



Diggin' Deep

Issue 285

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Staff Updates

Janine Clayton Becomes a Forest Supervisor!

This month, Janine Clayton, Assistant Director of the Minerals and Geology Program for the past three years, begins her new position as the Forest Supervisor of the Gifford Pinchot National Forest in Region Six. Look for details in the next issue of Diggin' Deep—March 2009.

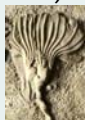
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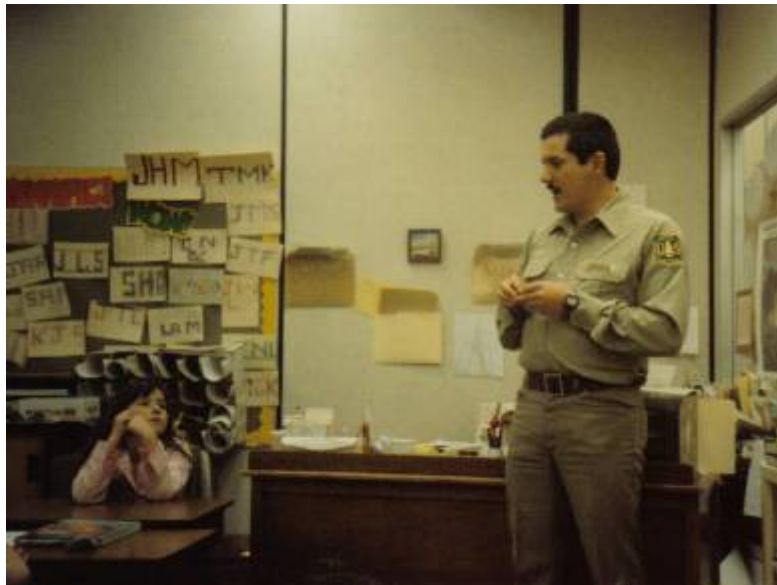
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Jim Shelden Set to Retire

In October, Jim Shelden, Region 1 Salable Minerals Specialist and GMTO Supervisor, announced his retirement plans. Jim will end his 32 years as a federal employee on January 2nd.



Jim talks to daughter Jennifer's (left) Third Grade class, a few years ago.

After receiving his BS in geology from the University of Idaho in 1975, he began his career on the Idaho Panhandle as a civil engineering tech, and later moved to the Bitterroot as a zone Lolo-Bitterroot geotechnical type.

A switch to mineral and geology came next with a hitch in Worland, Wyoming for the BLM. This work included oil and gas, a large dose of bentonite validity exams, supervising the bentonite lab, salables and the geology program. Jim came back to the Forest Service on the Clearwater National Forest to work with the placer, hardrock,

salables, geotechnical, and geology programs. Moving to the Deerlodge National Forest as Land and Mineral s staff officer in 1982 brought a taste of management team duties. In addition to being a supervisor, Jim worked as a back up grunt for the lands and minerals staff. The minerals work on the Deerlodge was heavy in locatables, including the permitting and administration of large mines. In 1989, Jim was recognized for this work permitting large mines with the Forest Service National Minerals Management award.



Jim (center) with Nancy Rusho (R1) and Tim Abing (R4) at the Alamo, after a Minerals Decision-Making class.

Moving to the Regional Office in 1988, Jim became the Salables and Geology Program team leader, and in 1995 took on Supervision of the National Minerals Training Office, now GMTO.

Jim has been married to Claudine for 34 years. They have two children, Jennifer, 30, who was married this past summer, and Kacy, 29, who was born in Arizona, while Jim was taking the BLM's Lands and Minerals training.

Like many retirees, Jim plans to do "nothing for awhile," but he intends to take Claudine to Rome and Northern Italy in 2009.

When asked for some parting wisdom, Jim replied "America's public land legacy is one of the most amazing things about our country.

Wild lands for the solace of the masses, clean water, fresh air, intact ecosystems. What a deal, and most of it is free. As a young man, the idea that I could run around these piney woods, four- wheeling and picnicking on somebody else's dime and they'd pay you, too, seemed incredible. But, low and behold, for much of my career such a thing was possible, and certainly one of the high points of my life. Remember this and do as much as you can as often as you can."

"Now as an old timer and nearly past timer I reflect that the opportunity to care for this treasure has given me much purpose. This is useful on the days when more than a paycheck is needed to leap out of bed at duck hunting hours and return just in time to catch Leno. It has been a pleasure and I thank you all past and present for your aid and companionship along the way. So for those of you who remain, now that you are working for me, I want you guys to keep the place up; I will be out to check up on you as soon as I have another cup of coffee and the sun warms up a little." -Tudi Smith, WO-GMTO

Staff Changes in Region 10

There have been some recent personnel changes in the Tongass Minerals Group (TMG); and some upcoming opportunities for the near future...

