

cognitive duties are demanded by a task.

Because of the wealth of evidence showing that the motor cortex is an engine of movement, some neuroscientists are skeptical of these conclusions. For instance, some think it's possible, despite the Minnesota team's results, that the neural responses seen in the study somehow correspond to a monkey's thoughts of moving in the direction of each new spot. To address that concern, says Carl Olson, a neuroscientist at Carnegie Mellon University in Pittsburgh, he would like to see how neurons in the motor cortex respond during a task in which the monkey must remember order, but doesn't ever have to move toward any of the remembered stimuli.

Georgopoulos argues, however, that if the monkey were thinking about moving toward the spots, the neural responses would have been linked to location, not serial position. Still, he agrees that the results are a surprise and says he and his co-workers did a lot of "soul-searching" over the data. It goes to show, he says, that "we hardly know anything about the brain."

—INGRID WICKELGREN

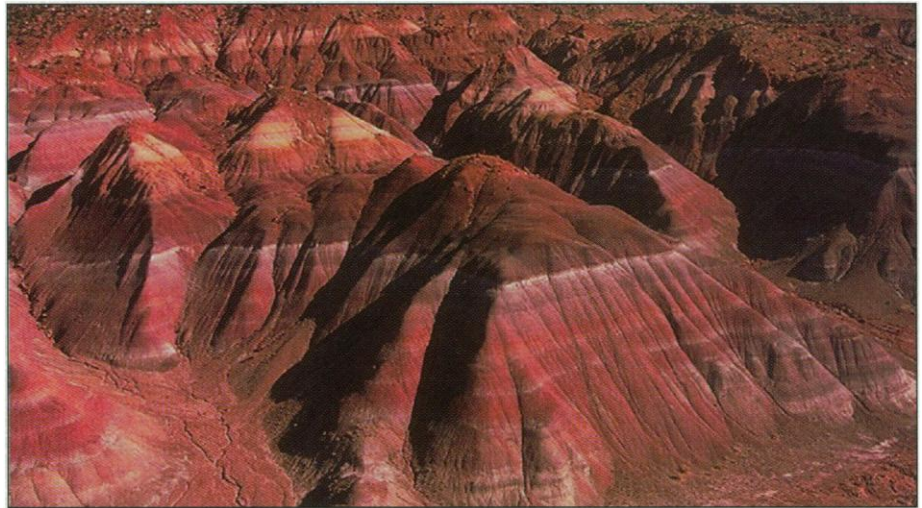
#### GRAND STAIRCASE MONUMENT

## Proposed Access Rules Split Community

Conceived in controversy, the Grand Staircase-Escalante National Monument in southern Utah is the largest U.S. reserve ever created specifically for science. Now, 3 years after President Bill Clinton set it aside, the vast preserve continues to be a flash point, as scientists take sides over a draft plan to preserve its scientific treasures without damaging them.

Clinton enraged state politicians—and surprised researchers—in 1996 when he abruptly set aside the 770,000 hectares of spectacular canyon-carved desert for scientific research. Although critics accused Clinton of pandering to environmental activists, White House officials said the move was the best way to head off a coal mine that threatened the area's fossil-rich rock formations, archaeological sites, and rare ecosystems. Now, the government has upset some scientists as well with a proposal that could limit access to the monument.

Last November, the Bureau of Land Management (BLM) unveiled a draft plan\* to close roads and limit routine excavations within the preserve, which lies in a remote area in southern Utah. Ecologists and archaeologists are cautiously praising the plan, but some geologists and paleontologists say that the restrictions will hamper their ability



**A rock and a hard place.** Geoscientists worry about restrictions on excavating fossil-rich formations such as the Chinle Badlands.

to carry out research. The plan is open for public comments until 15 March, and BLM has been getting an earful.

The rugged region was one of the last places in the continental United States to be mapped. In naming the reserve, Clinton paid tribute to pioneering geologist Clarence Dutton, who in 1880 described the area's terraced cliffs as a "grand staircase" for researchers to climb back into geologic time. Clinton also touted the reserve's "exemplary opportunities for geologists, paleontologists, archaeologists, historians, and biologists." And he gave BLM the tough job of balancing protection and use of the monument, setting a September deadline for a management plan.

The draft plan offers five options. Under its "preferred alternative," BLM would close roughly half of the monument's 3500 kilometers of paved and dirt roads, ban cross-country trips on all-terrain vehicles, and discourage surface-disturbing research on about 60% of the reserve. In the restricted zone, digs would be permitted only to study "unique" or "extremely high value" fossils, artifacts, and rock formations. The plan would also require research permits, with proposals that the monument's managers deem controversial—such as major digs in the restricted zones—subject to review by an independent scientific advisory panel.

Those suggestions have worried some geoscientists. Cracking down on motorized access and surface-disturbing research "could cause some great difficulties" for fossil researchers, says vertebrate paleontologist Jeffrey Eaton of Weber State University in Ogden, Utah, who notes that field studies often require sifting tons of soil for tiny fossil fragments. Adds paleontologist David Gillette of the Museum of Northern Arizona in Flagstaff, "It's just not practical to hike into every site, and you sometimes need heavy equipment." Although Gillette hopes

for "flexibility" in the permit system, he worries that the science advisory board may "open the door to needless bureaucracy."

Some geologists interested in studying the monument's oil and coal formations are more critical. The disturbance restrictions "are ludicrous" for large studies, says Utah State Geologist Lee Allison, who is attempting to rally opposition to the plan. If adopted, he says, the rules "would lead me to do science anywhere but there."

But monument chief Jerry Meredith says the BLM's intent is not to prohibit any research. "It would just require some projects to pass a higher test," he says. "Our responsibility is to first protect and preserve these resources—and then allow responsible study."

Archaeologists applaud the "preserve first" attitude. They say unregulated visitation represents the greatest threat to the monument's 2800 known rock art sites and ancient Anasazi dwellings, which date back 1000 years. Biologists and environmentalists are also supporting the restrictions as a way to provide a rare opportunity to study large tracts of undisturbed land. "We don't need roads open just so someone can remove rocks," says soils biologist Jayne Belnap of the U.S. Geological Survey in Moab, Utah. Indeed, the Wilderness Society would like to see more of the monument closed off. "Scientific research should be welcomed, but the monument's remote, unspoiled character should not be sacrificed to promote it," says Greg Applet of the group's Park City, Utah, office.

Meredith has already received more than 6000 comments, which will be analyzed in preparation for the final guidelines this fall. "I know paleontologists aren't excited about packing in backhoes on their backs," he says. But, so far, he isn't promising to put them in the driver's seat.

—DAVID MALAKOFF

CREDIT: BLM

\* [www.ut.blm.gov/monument](http://www.ut.blm.gov/monument)