



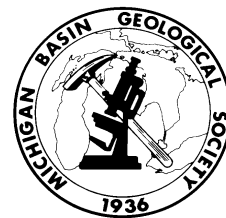
ON THE ROCKS

A Newsletter of the Michigan Basin Geological Society

2017-2018 Edition 5

www.mbgs.org

January 2018



ANNOUNCEMENTS

MONTHLY MEETING

January 10th, 2018: The January meeting will be held at Michigan State University, Natural Science Building at 7:00 pm in Room 351. Collin Plank, Senior Geologist, Burns and McDonnell, will be presenting "The importance of detailed site stratigraphy in understanding site contaminant transport and storage". Additional information is included in the newsletter.

MBGS FIELD EXCURSION ANNOUNCEMENT

SPRING 2020 - GEOLOGICAL EXCURSION BY RAFT ON THE COLORADO RIVER THROUGH THE *GRAND CANYON*

LEE'S FERRY TO WHITMORE WASH (PAGE, ARIZONA)

A 7-day Grand Canyon rafting trip through Hatch includes: 188 miles of rafting from Lee's Ferry to Whitmore Wash, pre-trip stay at Cliff Dwellers Lodge, helicopter ride & return flight to Las Vegas or Marble Canyon, and meals, beverages, camping gear and dry bags provided by Hatch while on the river.

TRIP BACKGROUND: The Michigan Basin Geological Society (MBGS) is returning to raft the Colorado River through the Grand Canyon in May of 2020. This is a repeat of the 2005 trip taken except this trip will be led by highly experienced geologist, Dr. Kata McCarville, Upper Iowa University. Many repeat stops are anticipated to be visited such as Lava Canyon, Redwall Cavern, Nankoweap Grainery and Havasu Canyon. New stops are also anticipated. The Grand Canyon is the first on the list of the Seven Natural Wonders of the World.

LED FIELD LENS AND MBGS LANYARD AVAILABLE

The Michigan Basin Geological Society is offering to its members and non-members this geological field hand lens and lanyard (photo attached). The field hand lens is a large 21mm lens with a 20X magnification. A pair of white LEDs provides illumination for all those darkened close-up viewing of rocks, minerals and fossils. A case is provided for the field lens with a key to remove the batteries. Batteries are included. The green lanyard has MICHIGAN BASIN GEOLOGICAL SOCIETY printed on one side of the unfussy 1" wide webbing. This lanyard is designed with a breakaway buckle clip and detachable keychain for versatile use and comfortable wearing. MBGS is offering the Lanyard/LED Hand Lens and Case combo for \$15 each and the Lanyard alone for \$5 each if picked up at a meeting or field trip. If you request to have your purchase mailed, standard costs for mailing container and postage will apply. *If you purchase one of the combos and you are in need of battery replacement, MBGS will provide replacement batteries at no additional cost. You must bring your MBGS LED field lens and lanyard to a monthly meeting or field trip. We will replace and dispose of the old batteries.* Please contact Mark Wollensak at wollensak@voyager.net to order.



MBGS ONLINE STORE

The Michigan Basin Geological Society now has an on-line store. Shop for shirts, hats, bags and other items at <http://www.cafepress.com/mbgs>. We appreciate any feedback on items you have purchased.

