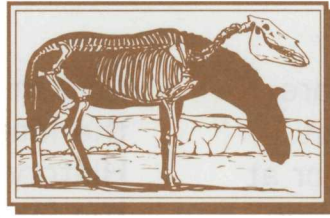


HAGERMAN FOSSIL BEDS NATIONAL MONUMENT

The FOSSIL



RECORD

JULY, 1995

VOLUME 4, NUMBER 3

THE BARE BONES OF THIS ISSUE:

Monument Tours

Fossil Days Recap

Volunteer Service

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Fractures, Seeps
and Failures

"I believe that there is a subtle magnetism in Nature, which, if we unconsciously yield to it, will direct us aright."

(Henry David Thoreau)

VISITOR INFORMATION

Tour Schedule for Remainder of Season - Tours of the Monument continue through the end of the season as noted at the end of this newsletter. Activities include horse quarry tours, Oregon Trail hikes, the Monument by water, and many other interpretive programs.

Fossil Days - A Success!!

Many thanks to the volunteers and staff of the National Park Service and especially to our visitors for making the Fossil Days event a success. Over 1,000 visitors stopped in our Visitor Center. Many enjoyed the outdoors with boat tours of the Monument and bus tours to the horse quarry.

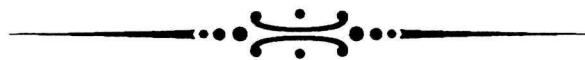
Congratulations to our Chief Ranger, Bob Willhite and wagon driver, Joe Bennett, for receiving the 3rd Place award for Horses and Mules Division in the Fossil Days Parade.



Volunteers in Parks (VIPs) -

We're proud of our VIP's who contribute their time and patience to our staff by assisting in the field with collection and preparation of fossils; preparing and cataloging new fossil finds in the lab; greeting visitors and answering questions at the Visitor Center; assisting with interpretive programs; and providing administrative skills.

If you, or someone you know would like to volunteer at least 20 hours per month, contact Park Ranger James Ward at (208) 837-4793.



Ranger Patrol - We are fortunate to have another ranger on our staff with a background in law enforcement. Mark Schaffeld is a graduate of Boise State University with a degree in Criminal Justice Administration. An experienced firefighter, he will also be leading interpretive programs this summer.

Staff members were able to attend fire fighting training with the Bureau of Land Management (BLM) this June. We now have several people available for wildland fire control, should the need arise during the summer.

Seasonal Staff - We are happy to welcome aboard our newest seasonal staff members. Many of these people leave the security of homes and family behind, so that they may contribute their skills to science, as well as enjoy the great outdoors.

Resource Management Staff -

Protects the natural, geological, historical, cultural, and paleontological resources of the Monument through surveys, management plans, and computer preparation.

Neal Farmer - Outdoor activities have always been a part of Neal's life. In fact one of his earliest memories occurred along the Snake River...he fell in!

But that didn't sway him from experiencing the outdoors. He loves to scuba dive, fish, swim, snow ski, hunt, travel, find fossils and rocks. Neal received a bachelors degree in geology from the University of Idaho, and is currently working on his masters degree in, yes you guessed it, water. "I may have once hated the 'mighty Snake' but I greet the river of life with open arms."

Jim Miller - Although, being part of the seasonal staff is a new role, Jim is familiar with the Monument since he

has worked as a volunteer for the past two summers. His permanent job is as a science teacher at Minico High School in Rupert, where he has been teaching Biology and Human Anatomy for the past eight years. Jim and his wife live in Burley.

Terri L. Salley - Living and working on an 80-acre farm has given Terri a sense of appreciation and stewardship toward the land. To demonstrate this appreciation, Terri received a B.A. in anthropology with an emphasis on archeology, and a B.S. in geology from Idaho State University. "I love working outdoors and being in touch with the land. All of this, coupled with my childhood fondness for fossils has brought me to Hagerman." Her husband and daughter have joined her for a summer of adventure.

Interpretive Staff - Provides the visitor with information concerning the natural, geological, historical, cultural, and paleontological resources featured at the Monument through talks, guided walks, and audiovisual programs.