As many of you are aware, Steve Hohensee has been on an extended detail to the Chugach NF to fill the gap behind Carol Huber who retired late last year. Prior to his detail, Steve had served the Tongass NF since early in 2001. He initially arrived as one of the ten Minerals & Geology trainees hired nationwide by the W.O. and learned the minerals administration ropes at the Greens Creek Mine. After his formal reassignment to the Tongass Minerals Group, he filled as a Minerals Administrator (GS-9), and was soon promoted to Lead Minerals Administrator (GS-11) for the Tongass Minerals Group, where he earned his Level I & II certifications. His responsibilities were expanded to include managing the controversial SEIS for the Kensington Gold Project and eventually administering the major construction phase of that operation. During his 7 years on the Tongass NF he also worked with minerals administrators around the Forest on some of their plans of operations, bonding issues, the minerals infra databases, and even volunteered to be "Sammy Salmon" for a District Kids Fishing Day. Steve Hohensee has accepted a permanent position, with promotion, on the Chugach NF, as Forest Geologist & Minerals Program Manager. Steve's reporting date is December 7th.

Sarah Shoemaker has accepted the Lead Mineral Administrator position, with promotion, for the Tongass NF. Sarah's effective date is also Dec 7th. Sarah started on the Tongass NF in an interpretative program, and then initially came to us as a Minerals Administrator trainee. She quickly learned the

ropes and progressed to administering the Greens Creek Mine while providing assistance to other units around the Forest and keeping her hand in interpretative programs. In addition to continuing with other assignments around the Tongass NF, Sarah will be administering both the large mining operations at Greens Creek Mine and Coeur Alaska's Kensington Project.

Congratulations go to both Sarah & Steve on their promotions & new duty assignments. The TMG will soon advertise to fill a career ladder (GS-5/7/9) position for Minerals Administrator located in Juneau, and we are also looking to establish a SCEP position in the minerals shop to facilitate mentoring & succession planning within the minerals program for the Tongass NF & Region 10. If you have interest or questions about any of these positions, please call Jeff DeFreest, Tongass Minerals Program Manager at (907) 789-6273, or email jdefreest@fs.fed.us. -Jeff DeFreest, R10-Tongass National Forest

A New Geologist in Region Six

Hello! I'm Meg Doolittle, a newly converted SCEP on the Wallowa-Whitman National Forest. I got my bachelors degree in geology from the University of Montana-Missoula in May 2008, focusing on natural



hazards and hard rocks. I was an officer in the geology club, and helped organize Rocky Mountain GeoDays, an undergraduate research conference. I was involved in timber sports and the Forestry Club, and worked food service jobs to get through school.

I became interested in the Forest Service after my dad suggested I should take a look at getting a job(!). He knew the Agency has good programs, so I went to the Regional office in Missoula to check it out. When I realized they had a geology program, I got excited and started to apply.

After being accepted to the SCEP program, I worked on the Rogue River-Siskiyou NF, and around Region 6 in Cle Elum, WA, Prineville, LaGrande, Eugene, and Sandy, OR in the summer of 2007. I spent many field days on both engineering geology and minerals aspects of the Minerals and Geology program. I got to be involved in some research for mineral classifications, a drilling project, an abandoned mine closure, Miner's Jubilee in Baker City, and a landslide survey.

Since the SCEP conversion here in Baker City, OR, I have been mostly working with small miners and some other various projects. I was on a BAER team in central California; an eye-opening experience. All of my experiences have been challenges and I look forward to more! In the next few years I hope to continue minerals and geology training, keep up my fire qualifications, and do more projects on the forest. I am excited to be a part of the Region 6 minerals and geology team! -Meg Doolittle, R6—Wallowa-Whitman NF

A Life-Long Paleontologist

Ever since I was little, I've loved geology. My dad is a geologist, so he is to blame. I always asked lots of questions about rocks and I loved going out in the field. Almost every summer, we visited different national parks, and depending on where we were, we would hunt fossils. Fossil hunting as a kid really sparked my interest in paleontology.

During my sophomore year at Portland State University (PSU), I started working with a paleontology instructor in the geology department to learn more about the field of paleontology. About that time, I applied for the Forest Service geology SCEP program, and was later accepted on the Okanogan-Wenatchee National Forest. Living and working in Wenatchee, Washington last summer was an incredible experience, both in the



Aili hunts for shark teeth in South Dakota during the 2008 Paleo PIT project.



Aili Gusey as a paleontologist (note PPE) at her 2nd - grade Halloween Party.

personal and working sense. It was the first time I had really been away from my family and living on my own in a city where I basically knew no one. It was definitely tough, but I learned a lot about my self through this experience.

The work was amazing and I learned so much. I learned a lot about what it is like to work for the agency. I got to do so many things that I never would have been able to do if without working for the Forest Service. For example, I spent two days in the Hells Canyon National Recreation Area with several geologists and biologists looking at bat gates installed on abandoned mines in the canyon. On another several-day trip, I visited the Holden Mine, the focus of a huge CERCLA clean-up project, mapped riparian reserves around the mine site, and reviewed the results of drilling that will help characterize conditions in and under huge tailing piles. My last trip was by far my favorite, a paleontology Passport In Time (PIT) project hosted by Barb Beasley, the North Zone Paleontologist in Region 2. We spent ten days in South Dakota surveying and excavating at several paleontological special interest areas. We camped out on the Thunder Basin National Grassland and managed to survive several wind and thunderstorms.