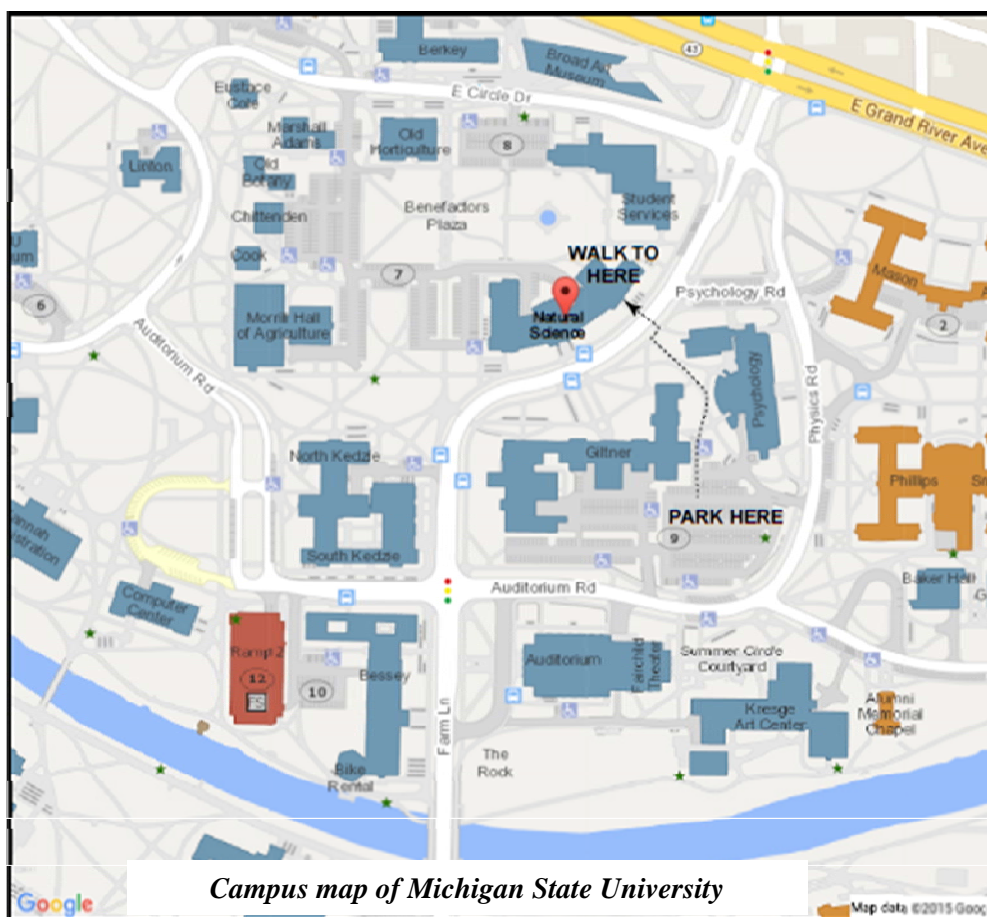
Michigan Basin Geological Society January 2018 Membership Meeting

Wednesday, January 10th, 201
Michigan State University, Natural Science Building
7:00 PM in Room 351

The Importance of Detailed Site Stratigraphy in Understanding Site Contaminant Transport and Storage Collin Plank, Senior Geologist, Burns & McDonnell

Abstract: The purpose of this talk is to provide a practical guide on the application of the geologic principles of sequence stratigraphy and facies models to the characterization of stratigraphic heterogeneity at hazardous waste sites. Application of the principles and methods presented in this talk will improve Conceptual Site Models (CSM) and provide a basis for understanding stratigraphic flux and associated contaminant transport. This is fundamental to designing monitoring programs as well as selecting and implementing remedies at contaminated groundwater sites. EPA recommends re-evaluating the CSM while completing the site characterization and whenever new data are collected. Updating the CSM can be a critical component of a 5-year review or a remedy optimization effort.

Bio: Colin has a bachelor's degree in geology from Grand Valley State University and a doctorate degree from the University of Minnesota. He previously worked as a geologist for AECOM and recently moved to Burns & McDonnell out of Lowell, MI where he is a Senior Geologist and Sequence Stratigraphy Specialist.



Between 5pm & 6pm you can park in Lot 9 behind Giltner Hall and the Psychology Building (former Physics and Astronomy building) for free. Otherwise you can try your luck with the metered slots clustered around the Natural Science Building and the adjacent Student Services Bldg, no charge after 6.



UPCOMING EVENTS

January 9th, 2018: MDEQ Hydraulic Analysis and Report Workshop, Mt. Pleasant, Michigan

http://www.michigan.gov/deq/0,4561,7-135-3308_3325---,00.html

February 27-March 1, 2018: 19th Triennial AWWA Groundwater/Source Water Conference, Lansing Michigan

<http://www.mi-water.org/events/EventDetails.aspx?id=1039708&group=>

March 16-18, 2018: 56th Annual Michigan Gem and Mineral Society's, Jackson County Fairgrounds American One Event Center, <http://www.mgmsrockclub.com/annual-show.html>

June 12-13, 2018: Michigan Environmental Compliance Conference, http://www.michigan.gov/deq/0,4561,7-135-3308_3333-451152--,00.html

June 12-13, 2018: Annual Michigan Section AIPG Technical Workshop to be held in Roscommon

June 16-21, 2018: Resources for Future Generations: Energy – Minerals – Water – Earth. Vancouver, Canada.