Judi Hart - "I always wanted to be part of the National Park Service...to work with dedicated people and make a difference in caring for the environment." In order to reach this goal, Judi went back to school to

receive a masters degree from Miami University in Ohio. She developed an interest in the outdoors and science from her husband, a geologist, and determined to make the avocation of preserving nature her vocation.

Mark Schaffeld - Mark is a native Boisean and a graduate of Boise State University. He has spent the past five years working seasonally for the National Park Service at Crater Lake NP, Sequoia & Kings Canyon NP, and Olympic NP, respectively.

Mark brings to Hagerman his love for the outdoors and his desire to protect it's innate beauty. He commutes to work on his bicycle regularly and appreciates fellow travelers sharing the road with him. "I am excited to have the opportunity to work at such a new National treasure with all these great people." Mark and his wife are enjoying the short commute from Hagerman to Boise on Mark's days off.



MONUMENTAL SCIENCE

Resource Management

Q. What's white, weighs 1,000 pounds, and flies through the air?
A. A beaver in a plaster jacket.

This ancient and now extinct beaver (*Castor californicus*), was airlifted June 29th by a Bureau of Land Management (BLM) helicopter out of its resting place on the Monument. This 3.5 million year old beaver was first discovered exposed in July 1994 by our paleontological staff. A plaster jacket and wooden frame were formed around the fossilized remains in an effort to preserve the complete beaver skeleton from further damage.

This is the first complete skeleton of its kind to be found in-place where it was buried. During the Pliocene epoch, aquatic wildlife thrived in this swampy, savanna-like area enjoying nearly twice the annual precipitation the valley receives today.

The remains will be intensely studied to better understand the relationship between the past, present, and future of our environment, as well as adaptive changes in beavers over time.

Critter Corner

Exploring Otter-native Life Styles at Hagerman Fossil Beds

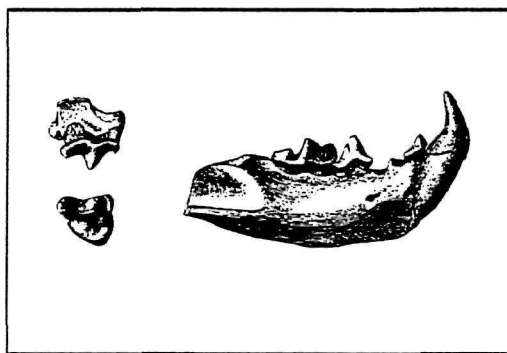
By Dr. Greg McDonald,
Monument Paleontologist

A quick look at the fossils preserved at Hagerman Fossil Beds quickly reveals that many of the species have modern relatives associated with wetland or aquatic environments. Fossilized bones of frogs closely related to the living leopard frog are quite abundant, as are pieces of shell of two different species of turtle. Most of the bird fossils found are waterfowl such as swans, ducks, geese, grebes, pelicans and cormorants. Likewise, aquatic mammals including beaver, muskrat and otter are frequently encountered. Although there are many non-aquatic species such as the horse, camel, ground sloth and peccary, there is no question that among the many types of fossil species found at the Monument, the fauna is dominated by aquatic forms. This data indicates that 3.5 million years ago this part of Idaho was much wetter and had considerably more wetland habitat than exists in the area today.

Although the overall amount of wetland habitat in southern Idaho today is less than in the past, the Snake River and associated wetland areas around the Hagerman Valley provide suitable habitat where many aquatic species can be found. One of those aquatic animals that can be seen on occasion is the river otter. Unlike the beaver, in which the fossil species found at the Monument is almost identical with its modern descendant, the fossil otter at Hagerman and the modern otter found along the Snake River today are different and represent two different groups of otters, one originating in the old world and one in the new. The modern river otter, Lutra canadensis, is closely related to the otters of Europe and did not appear in North America until about 1.9 million years ago. Our Hagerman otter, Satherium piscinarium, is part of a New World lineage and is closely related to the giant otter found in Brazil and other parts of tropical South America and in fact may be its ancestor.

