Monday, July 14

Twelve Iowa students and four Iowa science educators began their journey west to study the ecology and geology of Wyoming and western South Dakota and answer the question, “Why outdoors (WYOOutdoors)?” That is,

1. Why learn about the science of nature and the nature of science?
2. Why teach about nature?
3. What are good science teaching strategies?

The group included seven high school girls, five high school boys, an ISU science education doctoral student (Andrea Madsen), an ISU earth science education graduate (Chris Sindt), a middle school science teacher (Carla Wood), and a high school science teacher and Newton STAR Club advisor (John Williams).

The first major stop was in the Loess Hills, where students hiked and learned about this rare accumulation of sediment from glacial floodplains and its associated flora and fauna. Due to special arrangements, the Dorothy Pecaut Nature Center, usually closed on Mondays, opened for our group.

The miles passed with a Handbook Bingo game, icebreakers, content and motivation pretests, and introductory geology activities. An introduction to the Badlands took the form of a KWL chart, with students relating what they knew about the Badlands, what they wanted to learn, and how they planned to find answers to their questions. The KWL chart served the dual purpose of introducing the Badlands and introducing students to an effective teaching tool that uncovers students’ prior knowledge and misconceptions. During their stay, students learned that the Badlands are due mainly to deposition and erosion and geologically speaking, will be short-lived.

After setting up camp in the Badlands, ... took a hike at sunset and I got to see a pronghorn on top of one of the rock formations with my binocs ... it was one of the most magnificent things I have ever seen. Then I had like 30 bats just looping and flying right over my head. I also saw a fault. I also got to climb a ladder up about 30 feet and I got to see volcanic ash that had a chemical change that made it clay and learned that that is what they put in most makeup and is what they use for mud baths and facials.

— Seth Leaton, Iowa City

Journaling in the Badlands.

Regular reflection and journaling offered students insight into learning and teaching and were a refreshing respite from the usual fast pace of the camp.

It is so quiet now. It’s early in the morning, the birds are singing and the rabbits and deer are out and about.

— Jared McGovern, Peosta
Tuesday, July 15

Yesterday’s night hike was what I thought the most interesting thing ever, but Wind Cave today was even better. Okay, not better, but way cool... Oh man, I have to go back.

— Amy Xu, Fort Dodge

Students thoroughly enjoyed touring Wind Cave, famous for its abundant and unusual boxwork formations composed of thin calcite. They also enjoyed learning the role atmospheric pressure played in the discovery of the cave.

The Mammoth Site at Hot Springs is the world’s largest mammoth research facility, an active paleontological dig site. Students learned the fascinating history of the 26,000 year old site that formed when a large karst sinkhole collapsed, forming a 60-foot deep hole from which a warm spring percolated, dissolving limestone and creating a pond so steep-sided that animals drinking from the pond could not gain a foothold to escape. Mammoths, camels, giant short-faced bears and other Ice Age animals were gradually covered with layers of silt, other sediments, and more animal remains. A building was constructed over this important paleontological site to protect it.

On this trip, students were exposed to many different teaching forms and styles. Evaluating the many options available was a consideration in choosing how they would teach others about something they’d learned on the trip, a requirement at the end of camp.
The Mammoth Site was phenomenal! We went on the traditional tour and saw the bones excavated, etc. But then after that, we got a lab tour. It truly showed me an option to consider for my career. They were showing us how they preserve them, how and where they store them and how they mold them. They also showed us how they excavate them from the little bit of rock that is left.

— Bradie Kiefer, Kellogg/Colfax

Touring the bone beds of the Mammoth Site.

Students just scratched the surface of the Black Hills’ complex geology, that besides karst also includes igneous activity, metamorphism, faulting, and folding.

It was a pleasant camping night at Sheridan Lake, complete with a swim in the lake.

*We were all pretty stinky after going for 2 whole days without a shower, so we all “showered” in the lake. ... We don’t smell like sweat anymore, now we smell like lake!*  
— Allison Rick, Davenport
Scientists are not always in agreement in interpreting phenomena, and students learned that the origin of Devil’s Tower has long been a source of disagreement.

A ranger spoke to the group about the geologic and natural history of the area.

After Devil’s Tower we drove into the mountains, my first time, ever!

— Bradie Kiefer, Kellogg/Colfax

Big Horn Mountains … this beautiful blanket of furry trees, just covering the entire mountainside. We got to the campground …

— Amy Xu, Fort Dodge

We set up our tent right by the creek!

