NPS Fossil Resources

PARK PALEONTOLOGY

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1998 NPS OMNIBUS ACT PROTECTS FOSSIL SITES

If you have not yet heard, President Clinton has signed the NPS Omni bus Bill of 1998. In Section 207; Confidentiality of Information, there is language pertaining to disclosure of paleontological information.

Section 207. Confidentiality of Information

Information concerning the nature and specific location of a National Park System resource which is endangered, threatened, rare, or commercially valuable, of mineral or paleontological objects within the units of the National Park System, or of objects of cultural patrimony within units of the National Park System, may be withheld from the public in response to a request under section 552 of title 5, United States Code, unless the Secretary determines that:

(1) disclosure of the information would further the purposes of the unit of the National Park System in which the resource or object is located and would not create an unreasonable risk of harm, theft, or destruction of the resource or object, including individual organic or inorganic specimens; and

(2) disclosure is consistent with other applicable laws protecting the resource or object.

The most relevant points of this amendment are safeguarding paleontological resource localities from disclosure under the Freedom of Information Act. The phraseology " or paleontological objects within units of the National Park System ..." (section 207) sanctions the long sought protective status for these resources.

"Information concerning the nature and specific location of...paleontological objects within the units of the National Park System...may be withheld from the public source"

The "Research Mandate" for the NPS in section 202, and a requirement that the Secretary "take such measures... necessary to assure the full and proper utilization of the results of scientific study for park management decisions" in section 206, advocates examination and assessment based on scientific investigations.

Encouragement of collaboration with academic institutions in section 203 authorizes "to enter into cooperative agreements with colleges and universities ... to establish cooperative study units to conduct multi-disciplinary research and and develop integrated information products on the resources of the National Park System." Research conducted with academia taps into new springs of knowledge and innovative ideas. These types of partnerships nuture science and allow for more research to be completed.

Section 204 states, "The Secretary shall undertake a program of inventory and monitoring of National Park System resources ...". This wording reinforces the necessity for baseline paleontological surveys which provide the tools for effective and informed land management decisions. This is powerful material. Protection of paleontological resources within the NPS is instrumental to their preservation and conservation. ■

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Geologist-in-the-Park FY98 Yearbook

staff writer

The following are Geologist-in-the-Park paleontology experiences for the year 1998.

Torrey Nyborg agreed on very short notice to assist **Death Valley National Park** with the management of their fossil resources. He did field work in temperatures (120 degrees) that would have most of us running to our air-conditioned offices. Torrey says that, "I reminded myself that I was doing field work in an area of scientific research that I have spent the last fours years studying." A Geological Society of America internship recipient, Torrey documented and inventoried a fossil track locality within the park. He produced a GPS map of the fossil localities, accurate photo points, and detailed descriptions of about 50 sites for future research.

Tessa Watson, a recent graduate of Western State College, Gunnison, Colorado, spent the summer as a Geological Society of America intern at **Denali National Park and Preserve**. Tessa expanded the paleontological database created last year by locating and evaluating literature cited and selecting sites to field check. She stated, "I learned that geology isn't all fieldwork…that a considerable amount of time must be spent in the office planning and doing paper work…and that patience and persistence will get you a long way."

Ta-Shana Taylor, a junior at Northeastern University, Massachusetts, was a paleontology intern at **Florissant Fossil Beds National Monument**. She excavated, prepared, and cataloged fossil specimens. Ta-Shana also developed a database for the park's paleontological references.

John Fraser is a geology lab instructor at Harvard University. He assisted Herb Meyer, a **Florissant Fossil Beds National Monument** paleontologist, with documenting the park's fossil collection. John collected and photographed specimen information, and did a reference check to document cited publications of park fossils in Harvard University's Museum.

J.N. DiBenedetto continued the paleontology graduate work that he started last year in **Badlands National Park**. Joe discovered the first recorded fossil tree stump found *in situ* in the park. He also assisted with the reopened fossil quarry, known as the "Pig Dig," where he interacted with park visitors and educated them about the park's fossil resources. Joe felt that his time spent in the park was a great opportunity to explore the park scientifically.