Otters are members of the carnivore family Mustelidae, which also includes skunks, weasels, wolverines and badgers. Most members of this group are carnivorous or sometimes omnivorous and the otter is no exception, except the otter catches most of its prey in the water. The

living river otter eats fish, frogs, crayfish and freshwater clams and our fossil otter probably had similar habits. One major difference of these otters is in the teeth. In Satherium they are broad and seem better suited for crushing rather than shearing food.

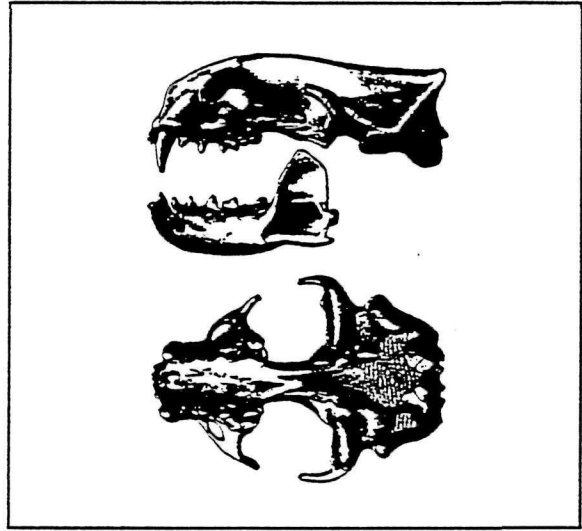


Jaw and teeth of Satherium piscinarium.

It is likely that the diet of the fossil otter at Hagerman included a higher percentage of freshwater clams and crayfish than the modern river otter, since these broader teeth would be useful for cracking shells. The Hagerman fauna includes a variety of freshwater clams and snails including a large freshwater mussel called Anodonta. Quite abundant as a fossil in the sediments, Anodonta would have provided a ready food source for the otter. Another item on the otter's menu, crayfish, have been found as fossils elsewhere in the Glenns Ferry Formation but only indirect evidence of their presence on the Monument is

available. This evidence for their presence in the Monument includes gastroliths (these are nodules of calcium minerals formed in the stomach of a crayfish resulting from the resorption of calcium salts from its exoskeleton when it is getting ready to molt), and by the presence of what are believed to be traces of their burrows preserved in some sedimentary layers.

Otters are distinguished from other mustelids by the modification of their skeleton for swimming. A nearly complete skeleton of Satherium collected by the Smithsonian shows that, like living otters, it was well adapted for life in the water. In many swimming mammals, including the otter, the femur (upper leg bone) is short and stout and the tibia (larger of the two lower leg bones) is long. The tail is long and muscular and along with the hind legs helps to propel the animal through the water. The skeleton of Satherium has all of the features one would expect to see in a strong swimmer. These features, along with the structure of the skull and teeth, support our interpretation that Satherium like the modern river otter could maneuver in the water to catch fish, frogs and crayfish or uncover freshwater clams hidden in the mud.



Skull of Satherium piscinarium.

Most of our knowledge of the extinct otter at Hagerman is based on the discoveries made by the Smithsonian and the University of Michigan. Field work at Hagerman by the National Park Service since the Monument was established has resulted in the discovery of a few pieces of otter which are now in the Monument's collection. Perhaps the discovery of additional material will help us to better understand the ecology of this extinct species and answer a number of questions such as: was its extinction due to competition with the river otter when it entered North America or how closely is it related to the Brazilian giant otter?

Perhaps Satherium is not really extinct, but still lives on in South America as the giant river otter.

FRACTURES, SEEPS and FAILURES - Part III or How Goes the Mudflow

By Larry Growney, Monument Geologist

Mudflows are a type of fast-moving failure created by oversaturation and liquification of loose sediments such as those found in the Monument. Heavy snows, excess rainfall or other sources of water work their way into these loose sediments increasing their weight. If this "heavier" soil is sitting on a steep slope, or is subjected to shaking, it may fail as a landslide and liquify into a mudflow. This is known as a slide-flow phenomenon and is very common in areas of great relief. The greatest danger comes from the mudflow which may travel as much as 20 or 30 miles from its source and move at speeds greater than 40 miles per hour.

