservations: The Board is looking into the benefits and disadvantages of an electronic reservation service that would allow credit card payments and electronic receipts for dinner meetings.

Finally, with the extended drought conditions in NH, I hope you are listening to that famous television personality and Society member, Abby Fopiano, who recommended on WMUR Channel 9 that we conserve water by limiting irrigation and that we not take our water availability for granted.

GOLD NUGGET WEIGHING MORE THAN 4KG FOUND IN CENTRAL VICTORIA

25 Aug 2016 - A lucky prospector, who has chosen to remain anonymous, said he found the nugget 12 inches below the ground. "I thought it was rubbish at first, maybe an old horseshoe," he said.

"As I began to scrape away the clay and dig deeper, I really couldn't believe my eyes. It's like catching a big fish and not knowing what to do with it. Where do we put it? I washed it in water, covered it in aluminum foil and kept it in my oven on the first night." The man said he planned to buy a van and travel around Australia.



According to metal detecting manufacturer Minelab, the discovery was made in a worked-over area on the southern edge of central Victoria's Golden Triangle. The 145-ounce nugget could be worth up to \$250,000. Minelab said the prospector, who has used his weekends to search for gold and coins for the past 10 years, found a a nine-ounce tennis ball-shaped nugget more than 60 centimetres deep just the day before. The well-seasoned prospector went back for more. <http://www.abc.net.au/news/2016-08-25/gold-nugget-weighing-more-than-4kg-found-in-central-victoria/7785204>

Another large gold nugget was found in 2012 by three men when they were prospecting along the side of the road near Ballarat [southeast Australia] and weighing more than 3.5 kilograms was sold for \$292,800 at auction in 2014. . Harry Glenn, the auctioneer who conducted the sale, said "There aren't many gold nugget specimens this size like this left anymore."

www.abc.net.au/news/2014-11-06/destiny-gold-nugget-goes-under-the-hammer-auction/5870670 [Well, there was as least one more. –Ed.]



WHAT IS YOUR BOARD DOING? By Lea Anne Atwell

On September 8th, Doug Allen hosted the quarterly Board meeting at the Haley & Aldrich offices in Bedford, NH. Key items discussed included:

We had a great turn out at the summer field trip, with over 50 people in attendance. Many thanks to Brian Fowler and Lee Wilder for organizing the trip; Thom Davis, Dykstra Eusden, and Brian Fowler for sharing their knowledge of the local geology; and the Mount Washington Observatory for hosting us!

We have GSNH t-shirts left and will be setting up a system for mail-ordering shirts via the webpage (or the newsletter form.) Stay tuned for details. T-shirts are \$18 each and can also be purchased at our upcoming dinner meeting in October.

We have Nick MacDonald, author and teacher, presenting on Fossils of the Connecticut Valley at the October dinner meeting. He has been collecting fossils for 40 years and found many specimens in the Jurassic formations of central Connecticut and Massachusetts.

We discussed a plan for setting up an online reservation and payment system for dinner meetings and field trips. The advantages include being able to pay with a credit card, getting a receipt immediately upon payment, easier tracking of reservations, and hopefully a smoother check-in process at the door. The disadvantage is that the system would likely cost us money. We are evaluating options and will be discussing this idea at upcoming BOD meetings. We'd love to hear your thoughts!

BOD elections are coming up in October, and we have a full slate of candidates. Write-in candidates are also welcome.

We are compiling an interactive, web-based map of interesting NH geological locales. We will be developing mini reports for a variety of sites. Please let us know if you have a spot we should include.

Our next meeting will be on Thursday, December 8, 2016 at the DES offices in Concord, NH. All members are welcome to attend our meetings. Please let a Board member know if there is something you would like added to our agenda!

DATES TO REMEMBER

October 12, 2016 – GSNH Fall Dinner Meeting – TBA – This meeting will be held on **WEDNESDAY** night so you can make it to NEIGC Friday am. <http://www.gsnh.org/>

October 14-16, 2016 – NEIGC - New England Intercollegiate Geological Conference - Geology of the Maine Coast from Maquoit Bay to Muscongus Bay
<http://w3.salemstate.edu/~lhanson/NEIGC/Conference.html>

November 19th & 20th, 2016 Worcester Mineral Club Annual Show at the National Guard Armory, 701 Lincoln Street, Worcester, MA. Open Saturday 10AM to 5PM and Sunday 10AM to 4PM <http://worcestermineralclub.org/annual-show/>

November 12-15, 2017 - Mount Washington Observatory Regional Climate Science Colloquium – Bringing together climate scientists and related educators to assess the status of climate science investigations and education. Keep an eye out.

THANKS TO THE SEE SCIENCE CENTER OF MANCHESTER

GSNH wishes to thank Adele Maurier and the SEE Science Center for their generous donation of their collection of minerals. Also, Lee Wilder who made the connection to pick up the box loads of minerals—we all know how much fun it is moving boxes of rocks, don't we? The Society will include some of these minerals in upcoming raffles that support Society programs. The SEE Science Center has many hands-on exhibits and the largest permanent LEGO installation in the world. The SEE Science Center is located at 200 Bedford St, Manchester, NH 03101 and can be found online at <https://www.see-sciencecenter.org/>.

THE WORLD'S DISAPPEARING SAND By Vince Beiser - June 23, 2016

http://www.nytimes.com/2016/06/23/opinion/the-worlds-disappearing-sand.html?_r=1

Most Westerners facing criminal charges in Cambodia would be thanking their lucky stars at finding themselves safe in another country. But Alejandro Gonzalez-Davidson, who is half British and half Spanish, is pleading with the Phnom Penh government to allow him back to stand trial along with three Cambodian colleagues. They've been charged, essentially, with interfering with the harvesting of one of the 21st century's most valuable resources: sand.

Believe it or not, we use more of this natural resource than any other except water and air. Sand is the thing modern cities are made of. Pretty much every apartment block, office tower and shopping mall from Beijing to Lagos, Nigeria, is made at least partly with concrete, which is basically just sand and gravel stuck together with cement. Every yard of asphalt road that connects all those buildings is also made with sand. So is every window in every one of those buildings. **Sand is the essential ingredient that makes modern life possible. And we are starting to run out.**



Beach sand mining in Sierra Leone.

That's mainly because the number and size of cities is exploding, especially in the developing world. Every year there are more people on the planet, and every year more of them move to cities. Since 1950, the world's urban population has ballooned to over 3.9 billion from 746 million.

According to the United Nations Environment Program, in 2012 alone the world used enough concrete to build a wall 89 feet high and 89 feet wide around the Equator. From 2011 to 2013, China used more cement than the United States used in the entire 20th century.