September 8-11, 2018: 55th Annual AIPG Meeting to be held in Colorado Springs, CO

CORE DISPLAY EDUCATIONAL TOOL AVAILABLE TO MEMBERS

MBGS has a core display available for use that visually demonstrates permeability/porosity. There are posters available for use with the core display. Contact Mark Wollensak at wollensak@voyager.net to reserve this great educational tool.



MICHIGAN BASIN GEOLOGICAL SOCIETY OFFICERS

2017-2018

PRESIDENT: PETER ROSE, Geologist

Office of Minerals Management, Michigan Department of Natural Resources
W (517) 284-5901 , RoseP1@michigan.gov

VICE PRESIDENT: ADAM W. WYGANT, Manager

Permits and Technical Services, Michigan Department of Environmental Quality, Oil, Gas and Minerals Division
W (517) 897-4828, wyganta@michigan.gov

SECRETARY: JOHN YELLICH, Director

Michigan Geological Survey, Western Michigan University
1903 West Michigan Ave, Kalamazoo, MI 49008-5241
(W) 269-387-8649 (C) 303-901-2886; john.a.yellich@wmich.edu

TREASURER: MIKE POZNIAK

Arcadis
300 S. Washington Square, Ste 315, Lansing, MI 48933
(W) 517-324-5054 (C) 517-898-3839 mike.pozniak@arcadis-us.com

BUSINESS MANAGER: EMANUAL “EZ” MANOS, President,

Detroit Salt Company LLC
12841 Sanders St., Detroit, MI 48217 ezmanos@detroitsalt.com

PAST – PRESIDENT: JOHN SHOOK, PE, VP Operations

Detroit Salt, Mine
12841 Sanders St., Detroit, MI 48217
W (313) 841-5144 x 121 (C) 707-293-7306

FIELDTRIP DIRECTOR: LUKE DEWIG

TransCanada
5250 Corporate Drive, Troy, MI 48098
(C) 248-904-8154, luke_dewig@transcanada.com

FIELDTRIP DIRECTOR: MARK WOLLENSAK, CPG

Hamp, Mathews & Assoc, Inc,
15266 Ann Drive, Bath, MI 48808
(W) 517-641-7333 (C) 517-719-8321, wollensak@voyager.net

NEWSLETTER EDITOR: ARLENE ANDERSON-VINCENT

Nestle Waters North America
19275 Eight Mile Road, Stanwood MI 49346
(W) 231-823-8451 arlene.anderson-vincent@waters.nestle.com

ELECTRONIC PUBLICATIONS: MARK WOLLENSAK and JOHN SHOOK (see above)

WEBMASTER: JOHN ESCH, eschj@michigan.gov

MBGS PUBLICATIONS

<http://www.mbgs.org/publications.html>



Prices include postage, handling and any applicable sales tax.
Orders for publications should be prepaid in U.S. Funds and addressed to:

MBGS — Publications
P.O. Box 14044
Lansing, MI 48901-4044

Historical CD #1: Nine out-of-print publications from 1949 through 1965 and 1998, 2000, \$15

- The Stratigraphy of Manitoulin Island, Ontario, Canada, June 19-20, 1954
- The Devonian and Silurian Rocks of Parts of Ontario, Canada and Western New York, June 22-23, 1951
- The Traverse Group of the Northern Part of the Southern Peninsula of Michigan, June 16-17, 1949
- The Devonian Strata of the London-Sarnia Area, Southwestern Ontario, Compiled by Erwin C. Stumm, Lewis B. Kellum and Jean Davies Wright, June 9-10, 1956
- The Ordovician Rocks of the Escanaba-Stonington Area, Led by R. C. Hussey , June 2-3, 1950
- The Niagara Escarpment of Peninsular Ontario, Canada, June 18-19, 1955
- Lower Paleozoic and Pleistocene Stratigraphy Across Central Wisconsin, Compiled by C. E. Prouty, Led by L. M. Cline, J. L. Hough and R. F. Black, 1960
- Classic Silurian Reefs of the Chicago Area, by Donald G. Mikulic and Joanne Kluessendorf , June 27, 1998
- Geology of Central Ontario, Canada, 1965

Historical CD #2: Four out-of-print publications from 1947, 1959, 1983 and 1991, 2001, \$15

- Copper Country Field Trip, Michigan, June 20-22, 1947
- Geology of Mackinac Island and Lower and Middle Devonian, South of the Straits of Mackinac, June 12-14, 1959
- Tectonics, Structure and Karst in Northern Lower Michigan, August 1983
- Geology of the Pictured Rocks, Upper Peninsula, Michigan, July 11-13, 1991