— Bradie Kiefer, Kellogg/Colfax

… jump into our suits…. It was dark. .. the water was cold but wet and we washed our hair …I was looking at the stars, and the sight was, is, amazing. Glittering black sky dotted with flecks of sparkling light. Beautiful.

— Amy Xu, Fort Dodge

… we went and actually swam in this freezing cold water. It was absolutely phenomenal! Definitely an experience, to swim in a mountain creek. So incredibly awesome!

— Bradie Kiefer, Kellogg/Colfax

Fun campfire going now. HOT DOGS … and s’ mores and chips and everything.

— Amy Xu, Fort Dodge
… at 4:30 the sun was already up. So, we sat outside freezing our tootsies off, watching the moose. It was absolutely awesome getting to see it so up close, like 30 feet away. We all watched in silence for about 20 min., and it was beautiful. … watched Cindy wash her hair with Katie with a canteen. 

— Amy Xu, Fort Dodge

The students enjoyed viewing wildlife in the BigHorns, but some of the planned activities were preempted when loose tires on the trailer had to be repaired. The Medicine Wheel Archeological site and fossil site above treeline on Hunt Mountain could not be visited.

Thursday, July 17

Dr. Erik Kvale, geology professor at the University of Indiana, new ISU Geology Field Camp Director, and discoverer of the Red Gulch Dinosaur Tracksite near Shell, Wyoming, spent the day helping students learn about the treasures of the Big Horn Basin. He showed how scientists glean information from dinosaur tracks, led students to an anthill where ants had mined small fossils, and led them to a current excavation site.

… by using fossils they found out that this part of Wyoming wasn’t actually under water but just a tide pool.

— Gretchen Roth, Newton

This was a perfect lesson on one aspect of the nature of science. Publications reported Wyoming quite underwater until Dr. Kvale discovered these dinosaur tracks in 1995!
I’ve never seen dinosaur footprints or bones before and it’s really weird to see things that are 160 million years old.

— Gretchen Roth, Newton

... got some dinosaur gizzard stones they swallow to help them digest their food.

— Seth Leaton, Iowa City

We tasted fossilized (dinosaur) bone, and it sticks to one’s mouth apparently. I also ate dirt at the track site; they made [let me identify mudstone and silt. Ugh! Ate a lot of rock today.

— Amy Xu, Fort Dodge
Jared welcomes contact with one of the Big Horn Basin’s living creatures.

Following the Big Horn Basin adventures, the group traveled back into the mountains and enjoyed such sights as Shell Falls. At Shell Falls, the students could see Precambrian granite, Cambrian rock units, and jointing in the rock that controlled the location of the falls. That night they slept in real beds and had real showers at the Greybull Motel.

*Showering felt so good let me tell you. First non-river, non-lake, non-creek, actual modern plumbing.*

— Amy Xu, Fort Dodge

Friday, July 18

This morning, the group took in a quick trip to world-renowned Sheep Mountain Anticline. The huge readily-apparent fold in the sedimentary rock layers is stunning testimony to the mountain-building forces that shaped the area. Professional geologists from around the world come to here to study the mechanics of folding and other geologic features.

*We saw a ton of neat stuff like the big anticline and we also saw shale and got bentonite to make masks*

— Gretchen Roth, Newton

Then it was on through southeast Yellowstone National Park and into Grand Teton National Park for an appointment at the Teton Science School. Students and staff alike were motivated by the ecological mission of the TSS and its many offerings.

The students learned of the active fault to which the Tetons owe their existence, and viewed classic stream features, both geological, such as a variety of bar types, and ecological, such as succession. Here and throughout the trip, students were rarely lectured to, but were asked thought-provoking questions. This enhanced their learning and modeled good teaching technique.

The group camped at Colter Bay Campground.
Saturday, July 19

Saturday was devoted to a full day hike in the Disappointment Peak area of the Tetons, to Amphiteater and Surprise Lakes. And what surprises were in store! Glacial features abounded, such as cirque lakes, glacial striations, glacial rubble fields and glaciers themselves, but wildlife was by far the highlight.