Oversaturation

Areas affected by oversaturation can be identified by water flowing out of a hillside or creating a persistent pond on flat ground. In the Monument, there are numerous areas of seeps and one persistent pond. Almost all of these features are associated with

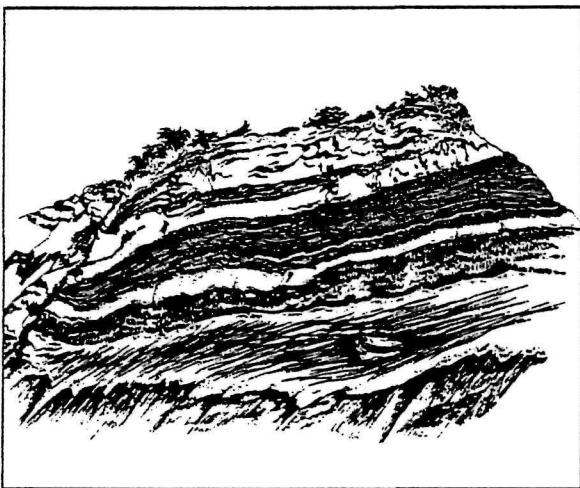
landslide locations. When there is an insufficient quantity of water to oversaturate a soil mass, there is no groundwater flow or persistent surface ponding of water. Instead, the water is held in place by the capillary action of the soil particles which remain locked together.

However, when there is too much water moving through the soil, capillary action is not sufficient to hold all the water in place between the soil particles and thus, these particles are forced apart. Think of a piece of sandpaper as being a layer of soil. When the rough sides of two pieces of sandpaper are in contact with each other, it is very difficult to slide one piece across the other. But when you flip the sandpaper so that the smooth sides are touching (that is, the grains are not in contact with each other), it is much easier to slide one piece over the other.



Liquification

When an oversaturated mass fails as a landslide, it does so along a single plane. But as the failure block is moving, the jarring liquifies the entire mass as the soil particles "swim" in the excess water. This slurry of mud, composed of soil particles, rocks and anything that was on the surface before the failure occurred, moves rapidly down the natural stream drainage. If the velocity of the flow is sufficient, a part of the mudflow could escape from the channel with catastrophic consequences. There are instances where entire small towns have been buried by mudflows which escaped from their channels. In other instances, mudflows have been known to redirect stream channels, dam streams and interrupt river commerce by filling in the shipping channel.



Monitoring

Because mudflows are commonly associated with the landslides at Hagerman Fossil Beds National Monument, it is critical that we develop a means which will enable us to predict future landslide activity. We have, over the past two years, commissioned a number of studies designed to tell us much about the physical characteristics of the soils. In addition, we have sought to identify the sources of unnatural water which have had a detrimental impact.

Due to a lack of funding, the recommendations of these studies remain to be implemented; however, the message they send is clear - **MONITORING IS CRITICAL!** This includes both surface and groundwater level monitoring. But how will monitoring keep landslides and mudflows from occurring?

Clearly, the ideal situation for the Monument would be where landslides and mudflows do not occur at all; however, this is not going to happen any time soon due to the long-term nature of this problem. Monitoring provides a technically verifiable method for assessing a situation through an on-going basis and generates comparative information to make informed decisions.

By monitoring surface conditions, such as the width of cracks in landslide areas, we are more able to determine whether a potential life-threatening situation is developing and take appropriate steps to ensure the safety of person and property. With continual monitoring over a period of years, hillside stability trends can be assessed through a historic comparison of changes in monitor data.

Groundwater (subsurface) monitoring can be conducted by taking well water level and seep discharge measurements. By noting changes at these points, we can identify how the quantity of groundwater may be changing in critical locations and concentrate our surface monitoring efforts on those areas where the change is the most dramatic.

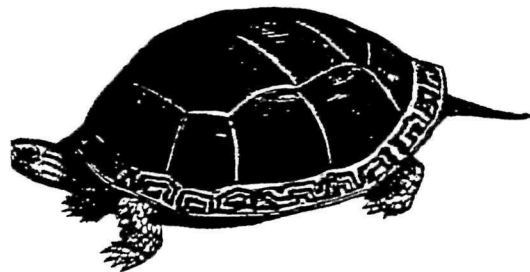
Monitoring of soil moisture content could identify changes in the degree of saturation at specific, critical points and reflect whether the situation was becoming more or less dangerous.