Historical CD #3: Six out-of-print publications from 1948, 1952, 1990 - 1995, 2001, \$15

- Pleistocene and Early Paleozoic of the Eastern Part of the Northern Peninsula of Michigan, June 18-21, 1948
- Stratigraphy and Structure of the Devonian Rocks in Southeastern MI and Northwestern OH, June 20-21, 1952
- Lower Ordovician and Upper Cambrian of Wisconsin , May 10-12, 1990
- Guidebook to the Precambrian Geology and Metallogeny of the Central Upper Peninsula of Michigan September 12-13, 1991

Historical CD #4: Six out-of-print publications from 1957, 1958, 1961, 1967, 1968 and 1970, 2004, \$15

- Silurian Rocks of the Northern Peninsula of Michigan , 1957
- Cambrian Geology of Parts of Dickinson and Iron Counties, Michigan, June 1958
- Geologic Features of Parts of Houghton, Keweenaw, Baraga and Ontonagon Counties, Michigan, May 19-21, 1961
- Correlation Problems of the Cambrian and Ordovician Outcrops Areas, Northern Peninsula of Michigan 1967
- The Geology of Manitoulin Island, June 1968
- Devonian Strata of Alpena and Presque Isle Counties, Michigan 1970

Historical CD #5: Five out-of-print publications from 1971, 1989, 2001, and Oil & Gas Fields Vol. 1 & 2, 1969 & 1992, 2006, \$50

- Oil & Gas Fields Symposium, Volume 1, April 1969, 200 pp., maps, illus., second printing with updates
- Oil & Gas Fields Manual of the Michigan Basin, Volume 2, 1992, 520 pp., maps, illus.
- Glacial Geology of Southwestern Michigan, 1989, 53 pp. by A. Kehew, L. J. Schmaltz, and W. T. Straw
- Geology of the Lake Erie Islands and Adjacent Shores, 1971, 65pp., maps, illus. by Jane L. Forsyth
- Glacial Geology of Southwestern Michigan, Landforms of the Lake Michigan Lobe, Southwestern Michigan, 2001, AAPG Eastern Section Meeting Field Trip, 32 pp., maps, illus. by A Kehew and A. Kozlowski

Historical CD #6: Six out-of-print

publications from 1946, 1953, 1963, 1966, 1978 & 1987 plus the Richfield Challenge, 1952 & Tom Knapp's MS Thesis, 2007 \$15.

- Guidebook for Ordovician Stratigraphy of the Cincinnati, Ohio and Richmond, Indiana Areas, June 12, 13, 1953 by W. H. Shideler and B. T. Sandefur
- Guidebook for Ontario Geological Excursion to Kettle Point – Owen Sound- Waubesa, June 21, 22, 23 1946 by W. A. Roliff, C.S. Evans and J.F. Caley
- Guidebook for the Stratigraphy of the Silurian Rocks in Western Ohio, May 31-June 2, 1963 by C. H. Summerson, Jane L. Forsyth, Karl V. Hoover and J. R. Ulteig
- Guidebook for Cambrian Stratigraphy in Western Wisconsin, May 21, 22, 1966 by Merideth E. Ostrom
- Geology of the Manitoulin Area, Special Papers #3, September 29, 30 and October 1, 1978 by J. T. Sanford
- and R. E. Mosher
- Middle Devonian Cratonic Carbonates and Shales in Southwestern Ontario, November 14, 1987 by Bruce Wilkinson
- The Richfield Challenge, A Review of the Richfield Developments in Michigan, 1952 by Gordon H. Hautan
- A Theory of Rogers City and Dundee Relationships in Central Michigan, Masters Thesis, 1947 by Tom Knapp

Historical CD #7: Field Guidebooks from 1962, 1969, 1977, 1980, 1985 & 1988, \$15

- Silurian Rocks of the Southern Lake Michigan Area, 1962, James H. Fisher, Chairman, MBGS Annual Field Conference
- Studies of the Precambrian of the Michigan Basin, by Harold B. Stonehouse, 1969
- The Geology of the Marquette District: a Field Guide By F. W. Cambray, 1977
- Ordovician and Silurian Geology of the N. Peninsula of Michigan, 1980, R.B. Votaw, 40 pp., illus., maps
- Special Paper #4: Ordovician and Silurian Rocks of the Michigan Basin and its Margins, 1985 K.R. Cercone and J.M. Budai (eds.), 96 pp., illus.
- Upper Keweenaw Rift-Fill Sequence, Mid-Continent Rift System, Michigan, 1988, P.A. Daniels and R.D. Elmore, M.S. Wollensak, ed., 150 pp., illus., maps