One of the great aspects about the SCEP program is the opportunity to work with people in different fields. It's a great way to learn new things as well as to get a better idea of how the Forest Service works as a whole. The program also is an excellent way to get experience in the field that you want to pursue after college. I hope to eventually earn a graduate degree in paleontology. The Forest Service is a great agency and I would love to continue to work with them while continuing my education. -Aili Gusey, R6-Okanogan-Wenatchee NF

Upcoming Conference on Fossil Resources

Next year offers a great opportunity for those who manage, or are interested in, fossils. Plan to use your travel/training budget to attend the 8th Conference on Fossil Resources (8th CFR) in sunny St. George, Utah. Past conferences have been a big success, and have been very helpful in gaining a better



handle on the management of the great paleontologic resources present on many of our National Forest System lands. These conferences are also a great opportunity to get to know others, in the FS, other State and Federal agencies, and academia, working with fossils and their management.

- The conference will be held May 19-21
- Abstracts are due March 1, 2009
- The pre-registration deadline is April 1
- There will be a pre-conference field trip for those interested
- [Additional information and a call for papers are here](#)

Following the 8th CFR, a two-day Cretaceous Conference will be held on May 22-23 at the same venue. A post-conference fieldtrip to look at the paleo resources in the Grand Staircase-Escalante National Monument will also be held. [More information about the Cretaceous Conference here.](#)

The FS is a formal sponsor for the 8th CFR. Hope to see many of you there. -Steve Robison, R4-Caribou-Targhee

The New Ground Water Notes: Fens

Ground Water Notes is the informational Fact Sheet series developed by the Forest Service Ground Water Program. A new issue of *Ground Water Notes* on the topic of fens has been released. This issue explains why fens are important ground water-dependent ecosystems on NFS lands, identifies the threats to these valuable features, and suggests management considerations for protection and restoration. You'll [find a copy here](#). This and other *Ground Water Notes* issues will be available soon on the MGM website. -Joe Gurrieri, R4 RO

First Producing Gas Well from Federal Minerals Estate on the Ouachita NF



Scenic site of second CDX gas well drilled on the Ouachita NF in 2005 producing from private mineral estate.

A gas well drilled in November 2008 will soon produce coal bed methane from the Federal mineral estate on the Poteau Ranger District of the Ouachita National Forest in west-central Arkansas. This is the first gas produced from the Federal mineral estate on the Ouachita NF. Ross Exploration Company has been interested in the coal bed methane potential on the Ouachita NF for over 25 years, but only recently submitted their first APD to drill two wells. Production is associated with a coal seam already tapped by two other wells on the Forest, which are on split estate (Federal surface, private minerals) owned by CDX.

The Ouachita NF has had an interesting gas leasing and exploration history. In the late 1980's over \$30 million in Federal revenue was generated in just two years from oil and gas leasing on the Forest, topping all minerals revenue generated from National Forests at that time. In 1989 through 1990, the largest land based drill rig in the world was used to drill what is still the deepest well in Arkansas at 27,000 feet. Other drilling has occurred on both the Arkansas and Oklahoma sides of the Ouachita NF.

The Ozark NF in northern Arkansas has long been a gas producer, and the national focus on the Fayetteville Shale in the Arkansas River Valley has led to a significant increase in drilling and production. Currently, the Ozark has 58 wells involving Federal minerals and about 25 involving private minerals. Companies drilling and producing natural gas on the Ozark NF are also now exploring on the Ouachita NF. If those wells succeed, the Ouachita NF will cross yet another hurdle and enter a new era of increased focus and emphasis on energy minerals in the Forest minerals program.-**John C. Nichols, R8-Ouachita NF**

A La Carte Ground Water Training Offered

With the increasing complexity of ground water-related issues experienced by National Forests and Grasslands staffs, decreasing travel and training budgets, and the need for more focused training, the Ground Water Program is offering a la carte ground water training to supplement the national Ground Water Resource Management course offered through the Geology and Minerals Training Office (GMTO). These limited short courses are expected to be 1 or 2 day sessions covering topics tailored to fit the specific needs of a group of forests or a region. Examples include basic hydrogeology, inventory and monitoring of ground water resources, ground water in energy or other large-scale NEPA, etc. The advantage of this form of training is you and your colleagues can learn what you really need to know about in a short time frame at minimal per student cost. We would work with you to clarify your ground water training needs, identify appropriate instructors and set a date for the session. We would expect the sponsoring unit(s) to assure about 8-10 attendees and cover instructor travel costs.