By combining the data collected from surface and subsurface monitoring, the positive steps we take to reduce the danger of landslides could be verifiably documented. For example, if we construct a system to dewater a landslide block, thereby reducing the likelihood of mudflows, we would expect to see a reduction in soil

moisture content and the discharge rate at seep locations on the landslide block. Without on-going monitoring, an occasional test for soil moisture content, or a visual inspection of apparent seep discharge, would not be meaningful and the success of our dewatering effort could only be interpreted as apparent rather than actual.

Public and scientific use of the Monument makes it essential that we implement surface and subsurface monitoring.

Monitoring has less to do with the taking of readings and everything to do with the reasonable implementation of data to provide for the safety and welfare of Monument users.



"Everybody needs beauty as well as bread, places to play in and pray in, where Nature may heal and cheer and give strength to body and soul alike."
(John Muir)

Schedule of Monument Tours: July 15 - September, 1995

Programs start at the Visitor Center in Hagerman along Highway 30 across from the High School unless otherwise noted. Visitors must provide their own transportation if not stated otherwise. Be prepared for rapidly changing weather. Most programs require sturdy footwear and sufficient water. Morning programs conclude by noon. Most tours are not suitable for access impaired individuals. Call (208) 837-4793 for more information.

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| July 15 | Hagerman Horse Quarry | 9:00 a.m. |
| | Discover Hagerman's famous horse quarry and take a scenic look at the past, present, and future of the Hagerman Valley and its fossils. | |
| July 16 | Hagerman Horse Quarry | 9:00 a.m. |
| | (See above.) | |
| July 22 | Oregon Trail Experience | 8:30 a.m. |
| | Walk along a primitive trail that provides similar conditions/scenery that many emigrants encountered on their journey across this country. | |
| July 23 | Hagerman Horse Quarry | 9:00 a.m. |
| | (See July 15.) | |
| July 29 | Hagerman Horse Quarry | 9:00 a.m. |
| | (See July 15.) | |
| July 30 | Monument from the Water | 9:00 a.m. |
| | Bring a canoe or kayak and enjoy the view while you learn about the Hagerman Fossil Beds National Monument from the Snake River. Sign up or call to register for the program. | |
| August 5 | Adaptation in the Desert | 9:00 a.m. |
| | Learn how plants and animals adapt to their habitat as you explore the flora and fauna of the Hagerman Fossil Beds. | |
| August 6 | Emigrant Trail Hike | 9:00 a.m. |
| | Explore the Monument with a three-mile hike which parallels portions of the Oregon Trail. | |

- August 13 Where did the Big Animals Go? 2:00 p.m. inside**
Join us for a slide presentation and discussion on the extinction of horses, camels, ground sloths and other large mammals.
- August 20 Trailblazers of the Oregon Trail 2:00 p.m. inside**
Join Maudie Miller (Mary Inman) as she brings to life tales of the great pioneers that blazed through this expanse of country.
- August 26 Monument Clean-up 10:00 a.m.**
Learn about fossils, geology, and the Oregon Trail while participating in a community service project. Civic organizations, girl/boy scouts, 4-H, and individuals are welcome.
- September 2 Emigrant Trail Hike 9:00 a.m.**
(See August 6.)
- September 3 Hagerman Horse Quarry 9:00 a.m.**
(See July 15.)
- September 9 Hagerman Fossil Beds Horse Tour 9:00 a.m.**
Bring your horse and ride along with a Park Ranger on the route of a proposed trail. Experience what it might have been like traveling along the Oregon Trail. Includes visits to geologic sites.
- September 17 Monument from the Water 9:00 a.m.**
(See July 30.)
- September 23 Oregon Bound with Maudie Miller 9:00 a.m.**
Go back to the year of 1843 with Maudie Miller (Mary Inman) as she relates her 1,300 mile journey along the Oregon Trail.
- September 30 Fossils for Kids 9:00 a.m.**
Do you have a favorite fossil that needs to be identified? Bring an adult for a tour of the fossil beds and learn about the animals that once lived here.