We can make more sand, but crushing rock or pulverizing concrete is costly, and the resulting sand is ill suited for many applications. We can use alternative substances for some purposes, but what other substance can we possibly find 40 billion tons of, every year?

It once seemed as if the planet had such boundless supplies of oil, water, trees and land that we didn't need to worry about them. But of course, we're learning the hard way that none of those things are infinite, and the price we've paid so far for using them is going up fast. We're having to conserve, reuse, find alternatives for and generally get smarter about how we use those natural resources. That's how we need to start thinking about sand.

More at http://na.unep.net/geas/getUNEPPPageWithArticleIDScript.php?article_id=110.

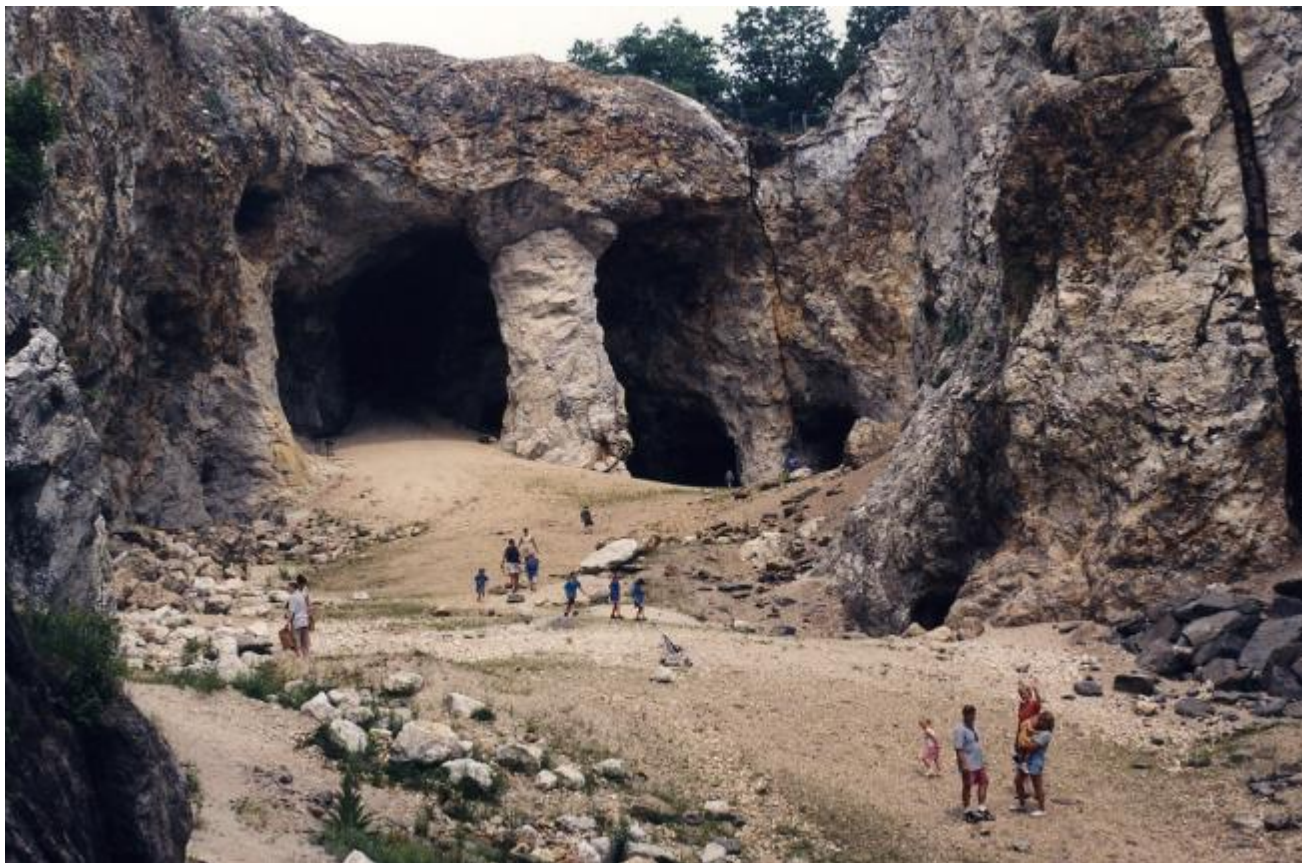
OLD N.H. MICA MINE, NOW A TOURIST ATTRACTION, FOR SALE BY Holly Ramer

The Associated Press <http://www.pressherald.com/2016/06/11/old-n-h-mica-mine-now-a-tourist-attraction-for-sale/>

GRAFTON, N.H. — It's a mine, but it could be yours for \$2 million. Ruggles Mine, which produced mica and other minerals for 160 years before being turned into a New England tourist attraction in 1963, is up for sale. The 235-acre property in Grafton is the oldest and largest mine of its kind in the U.S. The property includes a gift shop, small museum and an enormous pit with tunnels and caverns that make up the oldest and largest mine of its kind in the United States.

"It's quite spectacular when you drive up that country road and there's nothing but trees all around. And you get to the top of this mountain, and there's a magnificent view," said the mine's 90-year-old owner, Geraldine Searles. "Walking down into this massive rock formation that you could walk right through — it was thrilling."

Searles' late husband purchased the New Hampshire property in 1960 for \$20,000, hoping to continue the mica mining operation. But after the federal government stopped subsidizing the industry, leaving domestic mines unable to compete with the overseas market, the couple decided to open the property to the public.



Since then, a steady stream of school groups and tourists from around the world have paid admission to poke around and collect as many rocks as they can carry. While adults often saw "just plain old rocks," the children were quite knowledgeable, Searles said. "They were well taught in school and they have a great curiosity, naturally, and this is a wonderful spot for them," she said. "I used to get a big kick out of the kids because they were so enthusiastic."

The mine was discovered in 1803 by Sam Ruggles, who reportedly kept it secret for years and used to transport the mica, a layered mineral, in the middle of the night to Portsmouth. From there, the transparent sheets were shipped to England, where they were turned into windows for ships, woodstoves and whale-oil lamps. By the early 1930s, an estimated \$12 million worth of mica had been removed. Since then, the mica has been used for electrical insulation, roof shingles and cosmetics, and in later years, in scouring powder.

As a tourist attraction, the mine attracts thousands of visitors from May to October. The mine was not open this spring and summer, except for June 18, when hosted a free open house for the public.

"It's just time for me to stop working," said Searles, who has run the attraction with her daughter and other family members. "I hope someone enjoys minerals and will enjoy the mine as much as I did."