*I saw an elk huge and majestic. I saw bison rulers of the prairie. Squirrels, prairie dogs, ground squirrels, pikas, marmots, woodchuck, deer three feet away and didn’t care we were there. The best and most exciting part so far was the two-year-old wild black bear that came within 5 feet of us and warned us with a fake charge.*

*I will never ever forget what I saw here and will try for the rest of my life to conserve, use less, and respect the animals and give them the room they need.*

— Jared McGovern, Peosta

I’ve never witnessed such an in-depth argument about marmot types.

— Megan MacNeill, Newton

An all day hike in the Tetons, from the bottom to Surprise and Amphitheater Lakes. Very different emotions on this hike. This was an awesome scenic sight, and so many animals were observed in their natural environment. We were 10 feet away from a deer, close enough to touch chipmunks, squirrels, and marmots. Getting up the mountain was very tough. The glacier lake was so incredibly clear.

— Amy Xu, Fort Dodge
I was utterly amazed at my own strength and power.

— Bradie Kiefer, Kellogg/Colfax

In the evening: showers, laundry, card games -- enjoying a second night in the same location, Colter Bay Campground.

Students learned in a wide variety of areas on the trip:

I felt like an idiot because I did not know how to do my own laundry.

— Anonymous

Sunday, July 20

Heading north into Yellowstone, the camp learned about fire ecology at Grant Village Visitor Center and arrived at Old Faithful just 3 minutes before it erupted! The group toured numerous geyser basins and hot springs. Students found that their knowledge of physical science was of great help in trying to understand the workings of Yellowstone’s thermal features and the series of volcanic events that shaped it.

At the crowded Firehole Falls parking lot, the group met the President of Iowa State University! He even got to hear John’s talk on the paint pots!

Not many people, especially my age today, can say they’ve really experienced the outdoors. Honestly, I haven’t either. We’ve done the camping and the site-seeing, but that really isn’t “it” yet. I think I have a problem with the outdoors because sometimes I feel like it’s so immensely big I would never be able to be a part of it. So I guess WYO outdoors is to let people who aren’t close to nature try to make themselves part of the bigness.

— Megan MacNeill, Newton
Monday, July 21

Today was definitely a waterfall day. We got up early to see the falls and the thing is I can’t even say how cool it was. Totally cool. Way cool... Well, we saw the waterfall from so many angles. At one I just sat and watched the mist rise from the falls and gazed at the river water/glass. I just stared. It’s so easy to just write and look and not think. It’s really calming to not think that way, to be totally unaware of everyone else, yourself, and at the same time be totally aware of the surroundings. It’s the best way to see, because so many times we all just snap a picture and leave.

— Amy Xu, Fort Dodge

The group toured Artist’s Point, petrified trees, and Tower Falls. Upon returning to the Roosevelt Roughrider cabins, the students participated in a model activity on the use of pollen to decipher Yellowstone natural history. Palynology was new to many students and captured their interest, as did learning of all that was involved in the actual research upon which the activity was modeled. Some overdue down time followed by evening wildlife viewing in Lamar Valley rounded out the day.
We saw a huge herd of over 400 buffalo. It was amazing.

— Joe Decker, Farley

Saw coyotes hunt antelopes in Lamar Valley.

— Gretchen Roth, Newton

...you see stuff that is so beautiful it takes your breath away, so magnificent it makes your heart pound, so full of greatness it sweeps you off your feet. That’s how it is. I’m on this rock that you will not believe it’s right on the river and all of the above.

— Amy Xu, Fort Dodge
Tuesday, July 22

A ranger led a tour of Mammoth Hot Springs in the morning. Though the ranger made a last-minute change that did not allow the group to tour the backcountry of the area, learning the story of these colorful travertine terraces was very interesting.

The next stop was along Firehole River:

The water hole was so awesome. It was hard to swim against the current, but jumping by those rapids was so much fun! [Jumping] off of those rocks was great also. The water wasn’t clear at some areas, but deep and just pretty. I had such a rush when the water would carry me downstream and I had to swim furiously...

— Amy Xu, Fort Dodge

Firehole River swim.

The wolf program after lunch was pretty interesting; the ranger talked about roles of alpha males and females, lifestyles of wolves, and the reintroduction of wolves into Yellowstone...

Andrew and Amy examine a coyote skin with Ranger Trudy.
... she had John hide a wolf collar, and we had to use a tracking device to find it before we could swim. Well, after FOREVER, we (Quinn) found it in a bush.

— Amy Xu, Fort Dodge

I’ve been to Yellowstone before but ... It’s so much more fun to know the geology behind all the stuff we see.