Matt Hoskins is a senior this fall at Boston College, Massachusetts. As a Geological Society of America-supported intern at **Badlands National Park**, Matt interpreted the park's geology to the public. He showed visitors how to excavate fossils at the "Pig Dig", an active fossil quarry. Matt felt that the timing of this internship was "perfect" and learned a lot about geology that "you just can't get from a textbook." Matt enjoyed his experience so much that he is considering changing his major from Environmental Science to Geology.

Jack Rogers was able to earn college credits for his work this summer at **Petrified Forest National Park**. After retiring from the army, Jack is pursuing a second career as a paleontologist. He assisted with the park's geologic research and air quality monitoring, prepared fossil samples, and measured stratigraphic sections. Jack also assisted Dr. Adrian Hunt, Mesa Technical College, with fieldwork that focused on searching for evidence of early dinosaur fossils. The highlight of his field experiences was working in the Late Triassic dinosaur locality in the park. Jack is starting graduate school this year and hopes to do more paleontological work in other parks.

Linda Riggins, a graduate student at New Mexico Tech, spent the summer assisting with geologic research at **Hagerman Fossil Beds National Monument**. Linda was involved in a geologic mapping project of various sedimentary units. She measured and recorded stratigraphic sections and transferred this data into the park's GIS database.

Arvid Aase assisted Geologic Resources Division paleontologist, Vince Santucci, last winter with servicewide paleontological projects at **Fossil Butte National Monument.** They provided technical assistance to **Grand Teton, Yellowstone, Big Bend, and Guadalupe Mountains National Parks**. Arvid also formatted the Park Paleontology Newsletter, designed a logo for the National Park Paleontology Suvey and developed a fossil fish game to be used as an educational activity. Several volunteers and NPS employees are wearing the paleontology pins that Arvid designed while he was a GIP. Arvid is now a seasonal and has just completed his Master's thesis from the University of Kansas.

Merry Bacon recently completed her Master's degree from Georgia College. She is working with NPS paleontologists and cave specialist on a project involving paleontological resources occurring in NPS caves. She is also assisting in identifying outside repositories with park cave fossils. Merry worked in the **Fossil Butte National Monument** Scientific Quarry. She also led hikes and presented educational programs at FOBU Quarry.

Marikka Hughes, a junior at Yale University majoring in geology and geophysics, with special interests in paleo related topics, spent the summer at **Fossil Butte National Monument** working in the park museum. Marikka updated the catalogue eliminating the back-log of paleontology specimens from the previous years. Marikka initiated development on a new FOBU web page. Marikka is currently working at the Peabody Museum of Natural History.

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Interdisciplinary Late Jurassic Morrison Formation Extinct Ecosystem Reconstruction

staff writer

The Morrison Extinct Ecosystem Project is a joint NPS-USGS-funded interdisciplinary study to reconstruct the Late Jurassic predominantly terrestrial ecosystem throughout the Western Interior during deposition of the Morrison Formation. This colorful formation is known worldwide for the skeletons of large giant sauropods, which have been recovered from the west and displayed in many museums throughout the world. The formation is exposed in many NPS units including, Arches NP, Bighorn Canyon NRA, Black Canyon of the Gunnison NM, Capitol Reef NP, Colorado NM, Curecanti NRA, Devils Tower NM, Dinosaur NM, Glacier NP, Glen Canyon NRA, Hovenweep NM, Wind Cave NP, and Yellowstone NP. The goal of the project is to improve NPS interpretive programs and resource management strategies by applying modern research approaches. This will yield an improved understanding of the habitat that existed when the Late Jurassic dinosaurs roamed the western U.S.

The multidisciplinary approach to research intergrated various aspects of the rock and biostratigraphic record for the Morrison Formation, with various lines of evidence leading to an integrated picture. The investigations included studies of regional tectonics, regional stratigraphic framework, radiometric and paleontologic dating, sedimentology, paleosols (fossil soils), dinosaur bio-stratigraphy, trace fossils, taphonomy (processes that occur between the death of an organism and discovery as a fossil), invertebrates, microfossils, and isotopic analysis of teeth and paleosol nodules.