OTHER SPECIAL OFFERS

- **Historical CD Set - # 1 – 7 (detailed above) for a special purchase price of \$95**
- **NE Lower Peninsula Geological Field Conf., 2004, T. Black, M. Wollensak, On CD \$10**
- **Stratigraphic Lexicon for Michigan, 2001, prepared by MBGS and published by DEQ, \$4**
- **Robert E. Mosher Geological Studies** A lifetime of geological research on Silurian Rocks with John T. Sanford. The disks are organized chronologically and include field work in North America and Europe. 2007, 2 CDs \$35.

**SAVE THE DATE:
02.13.2018**



SUMMIT ON EXTRACTIVE INDUSTRIES

Michigan's mineral, stone, sand, gravel, crude oil and natural gas industries are a vibrant and little-known part of Michigan, providing essential building blocks for our lives. Please join us for a policy discussion as we work to:

- **INCREASE AWARENESS OF THE STATE'S EXTRACTIVE INDUSTRIES AS A VALUABLE BUILDING BLOCK TO MICHIGAN'S FUTURE.**
- **ENCOURAGE INVESTMENT AND GROWTH OF MICHIGAN'S EXTRACTIVE INDUSTRIES THROUGH SOUND, FACTUAL, SCIENCE-BASED POLICY DEVELOPMENT.**
- **BUILD COLLABORATIVE PARTNERSHIPS BETWEEN INDUSTRIES, COMMUNITIES AND GOVERNMENT.**



KEYNOTE SPEAKER:
Michigan Governor
RICK SNYDER

KEYNOTE SPEAKER:
Author, "This Brave New World"
ANJA MANUEL



AIPG Michigan Section Announces the



TH ANNUAL

Environmental Risk Management Workshop
Emerging Contaminants & Pathways:
A New Paradigm



Call for Abstracts

The American Institute of Professional Geologists' (AIPG) Michigan Section is calling for abstracts for the 8th Annual AIPG Michigan Workshop to be held June 12-13, 2018, at the Ralph A. MacMullan Conference Center on Higgins Lake in Rosecommon County, Michigan.

This 8th workshop in the series of annual training events hosted by the AIPG Michigan Section focuses on providing quality technical information and case studies. These environmental workshops bring together a broad base of topic expertise from consulting, regulatory, academic, and owner perspectives. This unique workshop forum promotes collaboration for solving tough environmental problems through real site case studies as valuable technical learning tools to develop strategies for evaluating and managing risks associated with releases of hazardous substances to the environment.

The theme for this year's Environmental Risk Management Workshop is **Emerging Contaminants & Pathways: A New Paradigm**. The discovery of new hazardous substances in the environment is becoming a driving force in the environmental industry with ever evolving information ranging from the discovery of the hazardous substances to finding remedies and management strategies to prevent exposure and protect human health and the environment. These emerging contaminants include substances like Per- and polyfluoroalkyl Substances (PFAS), pharmaceuticals, 1,4-dioxane, perchlorate, brominated flame retardants, energetics, insensitive munitions, etc.

Additionally, as more information is discovered about hazardous substances and their toxicity and associated exposure routes, certain pathways like volatilization to indoor air are also emerging as more serious concerns than once thought.

As these emerging contaminants and pathways are introduced and we look for means to assess their toxicity, their sources, their behaviors in the environment, associated legal concerns and how to manage exposures and implement remediation technologies, sharing information as practitioners in the environmental industry is crucial to addressing these new concerns in a timely manner to prevent unnecessary exposures.

The AIPG Michigan Section is seeking abstracts for new case studies that highlight the many aspects of emerging contaminants and pathways from a risk management perspective.

The presentations at this workshop will focus on how emerging contaminants and pathways are identified, how toxicity is determined, how to characterize and evaluate their fate and transport, legal concerns, and management and remediation strategies. This workshop will provide the same thought provoking, high quality technical presentations and discussions that have come to be expected of the AIPG Michigan Section's annual workshop. As professionals working in the environmental industry sharing the latest information on the advances in the science as well as the regulatory requirements and other legal issues, we can make better, informed decisions regarding the risks associated with these substances in the environment.