The National Ground Water Management course offered by GMTO will continue to be offered periodically (the next offering is tentatively scheduled for May 2010). The advantage of attending the national course is to learn about the entire array of issues under the Ground Water Program, meet others facing similar ground water challenges, and experience the "national" perspective. Contact Chris Carlson (202-205-1481 or 703-605-4634; ccarlson@fs.fed.us) for more information or to request an a la carte training session. -**Chris Carlson, WO-MGM**

Abandoned Mine Closures and Bat Habitat Protection

The Mountain Top Ranger District, on Region Five's San Bernardino National Forest, and the State of California's Department of Mine Reclamation, have successfully closed seven (7) mine adits for public safety and protection of bat habitat along Forest System Road 3N03. The gates prevent the public from entering dangerous mine openings and serve to protect bat roosts and maternity wards.



This entrance was used as a camp site.

The bat gates were constructed by Louie Nuno and his son Bryan, working as private contractors. Louie is an FS retiree who, while he was working as a forest employee, constructed three (3) bat gates last year with design and direction from the Joshua Tree National Park Service, Branch Chief Luke Sabala.

Don Buyak, helped construct and install the road gates, Randy Ridges of AmeriCorps helped with the logistics and the County of San Bernardino helped remove truck loads of trash from the mine site. -Raj Daniel, R5-San Bernardino NF

Hot Topic: 2008 Forest Service Uranium Workshop

On November 18-20, 2008, Region 3 hosted a Forest Service Uranium Workshop in Albuquerque, NM. Mineral specialists and mineral administrators from Regions 1, 2, 3, 4, 9, 10 and the WO attended the session. In addition to Forest Service personnel, representatives from the U.S. Geological Survey, the Nuclear Regulatory Commission, various state agencies, and industry took part in the workshop; in all, 48 people attended.

Workshop topics included: industry perspectives, geology of uranium deposits, radiation safety, in-situ leach recovery technology, current uranium exploration and mine projects on FS land, and uranium reclamation activities. On the second day of the workshop, staff from the Cibola NF led a field trip, with a stop at the Grants Mining Museum (with a wonderful replica of an underground uranium mine), a tour of the currently moth-balled Mount Taylor Uranium Mine, and lastly, uranium reclamation activities in the Ambrosia Lake mining district, near Grants, NM. The Grants area of northwestern New Mexico was the leading producer of uranium concentrate (yellow cake) in the country from the 1950s thru 1980. Of particular interest to many in the group is the current uranium exploration and mine projects on the Cibola NF that are within the recently designated traditional cultural property (TCP) of Mount Taylor. This site is a sacred mountain to numerous Southwestern tribes and pueblos. -Michael Linden, R-3 M&G Group Leader



The field trip group at the Mount Taylor Mine. November

2008 Return to Minnetonka Cave

As noted in my previous Diggin Deep article (#284, September 2008), the stalagmites collected from Minnetonka Cave in 2007, for paleo-climate research, did not contain data from the desired time-frame. There appeared to be lots of good data in the samples, but not the right data for the current research project. What is to be done? Well, the University of Utah simply asked permission to return to Minnetonka Cave, to collect additional samples. That's fine and dandy, but of course, they can't just come and collect every formation in the whole cave, one or two at a time, in hopes of finding one that works for them. How do we allow and encourage valid scientific research, while still protecting the cave and its resources properly?

Well, what was actually wrong with the samples we collected last year? They were good samples, but they were simply quite a bit too old. When collected, the samples had looked like they had only recently been broken, and they looked like they had been fairly active before being broken, but we couldn't prove either of those assumptions. They only looked recent. If we went back to Minnetonka Cave for additional samples, how would we know if any of the potential samples were any younger? And if more recent formations did exist within the cave, how could we tell which ones they were? The answers were obvious. We needed to find stalagmites that were not previously broken, and were obviously and actively dripping and growing. In other words, we needed to find and damage one of the pretty ones. Not on the tourist route of course, but somewhere in the cave.

I talked with the local cavers to see what my options were. Sure enough, one of the cavers knew of an active formation area, deep in a remote section of Minnetonka Cave. Down through a huge pile of collapse boulders, down through a tight and awkward squeeze, down a short hand-line rope, then up another hand-line, there was an active formation area with several nice formations like the ones being sought. How do we know the formations are actually growing, and not simply wet? Someone in the past had drawn on some of the formations, in crayon, to make arrows pointing the way out. Since that time, perhaps 50



Zachary Lundeen (University of Utah Graduate Student) Collects a Stalagmite from Minnetonka Cave, August 2008

years ago, the formations had overgrown the markings and incorporated them. It sounded like what we were looking for, so we planned a trip.