The synopsis of the habitat for the Late Jurassic Morrison Formation was a broad alluvial plain in the rainshadow of highlands that bordered the plain to the west. The presence of large dunefields, evaporites, intermittent streams, and development of a large alkaline, saline lake at various times during Morrison deposition all indicate that the Morrison experienced times of considerable aridity. In spite of the semiarid to arid climate, life-giving water was delivered to the plain by several means. These included seasonal or intermittent precipitation, perennial and intermittent streams that drained the western highlands, and shallow groundwater that was delivered by aquifers recharged by infiltration in the highlands. Riparian vegetation was largely supported by water from perennial streams and substream flow within intermittent streambeds. Vegetation on the floodplain had to depend primarily on direct precipitation (which may have been largely seasonal) and the ability to tap shallow aquifers. The large herbivorous dinosaurs could range across the plain in search of water and vegetation, whereas many of the smaller animals would have found water and shelter in riparian habitats. Scattered lakes and ponds across the alluvial plain supported a variety of aquatic life.

Thus, although the Morrison climate was much drier than originally interpreted, the Morrison ecosystem supported a considerable diversity of life, including the largest herbivores that ever lived.■

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Tom Olson, a senior at Northern Arizona University majoring in paleontology, spent the summer at **Fossil Butte National Monument**. Tom prepared a database of the all the stratigraphic units within the National Parks. Tom has been fascinated with paleontology for most of his life and has had many exceptional finds, such as a previously unknown species of crinoid and the skull of a *Metopasaur* . He is looking forward to working at a museum as a paleontologist after graduation.

Aimee Painter, a student at Southern Utah University, spent the summer at **Zion National Park**, implementing a paleontological survey. Aimee prepared GPS information on both existing track localities and on several new sites. She and other researchers discovered. She also spent many days in the field researching fossil localities throughout the park and compiled the information in a database format.

Rex Taylor spent the summer at **Zion National Park** . Rex used GPS to set the parameters on fossil localities throughout the park, especially the track localities. The primary task was to initiate a paleontological inventory of Zion National Park. Rex took detailed field notes and measurements of the existing fossil localities. This information has been compiled in a database for futureworkers. Rex is currently working with BLM in Escalante Grand Staircase National Monument.

Christian George, a senior at Franklin & Marshall College, worked at **Timpanogos Cave National Monument** working on the paleontology of Pleistocene mammals. He spent the month of May excavating parts of the cave. Christian was able to excavate pack rat middens from several locations in and near the cave: Organ Pipe Room, Hidden Mine Cave, and Boneyard, as well as a test in the Grotto. He is now in the process of identifying the pack rat bones. Christian is working with mammologists at the Academy of Natural Science in Philadelphia. His analysis of this site will focus on the taphonomy. It appears that there may have been two species of packrat, *Neotomacinera* and *Neotoma* sp. Besides determining what differences may lie in their two assemblages, Christian is also attempting to characterize the biometric differences between these two species.■

Death Valley National Park Paleontological Survey

staff writer

Death Valley National Park (DEVA) safeguards 3,336,000 acres that include world renowned and scientifically important paleontological resources. DEVA preserves an extensive geologic record ranging from the Precambrian through the Holocene epoch. Overcoming the high temperatures and limited available funding, a comprehensive inventory of all known sources of information regarding Death Valley's geology and paleontology was initiated in 1998.

Over a dozen fossiliferous stratigraphic units have been identified at DEVA containing fossil plants, invertebrates, vertebrates, and trace fossils including:

- Possible "Ediacara" fauna equivalent
- 520-million-year-old trilobites
- Devonian fish
- Eocene titanotheres
- Mammal and bird tracks in Miocene and Pliocene sediments

The significance and diversity of DEVA paleontology resources is demonstrated in this survey.

Undertaking the enormous assignment of assessing the paleontological resources of DEVA is Torrey Nyborg and Vince Santucci. In April 1988, GRD Paleontologist Vince Santucci first visited DEVA and began an initial assessment. Torrey Nyborg was recruited as a paleontology intern through the GIP program during the summer of 1998.

An area of particular interest at DEVA is Copper Canyon. This locality is exceptionally rich in fossil vertebrate tracks and is considered one of the gems of the park service. Sporadic conservation techniques have been implemented by the park staff since the discovery of the site in 1937. The fossil bearing strata is susceptible to a variety of natural and human-related threats, leading to the loss of paleontological resources. An inventory of the paleontological resources serves as a baseline for a paleontological resources management program. Management actions are addressed in NPS-77 for paleontological resource sites which include monitoring, cyclic prospecting, patrols, and closure.