UNUSUAL QUAKE CLUSTER WORRIES JAPAN

<http://asia.nikkei.com/Features/Kyushu-earthquakes/Unusual-quake-cluster-worries-Japan>

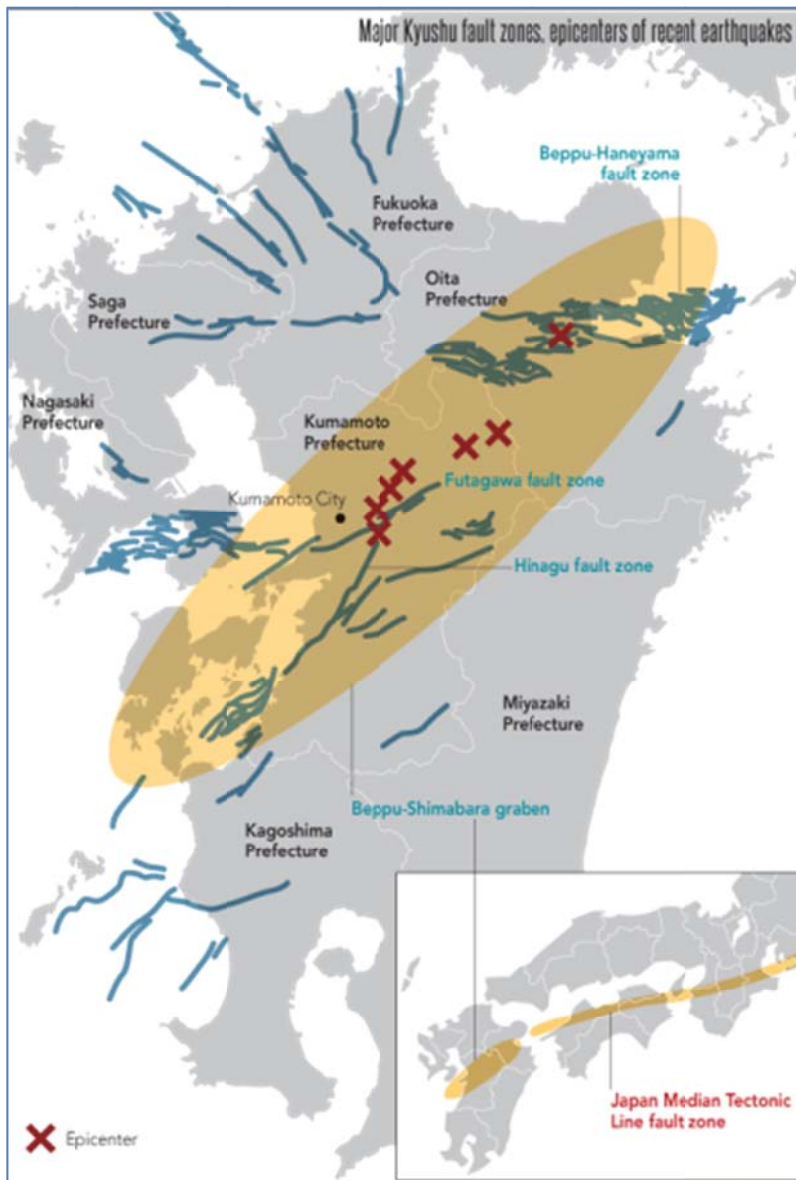
TOKYO -- April 18, 2016 Seismic activity in southern Japan is mystifying geologists and keeping the nation on edge. The island of Kyushu has been struck by a series of significant earthquakes, with the epicenters moving progressively further inland. The cluster started with the deadly quakes that hit Kumamoto Prefecture last Thursday and Saturday. Temblors subsequently rocked the Mount Aso region and neighboring Oita Prefecture. There is a known concentration of faults in the area. Still,

Japan Meteorological Agency said it is unprecedented says it is highly unusual to have a string of quakes measuring around magnitude 6 and stretching over such a vast area. The epicenter of the Oita jolt was about 100km away from the first Kumamoto quake. Experts are divided over how far the shaking will spread and whether it could prompt more quakes centered elsewhere. **Linked faults** - The Beppu-Shimabara graben stretches east to west across Kyushu, through Oita and Kumamoto prefectures. A number of faults run underground. Scientists believe such concentrations of faults increase the chances of earthquake swarms. When one fault shifts, causing an earthquake, it can add to the strain on other faults, triggering more tremors. The government's earthquake research committee attributed the magnitude-6.4 quake that hit Kumamoto last Thursday evening to a shift in the northern part of the Hinagu fault zone. The magnitude-7.3 quake that struck in the wee hours of Saturday morning occurred in the Futagawa fault zone, which runs just north of the Hinagu zone, the Geospatial Information Authority of Japan said. Part of the Futagawa fault zone, about 27km in length, slid by around 3.5 meters, according to the GSI.

The government committee met on Sunday and agreed that the Futagawa zone was the culprit in the main quake. This zone, it turns out, is longer than previously thought and stretches close to Mount Aso's caldera. The committee warned local residents to brace for more aftershocks. Indeed,

aftershocks continue in the Kumamoto, Aso and Oita regions. According to the Meteorological Agency, Kumamoto has seen the second-highest number of inland earthquakes on record, after those set off by the earthquake that hit the northwestern prefecture of Niigata in 2004.

The main Kumamoto quake unleashed 40% more seismic energy than the devastating 1995 earthquake. Saturday's quake "may have impacted nearby faults," said Hiroshi Yurai, director of the GSI's crustal deformation research division. Signs point to the quake nudging the Beppu-Haneyama fault zone in Oita, which lies northeast of the Futagawa zone. The Beppu-Haneyama zone, in turn, is linked in the east to the Japan Median Tectonic Line -- a huge fault structure that extends through western Japan, including the island of Shikoku and the Kii Peninsula in Wakayama Prefecture. This raises the possibility that the Kumamoto earthquakes could cause a broader chain reaction across the Bungo Channel in the Shikoku region. For now, though, a Meteorological Agency official said that "the Median Tectonic Line doesn't seem to have been activated yet."



BENNU MISSION: THE 'ARMAGEDDON' ASTEROID THAT COULD COLLIDE WITH EARTH

<http://www.telegraph.co.uk/science/2016/09/06/10-facts-about-bennu---the-armageddon-asteroid-that-could-collid/>, <http://www.asteroidmission.org/why-bennu/> and <http://www.space.com/33616-asteroid-bennu-will-not-destroy-earth.html>.

There's a slim chance Benu (formerly 1999 RQ36) could actually collide with Earth sometime in the next 200 years-but could it pose a threat to civilization? Benu crosses Earth's orbit every six years and comes within 0.002 AU (300,000 km) of the planet. At its furthest point it is over 340 million kilometres (211 million miles) away from the Earth.