We returned to Minnetonka Cave, on August 5, 2008 in search of a suitable stalagmite for the University of Utah to collect. We found the area in question, but none of the available formations seemed like the right one, so we pushed onward, through another tight crawl, higher and higher into the remote sections of the cave. At last, we found the right stalagmite. Not the largest or the smallest, or the most scenic, but a well-formed and actively dripping stalagmite, somewhat hidden behind a larger one. We probably spent an hour cutting away at the base of the stalagmite, and got about 1/3 of the way through, before we were able to pop the stalagmite free from the flowstone floor of the cave. The things we do for science. I never knew cave vandalism was such hard work, even for a good cause. We spent another hour or more getting back through the tight passages, and down and up the ropes, to get back to the main passage and tourist trail. Walking casually past the tourists, we had accomplished our goal, and collected a suitable cave formation for the paleo-climate research. Or had we? The newly collected cave formation went home with the University of Utah graduate student, but we don't yet know how old it is. Will this cave formation contain suitable data from the last 10,000 years, or will it also be too old? We'll have to wait and see. -David Herron, R4-Ashley National Forest

Documenting Hourglass Cave

This short report is simply documentation of a fun adventure, investigating rumors of a possible new tourist cave in Southern Idaho. Hourglass Cave is a challenging and well-decorated vertical cave, located on the Caribou-Targhee National Forest, in Southeastern Idaho. It first came to my attention in the spring of 2006, when local cavers reported rumors of a new, remote, and well-decorated vertical cave on the Caribou-Targhee National Forest. This is nothing particularly surprising, since new caves are certainly being discovered from time to time. However, the rumors suggested that this cave had actually been discovered about 20 years earlier, that the discovery had been reported to the Forest Service, and that it had been recommended to the Forest Service as a possible new tourist cave. At



Formations in Hourglass Cave

that time, the local Forest Service staff apparently had neither the time or desire to investigate these claims, nor did they have the equipment to safely descend the vertical cave entrance. The new cave was not visited by the Forest Service at that time, and was subsequently forgotten. This information caught my attention, and I determined that such a cave should be relocated and properly documented.

Local cavers contacted the Caribou-Targhee NF, to see what the Forest Service knew about this reported cave, and to see if they were interested in seeing the cave now, 20 years later. The local staff did not remember anything about this cave, but were definitely interested in learning more. In particular, they wanted to know if the cave really was interesting enough and decorated enough to warrant a possible future tourist operation, and if so, if the cave was safe enough (or could be made safe enough) to allow appropriate public tours. Local cavers tracked down the original discoverers of the cave, and arranged a trip, to show us the new cave. Because of the remote and rugged location, horses were also arranged to carry the needed gear (ropes, climbing and surveying gear, food and water) up to the cave entrance.

Finding the cave entrance, we unloaded our gear, rigged the entrance with rope, and prepared to start mapping and documenting the new cave. As was immediately apparent, and as can be seen in the accompanying map ([link to map](#)), the cave is very vertical in nature. The cave walls were almost entirely covered with a thick coating of calcite formations, and portions of the cave were quite scenic. And the cave layout proved to be interesting and challenging. However, it was immediately clear that this would not be a popular tourist cave. It was indeed very pretty, and very interesting, but not exactly a nice layout for a cave tour. It was cold, wet, and vertical, with some tight spots on-rope, and few level areas where casual tourists could visit safely, or be comfortable, without major modifications to the cave. The four-mile hike in a roadless area would further limit cave tour visitation.

In addition to carefully mapping the easily accessible portions of the new cave, we also noted numerous bat droppings (but no bats), some weird fungus, and a lot of high leads we couldn't reach. We could see the cave continuing in many places, but could not continue any farther ourselves. Some of these leads were too tight, like the narrow slot at the bottom where the water goes, but most of these leads were up high. You just couldn't reach them. We vowed to come back, to reach and explore these numerous high leads, but wondered how we could reach them. The walls were too slippery for climbing, too far apart for bridging, and too overhung to reach on-rope from above. The leads could be climbed with bolts, drilled into the rock walls, but bolts are time-consuming and damaging to the cave. How would these remaining high leads be explored?

We had indeed located another fine, interesting, and challenging natural cave. It was pretty, and fun if explored safely, and it had some interesting resources. However, sadly, this cave was not destined to become a new tourist attraction anytime in the near future. Perhaps the next cave will be? There are other rumors to follow, and a lot more karst to explore. -David Herron, R4-Ashley National Forest

Devonian Shark Research

The week of September 7-12, 2008, the Tongass National Forest hosted Dr. John Maisey, Curator and Research Chair for the Division of Paleontology at New York's American Museum of Natural History, to look at Devonian shark remains previously discovered in 1976 by USGS geologists.

The site visit notes from 1976 indicated that the material was sent to Cleveland Museum of Natural History by Michael Churkin (USGS) to David Dunkle (Paleontologist with the Geological Survey, National Museum of Natural History) where it was identified. On 5/22/2004, Ray Troll (Ketchikan artist and author), Rich Manning from Catch-a-King Lodge in Craig, Alaska, and I rediscovered the site. I sent digital photographs of the material we collected during that visit to John Maisey, and offered to send the material to him for identification. Before doing so, I contacted Dave McMahan, Alaska Department



Devonian shark tooth

of Natural Resources, Office of History and Archaeology, State Archaeologist / Deputy SHPO questioning the need for a collection permit from the State. It was determined that the State did not regulate the collection of fossil shark remains, and that the outcrop position at the upper intertidal was at the State/USFS boundary, so a permit was not needed.

