

## INNOVATIVE STRATEGIES TO DEVELOP INTERPRETIVE MEDIA FOR PALEONTOLOGICAL SITES AT CURECANTI NATIONAL RECREATION AREA, COLORADO

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**Abstract**—Curecanti National Recreation Area preserves three significant fossil localities along the shoreline of Blue Mesa Reservoir, primarily containing dinosaur fossils. Once resource management concerns are addressed to protect these paleontological resources, the park will provide interpretive resources to educate the visiting public. Due to the subject matter, location and physical conditions of the sites, traditional forms of interpretation are not adequate to meet the park's interpretive goals. The proliferation and sophistication of mobile technology in recent years provides an excellent opportunity for visitors to explore the sites, learn at their own pace and access interpretive information and activities on a variety of personal or government owned devices.

### INTRODUCTION

Curecanti National Recreation Area (CURE) is located in south-western Colorado (Fig. 1). Colorado's largest body of water, Blue Mesa Reservoir, is within the boundaries of the park. The majority of visitors come to the area for boating and fishing opportunities. Several paleontological localities are found exposed along the fluctuating shoreline within the Jurassic Morrison Formation. Invertebrate and vertebrate burrows, plant material, reptile and dinosaur fossils are known from the park.

### PALEONTOLOGICAL LOCALITIES

Three significant fossil localities are found along the Blue Mesa Reservoir shoreline in the Upper Jurassic Morrison Formation. The sites contain reptile and dinosaur body fossils and termite burrow fossils. *Apatosaurus* and *Allosaurus* dinosaur fossils were excavated from the Dino Cove locality in the 1990s and currently no bone material is exposed (Trujillo, 2000). A large collection of several hundred bone fragments was made in 2005 from the Northern Dinosaur Beach locality and resulted in expanding the paleofaunal list of the area to include six dinosaurs: *Apatosaurus*, *Allosaurus*, *Ceratosaurus*, *Camarasaurus*, *Diplodocus* or *Barosaurus* and *Stegosaurus* (Koch et al., in press) (Fig. 2). Limited collections exist for the Dinosaur Beach locality including crocodylian, turtle, theropod (*Allosaurus*) and sauropod (*Camarasaurus*) dinosaurs (Trujillo, 2001; Koch et al., in press).

### RESOURCE MANAGEMENT

Human and natural activities currently threaten the stability of these paleontological sites. The endangerment of the scientific and educational potential of the localities must be addressed. Wave actions of Blue Mesa reservoir are constantly eroding and undercutting the sites. Unpredictable water level fluctuations increase the erosion rate and threaten to seasonally submerge several exposed bones. Colorado's climate produces freeze/thaw events that crack both the exposed bone and the rock matrix that stabilizes the fossils. Additionally, the reservoir seasonally freezes and creates ice heaving on beach surfaces. All three fossil sites are accessible to visitors by recreational boating. Campers, fishermen and day users visit these fossil beaches.

Resource management will address the impairment concerns by collecting all scientifically valuable specimens, determining rates of new fossil exposures and creating and implementing a monitoring strategy. Once these actions are completed, the park will provide interpretive services to educate visitors about the important fossil resources that exist on the shores of Blue Mesa Reservoir.

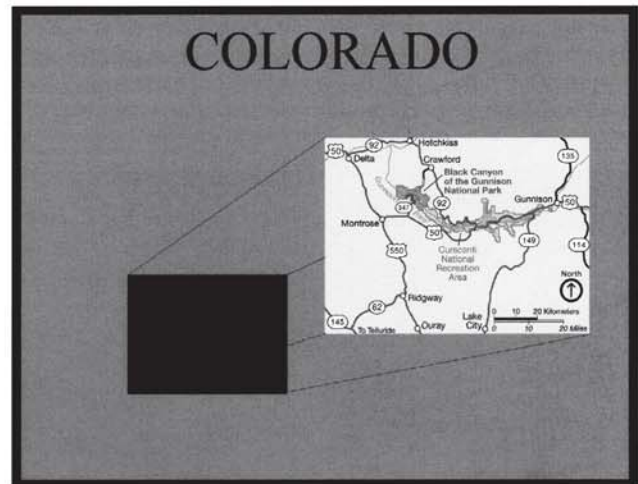


FIGURE 1. Location map of Curecanti National Recreation Area.

### INTERPRETATION AND TECHNOLOGY

#### The Balance of Information and Protection

If the public knew more about the importance of preserving paleontological resources, would they protect them? The balance of on-location interpretation of precious resources and greater visitor understanding is a struggle for interpretive management. Remote and obscure locations in national parks, far from the visitor crowd could go unnoticed and untouched for generations. Researchers know where the "best" fossils are at Curecanti National Recreation Area. The one million annual visitors could go on boating, fishing and camping with little knowledge or appreciation of what surrounds them in the rock record. Worse, a handful of fossil-savvy collectors could go unnoticed by the watchful general public, removing significant fossil evidence. The resources must have a value in the public's collective mind in order for protection to occur.