This report will include the first comprehensive stratigraphic column for the park. Compilation of reference data and a paleo-species list were an important product of this study. Field documentation and photos of fossil localities collected by the researchers were utilized to create fossil locality maps in an effort to provide information for paleontological resource management.This publication will be dedicated to H. Donald Curry, who in 1935 became the first naturalist/geologist for Death Valley. Don Curry was also one of the first professional geologists to wear the ranger uniform. The DEVA paleontological survey has increased park staff awareness of the occurrence and significance of the paleontological resources within the park. This, in turn, will serve to enhance the experience of Death Valley National Park.■

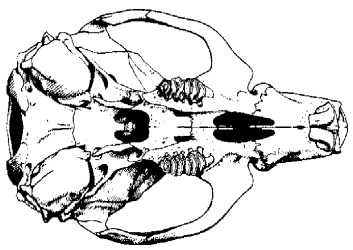
Composite fossil tracks of a Miocene felid

Paramyid Tooth from YELL Recovered

staff writer

A paramyid tooth that was collected from Yellowstone National Park in the 1980's was recovered recently. The rodent tooth is encased in volcaniclastic rocks of the Absaroka Volcanic Supergroup. Information is a bit sketchy, but several sources indicate the tooth may of been collected near Specimen Ridge in the Lamar River Formation in YELL. This "fossil forest" has been studied extensively for paleobotanical significance, but lacks information regading Eocene mammals. Therefore, this specimen is ly valuable from a scientific standpoint.

The tooth is being studied by a collaboration of scientists and will be further prepared by researchers. The tooth will then be curated into the YELL collection.■



Invitation for contributions

To keep Park Paleontology News letter fresh and informative we would like to hear from you. If you have paleontological news relevant to the national parks please write a few paragraphs and send to:

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Park Paleontology's schedule is quarterly. The spring issue is planned for publication in April 1999. ■

FOSSIL FORUM

PALEOECOLOGICAL APPROACH TO MANAGING PALEONTOLOGICAL RESOURCES

A holisitic multidisciplinary approach to managing paleontological re sources provides the greatest opportunities to interpret the ancient landscape. Paleontologists interested in conducting research within National Park Service areas should employ holistic strategies as part of their field collection of fossils and the associated geological and paleoecological data.

The significant values and information associated with a fossil are often not fully understood until long after the remains have been collected from the field. Appropriate field collecting techniques combined with detailed field data acquisition are essential in the science of paleontology.

Museums around the world contain fossils that have inadequate associated data. Past collecting habits have generated cabinets full of fossils that lack important scientific information. Attempts to reconstruct missing information can result in compromising the scientific integrity of the data.

As new methods and technologies reshape the paleontologist's approach to excavating fossilized remains, the ability to assimilate new levels of information increases. In some cases, "conservation paleontology" or preserving fossils *in situ* is the preferred resource management decision. This strategy is based upon the assumption that future technology may be able to extract greater amounts of information from the paleontological resources.

A paleoecological approach to managing non-renewable paleontological resources is a holistic strategy to research and field collection. The study of paleoecology, like modern ecology, considers the relationships between organisms and the environment. Thus ecosystems and paleoecosystems are defined by both biological and physical components. In our efforts to define an ecosystem, or even a paleoecosystem, we attempt to define the natural boundaries. Researchers and resource managers are cognizant that ecological boundaries do not generally coincide with adiminstrative boundaries (i.e., ranges of bison, grizzlies or wolves and the boundary of Yellowstone National Park).

Since ecosystems are dynamic entities, the boundaries can continually be reestablished. The interrelationships between organisms and the changing environment will be redefined. A paleoecological perspective incorporates a temporal component to understanding ecosystems. The paleoecological perspective provides an opportunity to assess the factors related to temporal changes such as climatic trends or extinction events.

There is some value in viewing ecosystems from a dual-uniformitarian perspective.