After Dr. Maisey looked at the original and new material he was very excited, noting that Dunkle had "identified the teeth as the genus *Phoebodus*. Unfortunately, Dunkle's findings were never published. My hope is that further prospecting will yield additional material that will provide a basis for a detailed description and analysis. Devonian shark fossils are rare, and the material is particularly important because it includes associated teeth, fin spines, denticles, and pieces of skeletal cartilage which probably pertain to a single species (the first known association of *Phoebodus* teeth and other fossil elements)."

The occurrence of intact shark cartilage is particularly significant because of its great age and rarity in the fossil record. The location of these remains is also of considerable biostratigraphic and biogeographic interest, because a worldwide zonation of the Middle and Upper Devonian was recently developed using phoebodontid teeth as stratigraphic markers. Accurate identification of the Alaskan teeth should therefore provide new biostratigraphic insights for the rocks in which they are found. Quoting from a letter dated June 7, 1977, from Michael Churkin to David Dunkle: "Since these terrains are allochthonous with respect to North America, their faunas may represent species totally unlike those of the Devonian of the continental interior."

Sue Karl, a USGS geologist, first visited the site with me in 2007, during which we measured a geologic section and located a similar deposit containing abundant teeth in a nearby bay. I informed Dr. Maisey of the new discoveries and provided him with photographs, which finally compelled the September visit. [See more photos here.](#)

Our field team consisted of Dr. John Maisey, his paleontologist wife Gloria Carvalho, Ray Troll, Sue Karl, and me. We visited the known sites, finding more shark teeth and parts, and a new shark located higher in the strata. After John and the crew left on Thursday, Sue Karl and I continued our geologic mapping near the site, and located three additional sites containing shark teeth, one possibly a third type of shark. We hope that this material, after being prepared and published, will return to SE AK, where, with a backdrop of Ray Troll's art depicting the sharks in a Devonian seascape, it will tour our communities for all to appreciate and enjoy. Jay Marble with KRBD radio interviewed us and the bit has been playing here in Southeast. Here's [the interview](#) for your listening pleasure... -Jim Baichtal, R10-Tongass NF

Shallow Groundwater Dynamics And Ecosystem Maintenance On Manistee NF

What started as a project to develop methodology for assessing the impacts of large groundwater withdrawals on ecosystems transformed into a field investigation in the headwaters of an important trout fishery on Forest Service lands? Working as a Guest Scientist through a partnership agreement between Region 9 of the US Forest Service and the Geological Society of America, my initial work to design an assessment methodology “uncovered” an assessment tool that had been mandated by the Michigan Legislature in 2006, and was made public on October 1, 2008. Developed by the Michigan Groundwater Conservation Advisory Council (GCAC) over a period of two years, the Michigan Water Withdrawal Assessment Tool is an interactive, web-based model found at www.miwwat.org. The tool integrates three numerical model routines that access statewide databases on geology, stream segment characterization, fish community health, hydrologic parameters, and others. Having gone through rigorous peer-review, the assessment model appears to be a viable screening tool to evaluate the potential for adverse impacts to ecosystems from large water withdrawals.

Because this assessment tool is available to resource managers on forest and other public and private land, we quickly developed an alternative focus for my guest scientist tasks. The GCAC and the larger scientific literature identify a lack of field data in Michigan (and elsewhere) describing the nature of groundwater and surface water interactions that are potentially vital to groundwater dependent ecosystems (GDE). Fundamentally, it is not explicitly understood how site-specific responses to hydrologic change, both short or long term, and human induced or “natural,” will manifest themselves. And, to see and understand change, antecedent conditions must be documented and understood. To those ends, a monitoring network was