Submission Deadline: January 19, 2018

MICHIGAN BASIN GEOLOGICAL SOCIETY

FIELD EXCURSION SPRING 2020

A GEOLOGICAL EXCURSION BY RAFT ON THE COLORADO RIVER THROUGH THE *GRAND CANYON* - LEE'S FERRY TO WHITMORE WASH PAGE, ARIZONA

- DATE:** May 2020, actual dates and length of trip (9-10 days total) to be determined in late 2018. Anticipate starting the trip at the start of the 3rd week in May.
- FEE:** Estimated at \$3,200 each (rafting trip only) for MBGS Members. Each participant will be responsible for round trip air travel (to Page, AZ and return from Las Vegas, NV), lodging, possibly surface travel and food outside of rafting trip.
- LEADERS:** ***Dr. Katherine McCarville, Pd.D.***, Professor of Geosciences, Upper Iowa University, Fayette, IA
- REGISTRATION:** A preliminary signup list is now being assembled for those interested in this trip. Email Mark Wollensak at wollensak@voyager.net to get your name on the prelim list. A non-refundable (but transferrable) down payment of \$500 will be required at the time our river expedition outfitter sets the firm dates for the trip (late 2018). There is a maximum of 30 participants.
- OUTFITTER:** **Hatch River Expeditions, Flagstaff, AZ**
www.hatchriverexpeditions.com/grand-canyon-motorized-rafting-expeditions
A 7 day Grand Canyon rafting trip through Hatch includes: 188 miles of rafting from Lee's Ferry to Whitmore Wash, pre-trip stay at Cliff Dwellers Lodge included, Helicopter ride & return flight to Las Vegas or Marble Canyon included. Meals, beverages, camping gear and dry bags are provided by Hatch while on the river.
- TRIP BACKGROUND:** The Michigan Basin Geological Society (MBGS) is returning to raft the Colorado River through the Grand Canyon in May of 2020. This is a repeat of the 2005 trip taken except this trip will be led by a highly experienced Dr. Kata McCarville, Upper Iowa University. Many repeat stops are anticipated to be visited such as Lava Canyon, Redwall Cavern, Nankoweap Grainery and Havasu Canyon. New stops are also anticipated. The Grand Canyon is the first on the list of the Seven Natural Wonders of the World.
- GEOLOGICAL BACKGROUND:** The geology of the Grand Canyon area includes one of the most complete and studied sequences of rock on Earth. The nearly 40 major sedimentary rock layers exposed in the Grand Canyon and in the Grand Canyon National Park area range in age from about 200 million to nearly 2 billion years old. Most were deposited in warm, shallow seas and near ancient, long-gone sea shores in western North America. Both marine and terrestrial sediments are represented, including fossilized sand dunes from an extinct desert. There are at least 14 known unconformities in the geologic record found in the Grand Canyon. *Wikipedia*

MICHIGAN BASIN GEOLOGICAL SOCIETY

FIELD EXCURSION SPRING 2020

A GEOLOGICAL EXCURSION BY RAFT ON THE COLORADO RIVER THROUGH THE *GRAND CANYON* - LEE'S FERRY TO WHITMORE WASH PAGE, ARIZONA

PHYSICAL REQUIREMENTS: We anticipate this trip will be challenging for some to adjust to the environmental conditions, including heat, cold, elevation, weather, water and sand. If you have factors that could make a trip more difficult including age, weight, lack of conditioning, and heart or other diseases, consider talking to a doctor before committing.

Here are some minimum requirements you must be able to meet to safely enjoy your journey:

- Able to fit into a Type 5 Life Jacket (max chest size 58");
- Ability to hold onto the raft while going through whitewater. Ropes are provided throughout the raft for hand holds;
- Capable of climbing onto and off of the raft. There will be about a 2 foot step up/down from the raft to the beaches. Please note that some surfaces may be wet and slippery;
- Comfortable walking on uneven, rocky terrain. Trails in Grand Canyon are not regularly maintained. Each day will have up to two hikes. Some hikes will start upstream from where we get picked up at a later time downstream. In these instances, the hike must be completed within the time allotted and returning to the starting point is not possible. Some hikes may be through a stream against moving water. One hike anticipated is approximately 3 miles on rough terrain and within narrow rock canyons. Also sand beaches are the norm for camp sites so make sure you are comfortable walking across the sand inclines;
- Able to carry your own personal gear to and from camp. The maximum weight for personal gear is 25 pounds.