#### Few Will Visit, Many Can Learn

With 10,000 acres of water surface surrounded by 30,000 acres of essentially trail-free land at CURE, most visitors won't explore the Morrison Formation. Even though the recreation area captures the highest tourism in Colorado west of the Continental Divide, few will partake in personal contact with an interpretive ranger. Previously, CURE relied heavily on visitors reading ten-year-old wayside exhibit signage located at various highway rest areas. Nothing was available for the average of

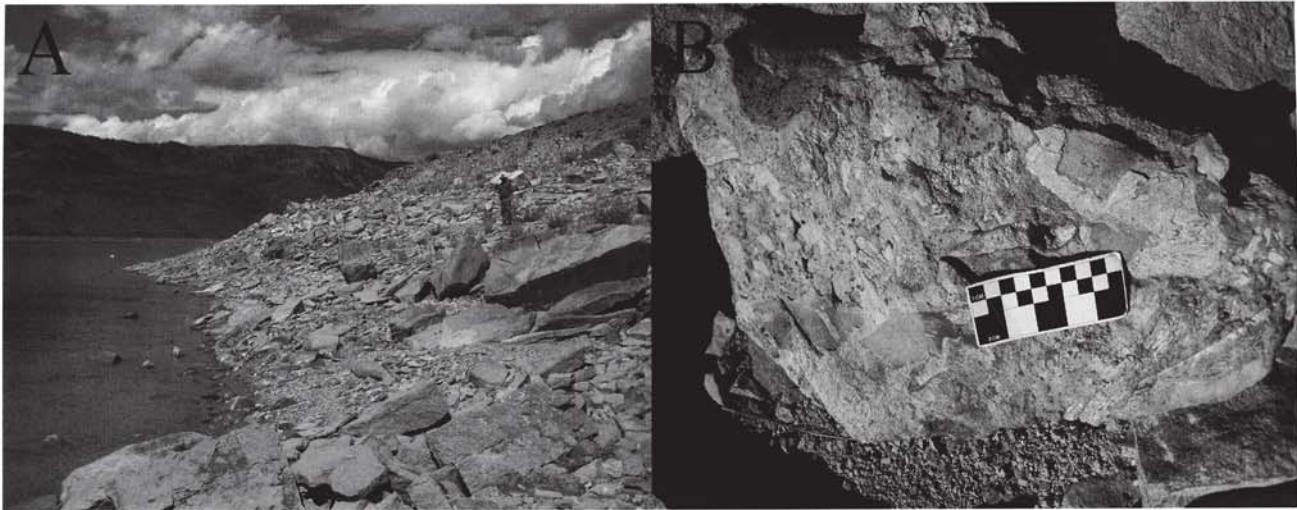


FIGURE 2. A, Northern Dinosaur Beach locality with archeologist for scale. B, Typical block of float at Northern Dinosaur Beach littered with fossil bone fragments.

two hundred daily boaters on Blue Mesa Reservoir. A two-minute safety message broadcasting night and day, inside a two-mile range along U.S. Highway 50 could be heard on AM radio. Interestingly, three times the number of on-site visitors to Black Canyon of the Gunnison National Park in 2005 visited the park's website last year. Most spent nearly an hour cruising through the two hundred pages of information. Visitors to the website came from every state of the United States and far more countries outside of our borders. Within seconds, and a few clicks of a mouse, visitors who had never seen Colorado were learning about dinosaurs inside a national park and a national recreation area.

#### The Newest Internet Frontier

The internet has been around for a long time with its early exchange of information in the academic community in the 1940s. Its popularity after the boom of the World Wide Web is unprecedented. Enter podcasting, a portable, time-shifting means of hearing the spoken word of radio disc jockeys, standup comedians and readers of periodicals. A new free subscription of information or entertainment, a podcast or broadcast deliverable by the internet and heard on an MP3 player (particularly the popular Apple iPod), became a new industry. On September 28<sup>th</sup>, 2004 a Google search for the word podcast would reveal 24 hits. On September 30<sup>th</sup>, the same search found 526, then 2,750 only three days later. A year later, Google finds more than 100 million hits for the word "podcast." In the summer of 2005, a new frontier of video-on-demand (VOD) was pioneered and marketed in the Netherlands ([www.vodcast.nl](http://www.vodcast.nl)). Not surprisingly, the Dutch had the largest demand for Internet-based video broadcast, since over 60% of the population has 1 Mbps or faster broadband connections. Asia followed suit in August 2005 with a Philippine-based infotainment "vodcast" called HIT. By winter, portable video devices (PVDs) appeared on the world market. Apple's video iPod was challenged within a month by more than ten affordable devices.