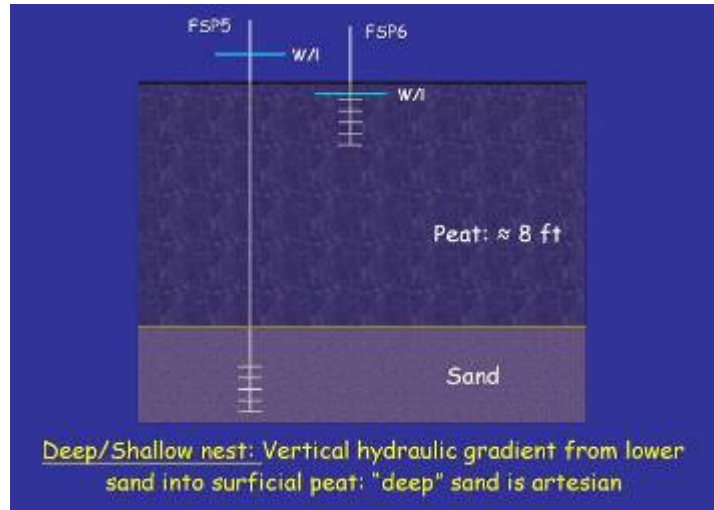


Figure 1. Piezometer Nest



Figure 2. Downloading data

designed and installed within the upland-riparian transition along a headwater reach of the White River. The White River is a Michigan State Natural River and a candidate Wild and Scenic River. Healthy populations of trout, salmon, and other fish depend on stream flow that apparently is dominated during at least parts of the year by groundwater discharge. These local groundwater flow systems are established in largely permeable glacial sands. Point discharges of groundwater are easily observed in the channel bottom of the White River and other cold-water streams in the Manistee NF. Six groundwater wells were installed in two transects normal to the upland-riparian transition, and a staff gage was installed on a nearby bridge crossing the White River. A continuous-recording rain gage will be installed in the spring. The initial sampling strategy will permit the evaluation of hydraulic gradients across the transition to the river and along valley. A deep-shallow well nest was also installed across peat deposits of the riparian corridor to evaluate vertical hydraulic gradients. Artesian conditions in the sand underlying the peat deposits adjacent to the stream were immediately evident (**Fig. 1**). This observation corroborates the field observations of groundwater discharge through the stream channel bottom.

Three of the wells were instrumented with pressure transducers and data-loggers that record ground water levels hourly (**Fig. 2**). Although only in place since early November 2008, dataloggers are already documenting variable responses to precipitation (groundwater recharge). The FSP4 site in the sandy upland displays a “typical” unconfined response to rainfall (**Fig. 3**). Following a 0.73 inch (0.06 feet) rain event, GW level increased 0.14 feet. In contrast, the artesian sand beneath the peat (FSP5) showed a rapid, pressure-induced response with subsequent decay, and a net GW level response of only 0.015 feet, an order of magnitude less.

Further work planned for this phase of the project includes in-situ determination of hydraulic conductivity, installation of a rain gage, and collecting and interpreting the long-term continuous data. Long-term groundwater data are prerequisite for determining the role of

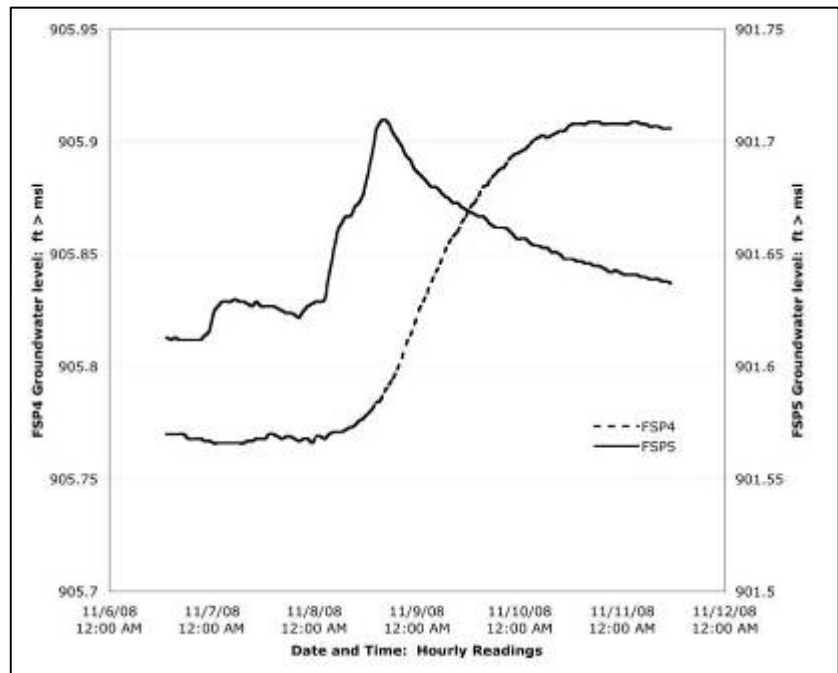


Figure 3. FSP4 & FSP5

groundwater in ecosystem maintenance. This network on the Manistee will ultimately help resource managers understand and protect important groundwater dependent ecosystems. Further, this groundwater-monitoring network can serve as the foundation for numerous potential avenues for an expanded sampling strategy. **–Paul Doss, Guest Scientist, Huron-Manistee National Forests, Michigan, and Associate Professor of Geology, University of Southern Indiana.**

LiDAR Imagery Aids Soil Inventories and Watershed Restoration

The White Mountain NF, in collaboration with NRCS, is using LIDAR digital imagery for detailed bare earth maps in its soil resource inventory process. This is a pilot project using LIDAR and other geographical information system technologies to analyze digital datasets to strengthen field soil resource inventory. This new technology has proven invaluable to more precisely inventory flood plain areas and the transition into upland areas and identify slope breaks with precision. The imagery shows in great detail the prior land use history such as old skid trails and roads than do current aerial photos or Digital Elevations Models (DEM). [View a PowerPoint about the project.](#) **–Randy Davis, WO Soils Program Leader**