Recommended Pre-Trip Conditioning Activities:

- Find and hike local trails that have elevation gain and loss;
- Use the incline feature on machines at your local gym (or take the stairs wherever you go);
- Walk and hike on uneven terrain to prepare for rocky trails;
- Purchase hiking shoes or cross training shoes and hiking sandals and break in ahead of time to avoid blisters; and
- Get in the habit of drinking water throughout the day – it's good for you every day, but mandatory on the river!

MICHIGAN BASIN GEOLOGICAL SOCIETY

FIELD EXCURSION SPRING 2020

A GEOLOGICAL EXCURSION BY RAFT ON THE COLORADO RIVER THROUGH THE *GRAND CANYON* - LEE'S FERRY TO WHITMORE WASH PAGE, ARIZONA

Biography: Dr. McCarville (Kata) has roots in the midwest but grew up in California. She studied geology at UCLA as an undergraduate, and worked as a uranium miner in Wyoming after graduation. She took a masters degree in geology Colorado School of Mines, working on uranium deposits in the Red Desert basin of Wyoming, and then worked for a number of years in computing and networking at universities and for engineering consulting firms. As a Bush Foundation Leadership Fellow, she did her doctoral work in avian paleontology of Fossil Lake, Oregon, at the South Dakota School of Mines. Her work resulted in an innovative interpretation for the locality.

Kata got started with Grand Canyon geology while working with John Warme on a number of projects. She has led or co-led numerous Grand Canyon geology rafting trips (including the 2005 MBGS trip), and organized and led many other geology field trips. Born at the confluence of the Missouri and Mississippi Rivers, she is a river rat. She's spent time on and along the Colorado, Green, Platte, Snake, Mississippi, and many of Iowa's rivers.

Kata is a member of the faculty at Upper Iowa University in Fayette, Iowa, where she coordinates the Environmental Science degree program. She teaches a wide variety of courses in geosciences and geography, and chairs the Department of STEM. Her interests span the earth and environmental sciences and often cross disciplinary boundaries. Her current research centers on the role of disturbance in prairie ecosystems, and the origins of the Iowan Erosion Surface. She enjoys mentoring students, and has supervised student projects in trumpeter swan restoration, wildland fire education, fish species in Grand Canyon, squirrel nest-tree selection preference, assessment of a local shooting range for lead contamination, and GIS-based studies of the distribution of algific talus slopes that serve as refugia for Pleistocene species, among others.

An advocate for diversity in STEM, Kata serves as UIU Campus Director for the Louis Stokes Alliance for Minority Participation in STEM disciplines, and as Co-Principal Investigator on an NSF-funded project called STEM-Pros: Growing More STEM Professionals in the Heartland.

1936

MICHIGAN BASIN GEOLOGICAL SOCIETY

FIELD EXCURSION SPRING 2020

A GEOLOGICAL EXCURSION BY RAFT ON THE COLORADO RIVER THROUGH THE *GRAND CANYON* - LEE'S FERRY TO WHITMORE WASH PAGE, ARIZONA

PROPOSED ITINERARY:

- Day 1: Travel by plane to Page, Arizona (or arrive previous day). Hatch will pickup participants at the Page, AZ airport (or hotel) for transportation to Cliff Dwellers Lodge. We anticipate sightseeing in afternoon which may include Glen Canyon Dam, Navajo Bridge, Marble Canyon, Horseshoe Bend and the Navajo Sandstone. A group dinner in evening at the Cliff Dwellers Lodge. A speaker is being arranged following the dinner.
- Day 2: Depart Lodge to Lee's Ferry. Load raft and begin rafting trip on Colorado River in the Grand Canyon. Day 1 on River.
- Day 3-8: Days 2 -7 on River. Stops and/or hikes may include Redwall Cavern, Nankoweap Grainery, Carbon Creek/Lava Canyon, Phantom Ranch, Elves Chasm, Havasu Canyon and Lava Falls. Camping will be on sand bars along the river suitable to accommodate 2 rafts of participants. Anticipate one party night "Margarita Night" on the river.
- Day 8: Day 7 on River. Arrive at Whitmore Wash for helicopter ride out of canyon to Whitmore Landing. Fly out of Whitmore Landing International Airport for Las Vegas or Marble Canyon. Lodge in Las Vegas or Marble Canyon/Page.
- Day 9: Depart for Home.