There is a tiny chance- about 1 in 2,500 that Benu could collide with Earth late in the 22nd century, scientists believe. The asteroid will pass between Earth and the moon in 2135 and could then collide with the planet later in the century should its orbit be altered by Earth's gravity as it passes. "That 2135 fly-by is going to tweak Benu's orbit, potentially putting it on course for the Earth later that century," Dante Lauretta, OSIRIS-REx principal investigator, told the Sunday Times. "It may be destined to cause immense suffering and death."

NASA does not believe the asteroid is big enough to wipe out planet Earth but the impact would be big enough to destroy a very large area on impact, experts say. NASA's new asteroid-sampling mission will do a lot of interesting things, but helping prepare humanity for Earth's imminent destruction is not among them. There is indeed a chance that the 1,650-foot-wide (500 meters) asteroid Benu — the target of NASA's OSIRIS-REx spacecraft, which is scheduled to launch next month — could hit Earth late in the 22nd century. But, mission officials stressed, that chance is slim, and the space rock is not nearly big enough to pose an existential threat to the planet, despite what some media reports claimed over the weekend. "We're not talking about an asteroid that could destroy the Earth," Professor Lauretta, Professor of Planetary Science and Cosmochemistry at the University of Arizona, told Space.com. "We're not anywhere near that kind of energy for an impact."

The near-Earth asteroid is estimated to be at least 500 metres wide (1,760ft). Measurements reveal that Benu's density is less than that of rock, so scientists think the asteroid may have voids in its interior, according to NASA. In comparison, the asteroid that wiped out the dinosaurs was an estimated 10km (6 miles) across.

The OSIRIS-REx mission will help astrophysicists work out a strategy for dealing with asteroids which are on a collision course with Earth. "If astronomers someday identify an asteroid that presents a significant impact hazard to Earth, the first step will be to gather more information about that asteroid. Fortunately, the OSIRIS-REx mission will have given us the experience and tools needed to do the job," explained Edward Beshore, Deputy Principal Investigator for the mission.

Why Benu?

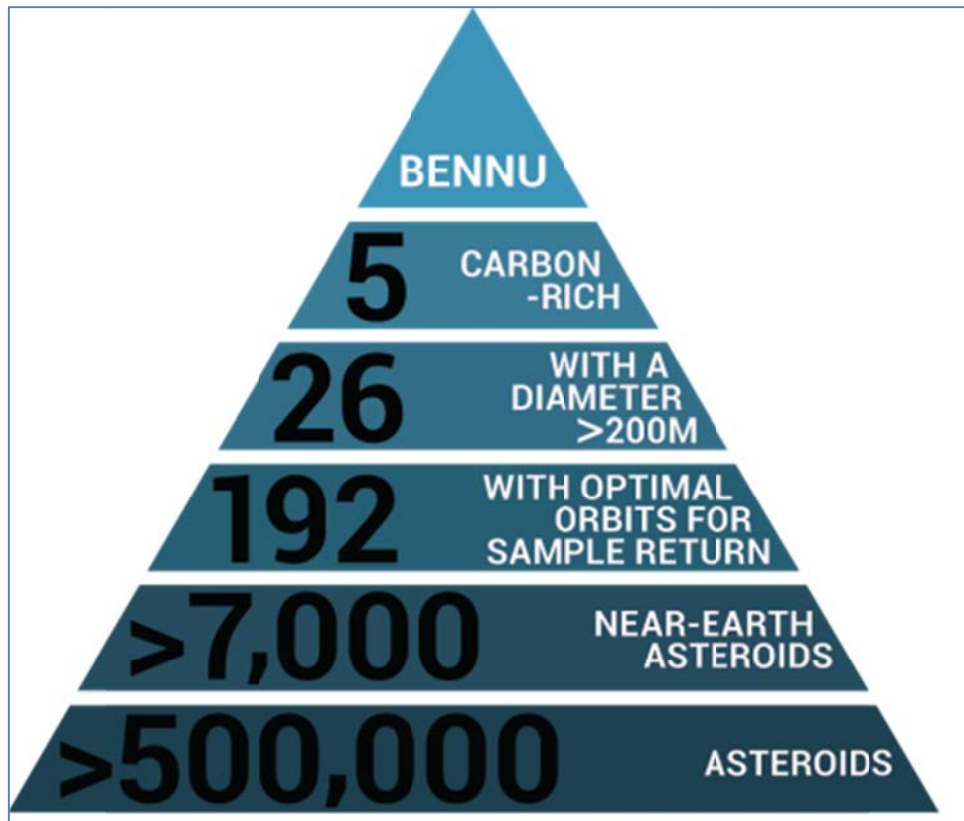
How was Benu chosen? The goal of the OSIRIS-REx mission is to collect a sample from an asteroid and bring it back to Earth. But just how did the OSIRIS-REx team choose Benu from the over 500,000 known asteroids in the Solar System?

Proximity to Earth - The closest asteroids to Earth are called Near-Earth Objects (NEOs). As the name suggests, NEOs are objects that orbit within 1.3 AU of the Sun. (1 AU = the distance between Earth and the Sun, or ~93 million miles) For a sample return mission like OSIRIS-REx, the most accessible asteroids for a spacecraft to reach are located between 1.6 AU and 0.8 AU. The ideal asteroid has an Earth-like orbit with low eccentricity and inclination. **At the time of the mission's asteroid selection in 2008, there were over 7,000 known NEOs, but only 192 had orbits that met these criteria.**

Size - Asteroids with small diameters rotate more rapidly than those with large diameters. With a diameter less than 200 meters, an asteroid spins so rapidly that the loose material on its surface (regolith) can be ejected from it. The ideal asteroid has a diameter larger than 200 m so that a spacecraft can safely come into contact with it and collect a sufficient regolith sample. This size requirement reduced the number of candidate asteroids from 192 to 26.

Composition - Asteroids are divided into different types based on their chemical composition. The most primitive asteroids are carbon-rich and have not significantly changed since they formed nearly 4 billion years ago. These asteroids contain organic molecules, volatiles, and amino acids that may have been the precursors to life on Earth. Of the 26 asteroids left on the list, only 12 had a known composition, and only 5 were primitive and carbon-rich.

From these 5 asteroids, Bennu was selected. Bennu is a B-type asteroid with a ~500 meter diameter. It completes an orbit around the Sun every 436.604 days (1.2 years) and every 6 years comes very close to Earth, within 0.002 AU. These close encounters give Bennu a high probability of impacting Earth in the late 22nd century. Bennu's size, primitive composition, and potentially hazardous orbit make it one of the most fascinating and accessible NEOs ... and the ideal OSIRIS-REx target asteroid.



EARTH SCIENCE WEEK 2016 Submitted by Lee Wilder

Promoting awareness of the theme of Earth Science Week 2016 – October 9 – 15, 2016 - "Our Shared Geoheritage" has been a priority for AGI for some time. Last year, AGI began laying a foundation for this year's celebration through two publications.