— Gretchen Roth, Newton

I’ve found out that science is much easier to learn when it’s taught in the field. It’s so much easier to ask questions and understand the answers when the subject’s right in front of you.

— Megan McNeill, Newton
Wednesday, July 23

This morning, we found out that a bear had been in our campsite.

— Amy Xu, Fort Dodge

Impressions

Teaching

Science teaching now seems more exciting and interesting to me. I never really considered teaching as a career for me, but after this trip I will definitely give it more thought because of the great examples of teachers I have experienced here.

— Amy Xu, Fort Dodge

I have been thinking about maybe becoming a science teacher, and the experience so far has just added to that.

— Quinn Palar, Urbandale

I want to be a teacher who teaches to the world with field studies. This trip taught me what I want to do for the rest of my life.

— Jared McGovern, Peosta

I think I would like to teach science ... zoology would be a great course. Geology looks interesting ...

— Andrew Richardson, Newton

I definitely have changed my mind about science teachers. It seems like John and Chris have a lot of fun teaching and it is really funny to see them go crazy about it. They showed me how fun teaching can be...

— Cindy Holmes, Runnells

This trip has really been life changing for me. I’ve always kind of enjoyed most science, but face it, learning about making shoes in science class isn’t exactly thrilling. This trip has shown me that there is so much more to science than you could imagine. I found out that geology and ecology are essential to understanding the world around us. ... I have found out that if my other options don’t turn out to be right for me it (science teaching) really would be awesome. ... teaching is definitely on my mind more than it was before. This trip has been awesome at opening my eyes to so many cool opportunities.

— Gretchen Roth, Newton
Nature

Studying geology and ecology is very important. ... maybe most importantly helps us to fill our endless curiosity about the past, present and future.

— Gretchen Roth, Newton

I want to become an ecologist because I want to help educate people about what we have been destroying.

— Jared McGovern, Peosta

Going to a national park isn’t like going to a zoo or seeing pictures; it’s a look into our land’s past. Visitors see amazing natural features ... They learn how we can preserve our land and avoid harming it. And after not showering for a few days they may learn that some things just aren’t as important as we thought. We see rivers which have spent millions of years cutting canyons the size of skyscrapers and we see wildlife that has never seen a zoo. We see things that awe us and humble us; you couldn’t see that in a library book. Every once in a while people need to see what life is all about.

— Gretchen Roth, Newton

Many people have different feelings on whether or not this is important, but I believe studying geology and ecology is very essential to living comfortably on Earth. By understanding geology, one can discover the past and at the same time, reveal the future. Rocks show a piece of Earth’s history and can show what sort of environment present during a certain time period. Rocks also harbor fossils, which are precious imprints or remains of life. Fossils tie in to ecology, because most life from the past is related to animals in the future. By understanding plants and animals in our environment, we, as humans, can learn how to share this Earth with all living things. It is very selfish of humans to live as they want and have no regard for any other. Understanding ecology can also help preserve species that have been threatened by humans. Without understanding ecology, we do not understand the consequences of our actions. By not understanding, we are ignorant, and no good can come out of that.

— Amy Xu, Fort Dodge

General

Coming to this camp has really helped me to learn a lot of things that I couldn’t at school.

— Allison Rick, Davenport

This trip has made me look at things in a whole new meaning. I will never look at a rock in the same way and it helped me conquer one of my dreams to climb a mountain.

— Seth Leaton, Iowa City
This camp... has changed my life, not only because of the great things I am seeing, but because of all of the amazing people I have met. Each person has taught me something new about this place or about myself. The staff is amazing, you couldn’t ask for a better group of people who everytime they see something cool, they fumble and bumble against each other. I was scared when I very first came here, I was scared at what Williams had gotten me into. But I have to say Thank You to Mr. Williams because this has got to be the single greatest opportunity of my life. It is teachers like him who inspire you to reach for the stars and to never give up. If I hadn’t had that, I would not be here today .. I love how the people here ask great intriguing questions to make you think.

I have to say that I will never ever forget this trip, the things I learned and saw, this trip truly has changed my life, I can’t believe all that I have been missing, I honestly had no idea.

— Bradie Kiefer, Kellogg/Colfax

It’s so amazing to me how strangers can become such good companions in less than 2 weeks. How empty faces now have names,....

— Amy Xu, Fort Dodge