#### The Saturation and Time-shift Stories in MP3

Not unlike television and the internet, MP3 and video player popularity in the US market has soared. According to new research from the Pew Internet and American Life Project, over 22 million Americans own an MP3 or iPod player and 6 million of these owners have listened to podcasts (Madden and Rainie, 2005). Pew also determined MP3/iPod players were owned by the more affluent at this time. Thirty-one percent of those with annual incomes over \$50,000 owned the devices. In

households with incomes under \$50,000 only 16% have the players. Broadband access is strongly associated with ownership of iPods and MP3 players, with 23% of broadband-enabled households owning music players, compared to nine percent of those on dial-up connections. Consumers with broadband at home and at work are the most likely of all to have iPods or MP3 players, with one in three owning the devices (Horriagan, 2005). Two-thirds of United Kingdom teenagers know the price of an iPod, but three-quarters have no idea about the price of a pint of milk, according to a separate 2005 study by ICM Research (ICM Research, 2005).

All of the portable devices allow the user to subscribe to an internet download and listen and/or view the broadcast at a later time. The service is now popularized by Apple's iTunes free software, allowing viewers to time-shift last night's most popular television shows for less than two dollars. Listeners in the United States downloaded 5 million podcasts in 2005, but that activity is projected to grow to over 62.8 million by 2010, according to a study by Bridge Ratings (2006).

#### Moving Compelling Interpretation into the Portable World

Capturing the attention of new audiences and keeping them interested is a challenge all interpretive managers and educators face. Teachers are facing the paradigm shift of required reading becoming required listening. National parks already get a great deal of travel planning, safety information and pre-site learning to visitors through the popular National Park Service ([www.nps.gov](http://www.nps.gov)) website. Rather than placing expensive location-based wayside exhibits, well-done interpretation can be loaded into visitor-owned portable devices. Interpreting geology stories through images, timelines, graphics and video can be far more compelling than written text. The viewer or listener can steer their own learning by navigating, like many do through the World Wide Web, in a non-linear fashion. Learners gain knowledge on their own schedule, at their own pace and when it's most important to them. For managers, the market saturation of this technology has made information management inexpensive, easy to edit and easy to broadcast. The interpretive materials are far easier to produce in multiple languages, at different education levels and distribute to wide-ranging audiences.

#### Interpretive Strategies for Curecanti National Recreation Area

Due to the location and environmental conditions of the three dinosaur sites, traditional forms of site interpretation do not seem feasible or appropriate. Waysides are too permanent a structure for an area that sees fluctuating water levels, high rates of erosion and may require

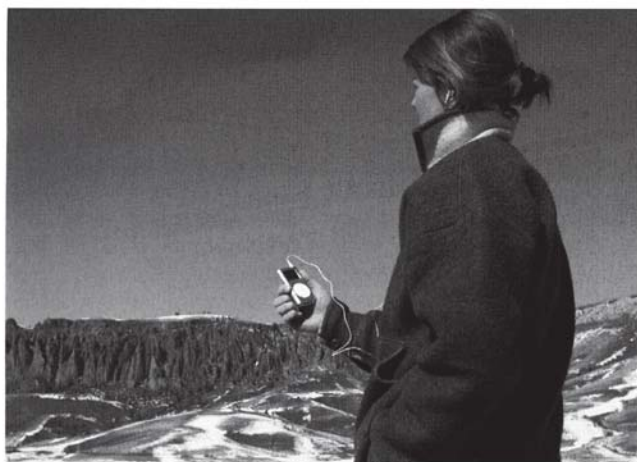


FIGURE 3. Visitor using a mobile device while exploring the park.

further digging in the future. Brochures do not seem sufficient to explain the geological and paleontological resources at the sites, create a connection for the visitor with the paleolandscape or provide information on the processes and techniques of paleontological science. The park believes that video presentations for mobile devices will better meet these interpretive goals. Visitors will have the opportunity to have a video presentation and/or interactive displays on hand while they explore the fossil sites along the beaches (Fig. 3).

Content will be created by park staff to include video footage, photographs, graphics and narrations. The park's visual information specialist will assemble all this information into one or several edited

video products. Topics may include reconstructing the paleoenvironment, animations to describe the paleolandscape, video and graphics describing the life of a fossil bone, footage showing scientists working on the site from collection to curation and a visual gallery of specimens collected from the site. Due to the ever-expanding marketplace for mobile devices and a desire for proprietorship, it can be difficult to determine the final file format in which to create video products. Fortunately, by using professional grade editing systems, the park can easily export content to an array of file formats to accommodate the growing mobile device market. Therefore, the park is not giving preferential treatment for interpretive content to any company, brand, device or file format.

There are several possible ways to provide the video content to visitors. First, content can be provided on the internet for viewing and for downloading for input into the visitor's personal mobile device. Second, the park visitor center may have a "downloading kiosk" or computer available for direct download of content into the visitor's device. Third, interpretive rangers can carry a flash drive, flash card or memory stick that contains the video files that can be copied to a visitor's device in the field during roving and visitor contact activities. Fourth, using Bluetooth technology, visitors can download the content virtually out of the air while inside the park. Finally, the park can invest in a few mobile devices to be rented to visitors who did not bring a device themselves but would like to have content on hand while at the fossil sites.

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