EARTH Magazine, a top resource for the latest geoscience news, published "Geoheritage: Preserving Earth's Legacy" in June 2015. The article provides a geoscientist's perspective on the global phenomenon of geoheritage studies, education, and conservation (<http://www.earthmagazine.org/article/geoheritage-preserving-earths-legacy>).

And in October 2015, AGI and the National Park Service jointly published "America's Geologic Heritage: An Invitation to Leadership," which provides a detailed overview and stunning pictures of the nation's geoheritage (http://www.nature.nps.gov/geology/geoheritage/docs/GH_Publicaton_Final.pdf).



GSNH SUMMER 2016 GEOLOGY FIELD TRIP by Abby Fopiano



GSNH banner - base lodge MW Auto Road, Saturday 08/06/16





P. Thom Davis speaking to the field trip at Craigway Turn aka “5 mile.” Photo by Dyk Eusden



Tip Top House in the clouds.” Photo by Sharon Lewandowski.



Field trippers ascending ladder in the Mount Washington Observatories tower.





THE NH GEOLOGICAL SURVEY GROUND WATER LEVEL NETWORK SUMMARY

Submitted by Lee Wilder of the NHGS

June 2016 - NH Groundwater level measurements were collected by the NH Geological Survey staff and volunteers from June 27, 2016 – July 1, 2016. The statewide June 2016 average groundwater level for wells in the overburden showed a decrease of -0.68 feet from May 2016. When compared with June 2015, the statewide average groundwater level for June 2016, in these wells, decreased -0.67 feet. It should be noted that all the June 2016 water levels for the overburden wells were down compared to May 2016. When compared to June 2015, 18 out of the 20 overburden wells were down for June 2016.

The June 2016 average groundwater level in the new bedrock wells showed a decrease of -1.61 feet, when compared with May 2016. When compared with June 2015, the bedrock wells showed a decrease of -1.18 feet for June 2016.

The June 2016 levels in all the bedrock wells were down compared to May 2016. When compared to June 2015, 6 out of the 10 bedrock wells were down for June 2016.

July 2016 - NH Groundwater level measurements were collected by the NH Geological Survey staff and volunteers from July 22, 2016 – July 29, 2016. The statewide July 2016 average groundwater level for wells in the overburden showed a decrease of -0.34 feet from June 2016. When compared with July 2015, the statewide average groundwater level for July 2016, in these wells, decreased -0.55 feet. It should be noted that 17 out of 20 of the July 2016 water levels for the overburden wells were down compared to June 2016. When compared to July 2015, 19 out of the 20 overburden wells were down for July 2016.

The June 2016 average groundwater level in the new bedrock wells showed a decrease of -1.21 feet, when compared with June 2016. When compared with July 2015, the bedrock wells showed a decrease of -1.26 feet for July 2016. The July 2016 levels in 9 out of the 10 bedrock wells were down compared to June 2016. When compared to July 2015, 8 out of the 10 bedrock wells were down for July 2016.

August 2016 - NH Groundwater level measurements were collected by the NH Geological Survey staff and volunteers from August 24, 2016 – Sept. 2, 2016. The statewide August 2016 average groundwater level for **wells in the overburden** (in soils on top of the bedrock) showed a decrease of -0.49 feet from July 2016. When compared with August 2015, the statewide average groundwater level for August 2016, in these wells, decreased -0.48 feet. *It should be noted that 19 out of 20 of the August 2016 water levels for the overburden wells were down compared to July 2016. When compared to August 2015, 18 out of the 20 overburden wells were down for August 2016.*

The August 2016 average groundwater level in the new **bedrock wells** showed a decrease of -0.47 feet, when compared with July 2016. When compared with August 2015, the bedrock wells showed a decrease of -0.87 feet for August 2016. The August 2016 levels in 8 out of the 10 bedrock wells were down compared to July 2016. When compared to August 2015, 9 out of the 10 bedrock wells were down for August 2016.

The groundwater level measurements for the deeper of the two Concord bedrock wells (CVWB-1) are no longer available in real-time. Past data are on the USGS website at:

http://waterdata.usgs.gov/nh/nwis/uv/?site_no=431034071340501&PARAMeter_cd=72019.

The data for all of the wells in the NH Groundwater Level Network are shared with and posted on the USGS website at: <http://groundwaterwatch.usgs.gov/statemap.asp?sc=33&sa=NH>.



THE CAPITAL MINERAL CLUB

See what's happening and membership information at

<http://www.capitalmineralclub.org/index.php>

DROUGHT CONDITIONS LEAD TO PROBLEMS IN PRIVATE WELLS

Published 6:40 PM EDT Jul 07, 2016 <http://www.wmur.com/news/drought-conditions-lead-to-problems-in-private-wells/40407838>



Abby Fopiano, General Manager of Epping Well and Pump Co and GSNH Board member explains the problems created by the drought.

EPPING, N.H. —Some New Hampshire homeowners with private wells are having water issues as drought conditions persist, especially in the southern part of the state. Seven crews from Epping Well & Pump were working Thursday to help people out with issues that company owner Henry DeBoer said are usually not seen until late in the season. "I would say we're into a fairly serious situation," DeBoer said. "Out of 30 years (in business), I would say we're headed toward the second worst that I've seen."

Abby Fopiano is a hydro-geologist who works for the company, and she said problems have cropped up because of a lack of rain and winter snowpack. "What we notice is that those shallow aquifers, those sand and gravel aquifers, get depleted first because those are more reliant on the annual, year-to-year recharge," Fopiano said.

Those aquifers often feed into the private wells of homeowners. "Some of those people have to drill wells, because their shallow wells have no water in them," DeBoer said. "So that's a reflection of the water table going down because of the drought." Issues with deep bedrock wells are mostly due to increased summer water use.

"So those people are hydro-fracking their wells or surging them, trying to open up fractures in the bedrock to make their wells more productive," DeBoer said. Given the warning signs, DeBoer and **Fopiano** said conservation is key. "If you are going to run laundry and do your dishes and do irrigation, really try to do it at off times and when you're not doing it altogether," Fopiano said. "And as much as you can, try to limit that altogether." Fopiano said New Hampshire is in a water-rich part of the world, but Granite Staters can't take it for granted. She said water should be conserved whenever possible.

<http://www.wmur.com/news/drought-conditions-lead-to-problems-in-private-wells/40407838>

JUPITER DOES NOT ORBIT THE SUN

<http://www.techinsider.io/jupiter-does-not-orbit-the-sun-2016-7>

WHOA. Jupiter is so freaking massive, it doesn't actually orbit the sun. Jupiter, the fifth planet from the Sun, gas giant, and subject of the Juno mission, is huge. *Huge*. It's so huge, in fact, that it doesn't actually orbit the Sun. Not exactly. With 2.5 times the mass of all the other planets in the Solar System combined, it's big enough that the centre of gravity between Jupiter and the Sun doesn't actually reside inside the Sun – rather, at a point in space just above the Sun's surface.

