TRIASSIC PARK:

first year results of the ongoing paleontological inventory of

PETRIFIED FOREST NATIONAL PARK

By William G. Parker

Petrified Forest National Park was established to protect natural and cultural resources in northeastern Arizona, including fossil trees and other plants and animals of the Late Triassic Period (about 210 to 235 million years ago). This year marks the 150th anniversary of the beginning of paleontological research, though the majority has been done in the last 80 years, resulting in a large amount of published scientific data (e.g., Camp 1930, Daugherty 1941, Ash 1972, Long and Murry 1985). As of 2003, investigators have documented more than 400 fossil sites within the park, including more than 250 vertebrate sites (fig. 1). In 2001, resource managers initiated a project funded with monies from the Recreational Fee Demonstration Program to locate and document all known paleontological localities beginning with vertebrate sites.

First, resource managers clearly defined what constitutes a "site" in order to locate these localities. A site is a geographic location where fossil resources are noted or collected, documented by curators, and deposited into a museum collection. Many of these sites are listed in scientific literature or in unpublished reports (Evanoff 1994, Long and Murry 1995, Parker 2002). Investigators from the Museum of Northern Arizona conducted the last general inventory of park fossil resources in 1979 (Cifelli et al. 1979). Unfortunately, during this study they only roughly mapped and described the localities and took very few photos of the sites. During the new inventory, investigators document these historical sites in three ways: (1) plotting with geographic information systems (GPS), (2) documenting the physical description, and (3) photographing the site. Investigators are not placing any physical markings now, in order to avoid confusion with numerous marked cultural sites in the park.

Preliminary work in the summer of 2001 resulted in the documentation of 35 preexisting and 10 new vertebrate sites, which far surpassed initial goals and expectations for the project. Work was even more productive in 2002 with investigators documenting 34 preexisting and 22 new sites. To date, investigators have located and documented more than 40% of all known vertebrate fossil sites in the park using the new criteria. In addition, investigators recovered numerous vertebrate fossils, which are now protected from loss by erosion (fig. 2). All of these specimens are scientifically important; however, the skeleton of a large, extinct, crocodile-like aetosaur *(Stagonolepis wellesi)*, the second most complete aetosaur skeleton recovered from the Triassic of Arizona, is most notable. This inventory is ongoing and future phases will include documentation of localities with plant, invertebrate, and trace fossils.

NPS PHOTO BY WILLIAM PARKER

Figure 1. The inventory crew investigates a fossilized tree in the Devil's Playground area of the park.

NPS PHOTO BY RANDALL IRMIS

Figure 2. In 2002 the inventory teams discovered an armor plate of a Triassic reptile in the Rainbow Forest. This plate belongs to a new species of animal previously unknown in Arizona.

Continued in right column on page 40

The park's partners benefit from the facilities and expertise that the park offers. Ultimately, of course, the resources being protected and enhanced are the primary beneficiaries of these partnerships. And because the park's natural resources are the public's to appreciate and enjoy, their stewardship benefits everyone.

Results and spin-offs

As a result of these partnerships, the survival and enhancement of Valley Creek as an outstanding natural, cultural, and recreational resource in the middle of an urban landscape has greatly improved. Exceptional value status adds an important management tool that can be used by both the National Park Service and Pennsylvania Department of Environmental Protection to protect the stream's water quality. A restored streamside woodland nurtures a growing fishery. Improved storm water control limits the creek's erosional power and enables landowners, such as the national historical park, to stabilize stream banks. These projects are rather high profile in that they are very visible, occur on a stream that is prized and protected by a large number of interest groups, and involve well-known partners, such as PennDOT.

An interesting and very beneficial cascading effect has occurred. Exceptional value status caused PennDOT to review its approach to protecting its assets (i.e., roads and bridges) along Valley Creek; this led to its partnership with the national historical park to stabilize stream banks along Route 252. In turn PennDOT chose the park for a riparian buffer project just upstream of Route 252, which was an important reason for the NPS Water Resources Division to fund the park's request to extend the upstream riparian restoration work on Valley Creek several hundred feet.

Of course, with all this interest in protecting the creek, it was politically untenable for the two townships, which encompass 90 percent of the watershed, not to improve their storm water ordinances. Both did, and now their ordinances require control not only of runoff rate, but also volume—a change sought by the park and environmental groups for more than a decade.

> "Now . . . storm water ordinances require control not only of runoff rate, but also volume—a change sought by the park and environmental groups for more than a decade."

About the authors

Betsie Blumberg *is a Writer-Editor with Penn State University, working for the National Park Service under cooperative agreement CA 4000-8-9028. She can be reached by email at bmb4@psu.edu.*

Brian Lambert *is a Resource Management Specialist at Valley Forge National Historical Park, Pennsylvania, and can be reached at (610) 296-2583 or brian_lambert@nps.gov.*

"Triassic park" continued from page 15

This project has demonstrated the importance of conducting fieldwork-based inventories. In many cases, existing data, including field maps, are inaccurate; in extreme cases, actual localities may be positioned as much as three-quarters of a mile from where they were physically mapped. Thus, locality maps not based on fieldwork (e.g., Evanoff 1994) can be unreliable for use in management decisions. In addition, photographs of the older localities do not exist, making their exact relocation almost impossible. Current and future projects that provide accurate GPS data, detailed notes, and site photographs will improve protection and management of fossil resources at Petrified Forest National Park.

> ***"Locality maps not based on fieldwork can be unreliable for use in management decisions."***

REFERENCES

Ash, S. R. 1972. Plant megafossils of the Chinle Formation. Pages 23–43 in C. S. Breed and W. J. Breed, editors. Investigations in the Triassic Chinle Formation. Bulletin 47. Museum of Northern Arizona, Flagstaff, Arizona.

Camp, C. L. 1930. A study of the phytosaurs with a description of new material from western North America. Memoir 10. University of California, Berkeley, California.

Cifelli, R. L., G. H. Billingsley, and W. J. Breed. 1979. The paleontological resources of Petrified Forest: a report to the Petrified Forest Museum Association. Unpublished report. Petrified Forest Museum Association, Holbrook, Arizona.

Daugherty, L. H. 1941. The Upper Triassic flora of Arizona with a discussion of its geologic occurrence by H. R. Stagner. Publication 526. Carnegie Institution, Washington, D.C.

Evanoff, E. 1994. Paleontological locality map of Petrified Forest National Park, Arizona. Unpublished report. Petrified Forest National Park, Petrified Forest, Arizona.

Long, R. A., and P. A. Murry. 1995. Late Triassic (Carnian and Norian) tetrapods from the southwestern United States. Bulletin 4. New Mexico Museum of Natural History and Science, Albuquerque, New Mexico.

Parker, W. G. 2002. Correlation of locality numbers for vertebrate fossil sites in Petrified Forest National Park. Pages 37–42 in A. B. Heckert and S. G. Lucas, editors. Upper Triassic Stratigraphy and Paleontology. Bulletin 21. New Mexico Museum of Natural History and Science, Albuquerque, New Mexico.

ABOUT THE AUTHOR

William G. Parker *is the Vertebrate Paleontologist at Petrified Forest National Park, Arizona. He can be contacted at william_parker@nps.gov.*