Outwash 5

1. **Naturally Occurring Asbestos** - Region Five has taken a fresh look at naturally occurring asbestos on NFS lands in California as part of travel management planning. Here’s a link to R-5’s recently developed [asbestos fact sheet](#), and [this map](#) points to known asbestos occurrences nationwide.
2. **The Value of Resources** - We often talk about the value of the resources we manage, especially those without a traditional market or monetary value. USFS researchers have been exploring this topic, and you’ll [find more information here](#) under Discussion Papers.
3. **Geomorphology** - The latest issue of the Journal *Geomorphology* offers several articles of practical interest, including
 - a. [Application of radar data to modeling rainfall-induced landslides](#)
 - b. [Destabilization of streambanks by removal of invasive species in Canyon de Chelly National Monument, Arizona](#)

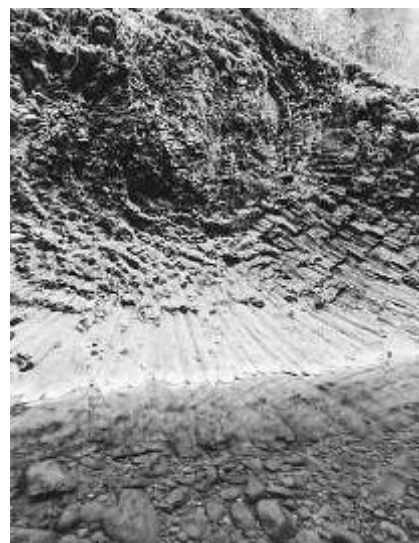
- c. [The impacts of ski slope development on stream channel morphology in the White River National Forest, Colorado, USA](#)
 - d. [Morphometric analysis of relic landslides using detailed landslide distribution maps: Implications for forecasting travel distance of future landslides](#)
 - e. [Geomorphology, complexity, and the emerging science of the Earth's surface](#)
4. **Caves/Karst** - The [Proceedings of the 18th National Caves and Karst Management Symposium](#) offers a wealth of useful information about aspects of cave and karst resource management.
 5. **Geology is the foundation of ecosystems** - a fact frequently masked by flora and fauna or visual beauty. The basic connections between geology and biology can be more easily seen in situations like the one explored in this [USFS Botany Program webpage](#), which happens to be one of the best USFS webpages I've seen!
 6. **Water in the United States** - RMRS researcher Thomas Brown and co-authors offer some useful information and statistics in a recent paper titled: [Spatial Distribution of Water Supply in the Coterminous United States](#) ([link to paper here](#)). Here's the paper's abstract:

ABSTRACT: Available water supply across the contiguous 48 states was estimated as precipitation minus evapotranspiration using data for the period 1953-1994. Precipitation estimates were taken from the Parameter-Elevation Regressions on Independent Slopes Model (PRISM). Evapotranspiration was estimated using two models, the Advection-Aridity model and the Zhang model. The evapotranspiration models were calibrated using precipitation and runoff data for 655 hydrologically undisturbed basins, and then tested using estimates of natural runoff for the 18 water resource regions (WRR) of the 48 contiguous states. The final water supply coverage reflects a mixture of outputs from the two evapotranspiration models. Political, administrative, and land cover boundaries were mapped over the coverage of mean annual water supply. Across the entire study area, we find that 53% of the water supply originates on forested land, which covers only 29% of the surface area, and that 24% originates on federal lands, including 18% on national forests and grasslands alone. Forests and federal lands are even more important in the West (the 11 western contiguous states), where 65% of the water supply originates on forested land and 66% on federal lands, with national forests and grasslands contributing 51%.

Terry Toedtemeier

Those of you who attended the 2005 GeoFest in Portland may remember the keynote speech at the banquet. It was a photo collage and commentary on Northwest geology by Terry Toedtemeier, the Curator of Photography at the Portland Art Museum, a professional photographer, and a geologist. In October of this year, the opening of an exhibition curated by Terry titled "Wild Beauty: Photographs of the Columbia Gorge, 1867-1957" created considerable excitement. A book of the same title, written by Terry and co-author John Laursen, is based on the photographs and history depicted in the exhibition.

On Wednesday evening, December 10th, Terry collapsed and died just after giving a talk about "Wild Beauty" to about 175 people in Hood River, Oregon—in the Columbia Gorge on the south shore of the river. He had dealt with an undiagnosed heart ailment for the last year. Terry's passion for photography and nature were informed by his love of geology. Perhaps his interest in early photography was, in part, a way to see the elemental world without human distractions. Terry Toedtemeier's work with a camera, and in the exhibition hall, makes it clear that geology is both art and science.



Columbia River Basalt Group, Molalla River, Oregon—T. Toedtemeier

This [article from the Portland Oregonian](#) newspaper offers more on Terry's life and work, and here's a [link to a gallery website](#) displaying some of his photographs. -Courtney Cloyd, WO-MGM



Happy Holidays to you and your families!