Here's how that works. When a small object orbits a big object in space, the less massive one doesn't really travel in a perfect circle around the larger one. Rather, both objects orbit a combined centre of gravity.

In situations we're familiar with – like Earth orbiting the much-larger Sun – the centre of gravity resides so close to the centre of the larger object that the impact of this phenomenon is negligible. The bigger object doesn't seem to move, and the smaller one draws a circle around it.

But reality is always more complicated. For example: when the International Space Station (ISS) orbits Earth, both Earth and the space station orbit their combined centre of gravity. But that centre of gravity is so absurdly close to the centre of Earth that the planet's motion around the point is impossible to spot – and the ISS follows a near-perfect circle around the whole planet.

The same truth holds when most planets orbit the Sun. The Sun is just so much larger than Earth, Venus, Mercury, or even Saturn that their centres of mass with the Sun all lie deep within the star itself.

Not so with Jupiter. The gas giant is so big that its centre of mass with the Sun actually lies 1.07 solar radii from the middle of the Sun — or 7 percent of a Sun-radius above the Sun's surface. Both the Sun and Jupiter orbit around that point in space. That is, in essence, how Jupiter and the Sun move through space together – though the distances and sizes are far different. Jupiter is still only a fraction of the Sun's size. So next time someone asks you for a crazy space fact, you'll know: Jupiter is so massive, it doesn't orbit the Sun.

See more about the Juno mission at <http://www.techinsider.io/juno-probe-turns-on-science-instruments-2016-7>.

PROFILE CABIN AT THE OLD MAN PLAZA, FRANCONIA NOTCH STATE PARK

**Lee Wilder,
Old Man Of
The Mountain
Legacy Fund**

The Profile Cabin was recently restored and is now open to the public. This unique remnant of the days of the Profile House contains a fascinating display of the huge turn of the century hotel that one occupied the area of the notch, where the Cannon Mtn. facilities sit today.



CALIFORNIA TOWN FIXES CROOKED CURB, BREAKS GEOLOGISTS' HEARTS

July 6, 2016 http://www.npr.org/sections/thetwo-way/2016/07/06/485021384/california-town-fixes-crooked-curb-breaks-geologists-hearts?utm_source=pocket&utm_medium=email&utm_campaign=pockethits

To the average pedestrian, it was just a curb. To an observant one, perhaps, it was an oddly *misaligned* curb. To geologists, it was a snapshot of the earth's shifting tectonic plates — an accidental experiment, a field trip destination for decades.

But to the town of Hayward, Calif., it was just a bit of subpar infrastructure. The Los Angeles Times sums up what happened next: "Then, one early June day, a city crew decided to fix the faulty curb — pun intended. By doing what cities are supposed to do — fixing streets — the city's action stunned scientists, who said a wonderful curbside laboratory for studying earthquakes was destroyed."

Geologist David Schwartz of the U.S. Geological Survey spoke with NPR on Wednesday. He has been visiting the curb for 30 years. He says the fault that broke the curb — the Hayward fault — is "one of the major and most important faults in the San Francisco Bay Area." "In probably the late 1950s, your standard sidewalk curb was built across the fault — and the fault is creeping," Schwartz explained. "That means it moves a little bit every year, maybe about 4 millimeters. It broke through the curb and started pushing it out. And over the years it has moved it 8 inches."



Geology enthusiasts gather at a (formerly) noteworthy curb in Hayward, Calif., in May 2012. The curb was once straight; the shifting Hayward fault pulled it apart

A website for geology-themed field trips has photos of the curb dating back to the early '70s (<http://www.geologyfieldtrips.com/haywardresidential.htm>). They show the separating halves of the curb at first disjointed but overlapping, then growing farther apart.

Now the curb is gone — making way for a wheelchair-accessible ramp, the *LA Times* reports.

"Our mandate from our council is that we have safe sidewalks and accessible sidewalks for all members of our community," an assistant city manager told the paper, while noting that they might have acted differently if they'd known of the curb's unusually exalted status.

Andrew Alden, a geologist who is also a science contributor for member station KQED, noticed the new construction more than a week ago and documented it on his blog. He mourned the loss of an "icon," one worthy of pilgrimages for geologists. He also wrote that the addition of an accessible curb is "a good thing and undoubtedly overdue. Still."