Figure from Benton and Spencer. 1995. Fossil Reptiles of Great Britain

This view recognizes that the "present is the key to the past" and that the "past is the key to the future". Our ability to best understand our universe, from the limited slice in time we occupy, is enhanced from any knowledge gained from the past.

A multidisciplinary approach to understanding past ecosystems is the recommended approach to managing paleontological resources. Research collecting should look beyond the fossilized flora and fauna. All paleontological resource collecting should require that researchers obtain all associated geologic or paleoecologic data. This associated information can enable greater levels of interpretation of ancient sedimentary environments, past climates, historical biogeography of paleospecies, and other valuable information. Just as modern ecosystems do not end at park boundaries, likewise, paleoecosystems extend beyond these same geographic boundaries.

Fossil Butte National Monument preserves approximately 8,000 acres of ancient Fossil Lake. Within the park boundaries are important exposures of the deep water portion of the fossiliferous Green River Formation. Fossil rich deposits representing near shore and shallow water portions of the lake are not represented in the monument and provide a different assemblage of organisms. Since the fossil record does not end at the park boundary, research should consider the resources outside of the park.

In 1994, The Morrison Formation Extinct Ecosystem Project, was initiated as a multidisciplinary endeavor designed to determine the nature, distribution, and evolution of ancient ecosystems that existed in the Western Interior of the United States during the Late Jurassic. A team of specialists were assembled to gain a more complete picture of the Morrison ecosystem. Isotopic dating, regional tectonics, and trace fossil analysis were some of the lines of evidence used to interpret the ancient climate and changes in the paleohydrology.

The value of a multidisciplinary, beyond the park boundaries approach to understanding the ancient landscape provides greater opportunities for interpreting this information to the public. Part of the responsibility within the National Park Service is to provide the highest level of scientific understanding to the park visitor. Presenting a broad perspective of the ancient setting can often be a very effective means of interpreting paleontological resources to the park visitor.■

FOBU Previews Expanded Web Page

staff writer

Through the talents of David Hays, a former Systems Engineer for Apple Computers, Fossil Butte National Monument has a snazzy, newly expanded web site. Dave is a paleontology intern at FOBU and has used his extraordinary web skills to create this display.

FOBU website at
http://www.webasic.com/fobuweb

The **home page** opens up with a dynamic depiction of Fossil Lake in the Eocene. A winter scene and FOBU information are included on this page. Links to Park Paleontology, Geologic Resources Division, and National Park Service websites run as headers across the top on all pages. Additional links expand on topical information. Other pages such as **general information** dispenses basic park information with links to maps and a site to pose questions. The principal **scientific** investigators at FOBU have a page with connections to their work and published articles. Dave introduces the **staff** at FOBU with a photo exhibit and a short biography. A **photo gallery** exists with encouragement to send in images with relevant photographic information. The **fossil** site provides geologic history and interpretation of both Fossil Lake and the Green River Formation. The **activities** page informs the web visitor on FOBU trails, guided tours, and visitor center programs. The **education** site has teacher programs, Jr. Ranger programs, and volunteering and internship information. **Other sites** includes links to NPS and related sites, museums and science institutions, the Oregon Trail Association, and various sites related to FOBU. The local **weather** conditions can always be accessed as there is a connection to the Weather Channel weather data.

Dave has provided access to a wide array of information on paleontology in and outside of FOBU. Take a look!■

Park Paleontology Recognition Pin

staff writer

Individuals making noteworthy contributions to promote paleontology in the national parks and to the National Park Service Paleontological Resource Program are recognized and rewarded with gold pins modeled after the Park Paleontology Resource logo.

Steve Shackleton, a NPS Ranger and a Tony Bevinetto fellow in Washington, D.C., has worked on the Omnibus Bill featured on the front page as well as several other notewothy pieces of legislation that protect paleontological resources.

Mark Hertig, paleontologist at AGFO, and **Tom Ulrich**, Chief Ranger at FLFO, have revised the "Cenozoic Age of Mammals" on the commonside NPS brochure.

Christine E.Turner, USGS-NPS researcher, is one of the leaders on the interdisciplinary Morrison Extinct Ecosystem Project that focuses on reconstructing the extinct ecosystems in the Late Jurassic.■

Footnotes In Time

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Dr. Watson ponders the mystery of why the fossil record ends at the park boundary