FEDERAL STUDY WARNS OF CORROSIVE POTENTIAL OF NH GROUNDWATER

U.S. Geological Survey finds 'very high prevalence' in Granite State

<https://pubs.er.usgs.gov/publication/sir20165092> July 13, 2016

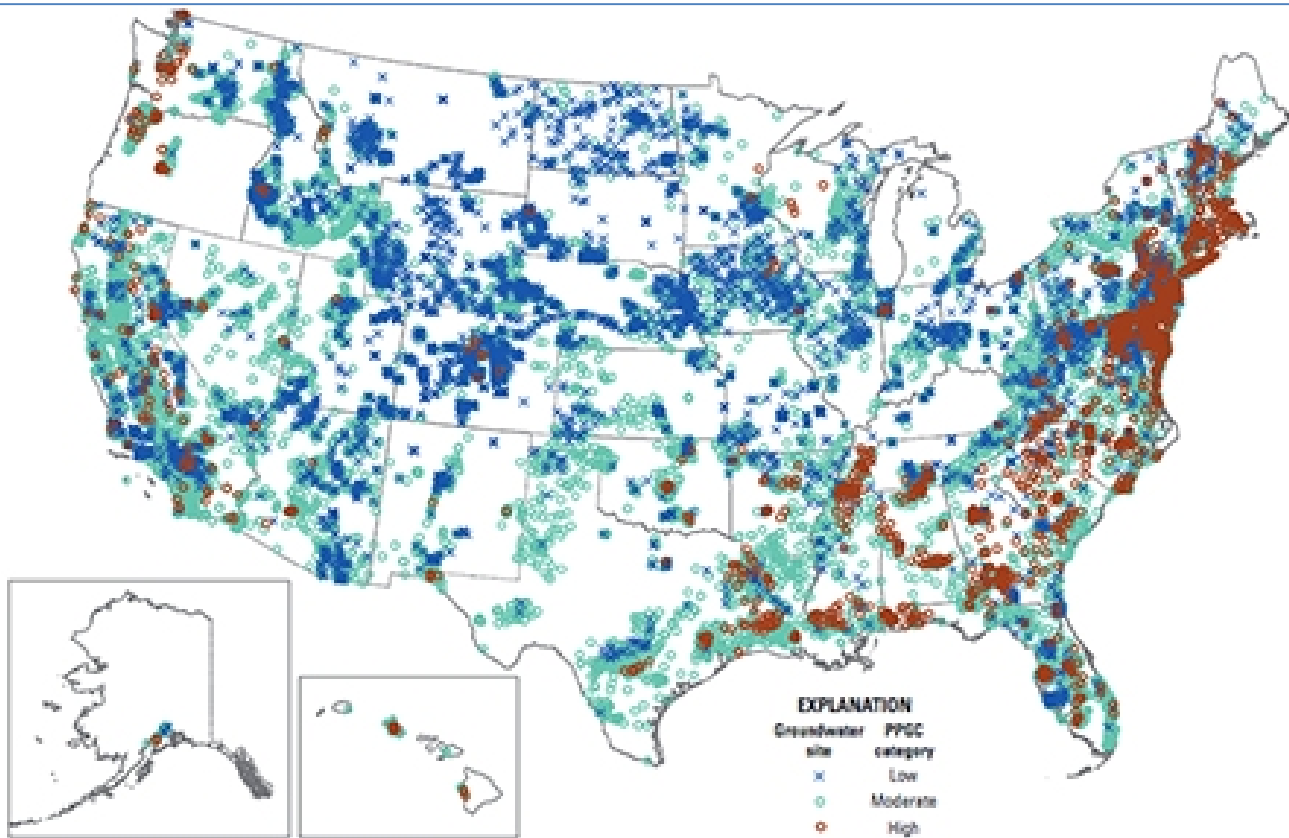


Figure 3. Potential to Promote Galvanic Corrosion for 26,831 groundwater sites in the United States. PPGC, Potential to Promote Galvanic Corrosion.

New Hampshire's private wells are especially susceptible to the metal-leaching effects of corrosive groundwater, according to a study by the U.S. Geological Survey. The study ranked New Hampshire, along with 11 other states, with a "very high prevalence" of potentially corrosive groundwater. To determine this, the study tested 27,000 groundwater sites across the country from 1995 to 2015 to determine potential corrosivity.

Most of 12 most susceptible states are highly clustered along the East Coast, including Maine, Massachusetts, Connecticut, Rhode Island, New Jersey, Maryland and Delaware, along with South Carolina, Alabama and Georgia. Corrosive water, if left untreated, can leach metals like lead or copper from plumbing materials into the water supply of private wells.

The U.S. Geological Survey wrote that 44 million people across the nation rely on self-supplied water, which is often not regulated. New Hampshire is no exception; about half the population uses private wells as its water supply, but those wells are not regulated by the state or the federal Safe Drinking Water Act.

That's according to Cynthia Klevens, water treatment engineer at the NH Department of Environmental Services Drinking Water and Groundwater Bureau. Klevens said factors that can cause groundwater to affect a private well's drinking supply can vary greatly. High salt, low pH and low alkalinity contribute to how corrosive groundwater can be, though there is no "harmful" combination of those numbers—any level could only potentially lead to corrosivity.

The issue isn't as clear-cut as old plumbing versus new. Even newer copper fixtures can be more susceptible to metal leaching than older fixtures of another metal, Klevens said.

<https://www.usgs.gov/news/new-study-shows-high-potential-groundwater-be-corrosive-half-us-states-0>
<http://www.nhbr.com/July-22-2016/Federal-study-warns-of-corrosive-potential-of-NH-groundwater/>

SAVE THE DATE!



CLIMATE SCIENCE COLLOQUIUM

Omni Mount Washington Resort
November 12-15, 2017

Bringing together climate scientists and related educators from a variety of research disciplines and educational settings to assess the status of climate science investigations and education in northeastern North America.

MWOCLIMATE.ORG

SLATE FOR BOARD OF DIRECTORS ELECTION - From the GSNH Nominating Committee

The following slate of candidates for the GSNH Board of Directors is offered for your consideration (as per the GSNH Constitution and By-laws). Current GSNH members may vote on the slate of nominees at the GSNH Fall 2016 Annual Dinner Meeting, on Wednesday October 12, 2016 at Makris Lobster and Steak House in Concord. Write-in candidates are also welcome.

President – Wayne Ives

Wayne was graduated with a geology major at Albion College in Michigan. He worked in groundwater exploration consulting for ten years conducting geophysics, drilling and testing wells, and managing projects in New England, New York, California, Georgia, Virginia and Sudan. He left consulting to work for the Superfund Program at the Department of Environmental Services, where he quickly began managing Superfund Sites while serving as the Program's hydrogeologist. After seven years in Superfund, Wayne transferred to the Water Division to become the state's Instream Flow Specialist where he has been working for 16 years protecting stream flow quantities and managing water withdrawal issues.

Society VP – Doug Allen

Doug is a Senior Hydrogeologist and Project Manager with Haley & Aldrich, Inc. in Bedford, specializing in environmental site investigations and remediation, application of GIS to environmental projects, engineering geology, and hydrogeological studies. He is a licensed PG in New Hampshire, with a MS in geology from Lehigh University and a BA in Environmental Science from the University of Rochester. Doug has played an active role in GSNH since joining in 2002, volunteering on the membership committee (maintaining the membership database, preparing member directories, and communicating event information to members) since 2004 and previously served on the Board of Directors as Secretary, Society Vice President, and Member-at-Large. Doug and his family live in Warner where he serves on the Town's Conservation Commission. Doug appreciates the professional fellowship that GSNH brings to the geological community of New Hampshire and looks forward to ongoing active participation.

Council VP – Thomas Fargo

Tom received his Bachelors and Masters Degrees in geology from the State Universities' of New York at Fredonia and Buffalo, respectively. He moved to Dover, NH in 1988 to pursue a Ph.D. in geology at UNH. Tom spent many years working in environmental consulting, primarily in New England, before "retiring" in 2000. During a nine-year sabbatical he engaged in many citizen volunteer pursuits, including serving in the NH House of Representatives in 2007-08. Tom returned to full-time employment with the NH Department of Environmental Services in 2009 and is currently working as a Project Manager in the Oil Remediation and Compliance Bureau. Tom is a licensed NH Professional Geologist and a long-time member of the GSNH.

Treasurer – Bill Abrahams-Dematte, NHPG #575

Bill is a Project Hydrogeologist/Scientist for AECOM Environment in Chelmsford, MA and Manchester, NH, where he has worked for the last 15 years. Prior to AECOM, Bill worked for Continental Placer in Laconia, NH, as a private consultant in Williston, VT, and for the Vermont Association of Conservation Districts in Montpelier, VT. Bill specializes in environmental site investigations, site characterization and remediation, hydrogeological studies, data management, GIS, and geotechnical work. Bill has been a member of the GSNH for the last 15 years and has held several positions with the Board of GSNH: Council VP for a 1-1/2 year term (2010-2011), Webmaster for the GSNH website (2011-2013) and Treasurer (2013-present). His other professional associations include the GSA, NGWA, and AIPG societies as well as being a New Hampshire licensed PG. Bill lives in Wilton, NH and appreciates the GSNH for providing a means to being more connected with the New Hampshire geological community, for the excuse to go out and hike around on a bunch of rocks, and for the opportunity meet new people.

Secretary – Shane Csiki

Shane serves as the Fluvial Geomorphologist, and Administrator of the Flood Hazards Program in the New Hampshire Geological Survey. He earned his Ph.D. in Geography from the University of Illinois at Urbana-Champaign. Shane's professional interests include river processes, flood hazards and water resources issues. He is enthusiastic about the mission of state geological surveys and in organizations dedicated to a healthy earth science community, as GSNH fulfills in New Hampshire. His personal interests include books, and studying the history of places and of our nation's roads and highways.

SLATE FOR BOARD OF DIRECTORS ELECTION - continued

Member-at-Large (Three Positions)

Abby Fopiano

Abby is the General Manager at Epping Well & Pump Company, whose focus is on residential and commercial water systems (wells, pump, testing and treatment). Abby is the lead hydrogeologist for projects pertaining to development and permitting of small community water systems. Abby is NH Professional Geologist, has a Geology degree from the University of Montana and a masters in Hydrology from the University of New Hampshire. She's been serving as the Society's webmaster for the last two years, this would be her second term as Member-at-Large.

Thor Smith

Thor has worked as a hydrologist with the U.S. Geological Survey in Vermont and New Hampshire since 1994, and is a licensed Professional Geologist in NH. Before joining the USGS, Thor studied geology (Sc.B., Brown University) and hydrology (M.S., University of New Hampshire) and enjoyed a geographic variety of outdoor work, including acid precipitation research in the Adirondack Mountains, hydrologic monitoring for the Bureau of Reclamation in Colorado, and environmental consulting in California. He has served two previous terms on the GSNH Board of Directors, as Member-at-Large and Society Vice President.

Sharon Lewandowski

Sharon is a Project Geologist for AECOM in Manchester, New Hampshire and is a registered P.G. in New Hampshire and North Carolina. She grew up in New Hampshire and earned her B.S. and M.S. in Geology from Bowling Green State University in Bowling Green, Ohio. Sharon moved to Nashua, New Hampshire in 2014 after working for eight years in Greenville, North Carolina. She has been a member of GSNH since 2015 and is excited to become more involved with the geological community in New Hampshire.



GSNH T-shirt Order Form



	Number of shirts	Price each	Total
GSNH Small t-shirt		\$ 18.00	
GSNH Medium t-shirt		\$ 18.00	
GSNH Large t-shirt		\$ 18.00	
GSNH Extra Large t-shirt		\$ 18.00	
Shipping & handling costs			Subtotal
One shirt	\$4	Shipping & handling	
Two shirts	\$7	Total	

Ship to: Name
Street Address

City, State, Zip Code

Phone # (In case of questions about your order)

Please make checks payable to "GSNH" and mail with this completed order form to:

GSNH
P.O. Box 401
Concord, NH 03302





Geological Society of New Hampshire

GSNH 2016 Fall Dinner Meeting

Window into the Jurassic World: Fossils of the Connecticut Valley

Speaker: Nick McDonald

Geologist, author, fossil collector, and teacher

Until his retirement in 2014, Nicholas G. McDonald taught Geology, Biology and Chemistry at Westminster School in Simsbury, Connecticut, and served as Chairman of the Science Department. He holds two degrees in geology, including a Master's from Wesleyan University. In 40 years of fossil collecting, Nick has brought to light literally thousands of well-preserved specimens from the Jurassic rocks of central Connecticut and Massachusetts. He has published two books and authored numerous scientific papers on geology and paleontology. He is also an avid book collector, focusing on the history of geology, paleontology and mineralogy.

WEDNESDAY, October 12, 2016

**Makris Lobster House Restaurant
354 Sheep Davis Rd, Concord, NH 03301**

5:30 pm Social Hour; 6:30 pm Buffet Dinner; 7:15 pm Speaker

RSVP by 4 pm Friday, October 7, 2015 to get the reservation price

Advance Reservations: _____ Member (Dues Paid) \$22.00
 _____ Non-member \$25.00

_____ **Please indicate the number of vegetarian meals – leave blank for none.**

- Member at the Door (\$25.00)
- Non-Member at the Door (\$28.00)
- Students \$10.00 with valid student ID card (Reservation Requested)

GSNH will also accept dinner reservations by e-mail, which will then allow you to pay at the door. **Please note that e-mail reservations constitute an agreement with the Society for which you will be responsible to pay, whether you are able to attend or not, unless you cancel your reservation by noon the Tuesday before the Dinner.**

Reply via e-mail to: LeaAnne.Atwell@des.nh.gov. Mail to: **Lea Anne Atwell, GSNH Dinner Meeting, PO Box 401, Concord, NH 03302. Checks payable to: GSNH.**

Name(s) _____

Address: _____

Your phone or e-mail: _____

Half the cost of the dinner may be tax-deductible as a business expense. **The lecture part of the program counts as 1.5 hours of CEU contact hour credit.**



MEMBERSHIP & RENEWAL APPLICATION

Geological Society of New Hampshire

PO Box 401, Concord, NH 03302

Name: _____

(Please print clearly)

E-mail: _____

Renewing Members: Only update this section if you have changes to your contact information (including email) or educational history.

New applicants: please complete this section.

Preferred address/email to receive GSNH Communication: ___ Home or ___ Business

Home Address:

Business Address:

Home address lines

Business address lines (Employer):

Home Telephone: _____

Office Telephone: _____

New Hampshire PG # (if applicable) _____

Education: Degrees received or in progress:

Table with 4 columns: Year, Degree, Major, College or University

I volunteer to help with one of the following committees or tasks:

- Membership Committee, Regulations Committee, Communications Committee, Legislative Committee, Education Committee, Giving a talk at a meeting, Events Committee, Other

Membership Category:

- Regular Member (Annual Dues \$20.00), Student Member (Annual Dues \$10.00)...Please complete Education section above.

Make checks payable to "Geological Society of New Hampshire." Note that GSNH dues are not deductible as a charitable contribution, but may be deductible as a business expense. Please return this completed application form with any necessary corrections and a check for the appropriate dues to the GSNH at the address above. The Society's membership year runs from January 1 to December 31.

Signature: _____ Date: _____