

TITLE: Gunnison Gorge National Conservation Area, Colorado—creating an integrated geological inventory and guide

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PARTNERSHIPS AND ROLES:

- Richard I. Grauch, U.S. Geological Survey, Geologic Division, Mail Stop 973, Box 25046, Denver Federal Center, Denver, CO 80225, phone: (303) 236-5551, fax: (303) 236-3200, rgrauch@usgs.gov. Role: Investigates water-rock interaction in the Mancos Shale and the effects of released selenium and dissolved salts on the environment.
- Robert Waltermire, U.S. Geological Survey, Biologic Resources Division, 4512 McMurry Ave., Ft. Collins, CO 80525-3400, phone: (970) 226-9344, fax: (970) 226-9230, bob_waltermire@usgs.gov. Role: GIS specialist; preparation of digital database.
- Paul VonGuerard, U.S. Geological Survey, Water Resources Division, 964 Horizon Drive, Grand Junction, CO 81506, phone: (970) 245-5257 ext. 14, fax: (970) 245-1026, pbvongue@usgs.gov. Role: consults, as necessary, on water-resource issues.
- Bruce Heise, U.S. National Park Service, P.O. Box 25287, Denver, CO 80225-0287, phone (303) 969-2017, fax: (303) 969-2822, bruce_heise@nps.gov. Role: Liaison between USGS and NPS; facilitates contacts with NPS and provides digital mapping for areas within the NCA adjacent to Black Canyon of the Gunnison.

TYPE OF SUPPORT REQUESTED: Technical assistance is requested by the BLM managers of the Gunnison Gorge National Conservation Area (NCA) for preparing of an annotated inventory of geologic features within the NCA. The inventory is needed for baseline information in the Gunnison Gorge NCA plan for developing management alternatives and actions to ensure the protection and public appreciation of the outstanding natural features of the gorge.

PROBLEM STATEMENT AND IMPLICATIONS: The Gunnison Gorge National Conservation Area (NCA) and Wilderness near Montrose, created by Congress in 1999, encompass 57,725 acres just west and north of Black Canyon of the Gunnison National Park in Colorado. The outstanding scenery and recreational opportunities of the NCA and Wilderness attract over 10,000 visitors a year, and future visits are bound to increase significantly. River running, fishing, hunting, hiking, and camping are some of the activities that visitors enjoy. Tourism plays a vital role in the economy of the region; commercial outfitters to the NCA alone gross over \$1,000,000 a year, and the motels and restaurants of Montrose and other nearby communities largely depend on outside visitors for their livelihood.

The major attraction to visitors of the NCA and Wilderness is clearly the spectacular geologic formations, both within the gorge and in the surrounding area. These features, and the processes that created them, need to be photo inventoried, cataloged, and provided with narrative descriptions for use in the NCA plan and in the preparation of interpretive signs, displays, educational material, and other visitor information. Geologic cross sections and other illustrations showing the canyon's various geologic formations and easy-to-understand narratives are needed to explain the gorge's geologic evolution. There are also important societal issues related to the geology of the region that need to be explained to the public. For example, years of grazing and off-road vehicle use on areas underlain by Mancos Shale have created erosion problems and facilitated the release of selenium and salts to the environment.

OBJECTIVES: The objective of the project is to create an inventory of geologic features in the NCA and Wilderness that can be keyed to a layer of an overall geographic information system (GIS). This database will be crucial for the implementation of the NCA plan and will provide material for displays, posters, signs, and environmental education projects. In addition, a descriptive geologic guide to the geology of the NCA and Wilderness, using the geologic inventory as its database, will emphasize the geologic features along the river corridor, which attracts most visitors. The guide will include photographs with descriptive narratives, diagrams to explain the geologic evolution of the region, and text that unfolds the geologic history of the gorge. If time and resources permit, the guide will also integrate the geology with the ecology and human history of the area.

METHODS AND STUDY AREA: The Gunnison Gorge NCA and Wilderness is located approximately 10 miles northeast of Montrose, Colorado and approximately 1 hour south of Grand Junction, Colorado. The majority of the photo inventory will be conducted within the 14 mile Gunnison River canyon from its upstream boundary adjacent to the Black Canyon of the Gunnison National Park to the Gunnison and North Fork Rivers confluence, near Hotchkiss, Colorado. However, where needed to explain the regional geology, the inventory will also include photographs and points of geological interest outside the canyon. All locations will be accurately located using GPS on a digital geologic database. The National Park Service has digitized most of the existing geologic maps for the NCA and Wilderness and additional digitization will complete the necessary coverage. Photographs and geologic points of interest will be accurately located on the digital database, which will be useful for a number of display and educational purposes.

The geologic evolution of the Gunnison Gorge will be explained using a series of drawings, geologic cross sections, photographs, and explanatory text. The geologic story, conveying a sense of the vast geologic time necessary to form the rocks and canyon, will describe the formation of Precambrian crystalline rocks that comprise the canyon walls, the Paleozoic and Mesozoic seas that covered the area, the Uncompahgre uplift and erosion that stripped the area of the Paleozoic rocks, the Laramide orogeny that formed most of the present Rocky Mountains, the volcanic activity that covered large parts of the region, and the more recent uplift and downcutting that formed the present canyon.

Geologic terms will be explained and a geologic glossary included. An excellent, easy-to-understand explanation of the geology of the adjacent Black Canyon of the Gunnison (Hansen, 1987) provides one model of how such a geologic story might be told.

PROJECT DURATION: Fieldwork for the project will begin June 1, 2002 and be completed by July 15, 2002. Products will be delivered by June 1, 2003.

PRIORITY: In 2000, the BLM established the National Landscape Conservation System (NLCS) to protect some of the nation's most remarkable and rugged landscapes and ensure that future generations will enjoy these last, great open spaces. The NLCS lands, which include the Gunnison Gorge NCA, enable the public to experience the solitude and splendor of these undeveloped landscapes by providing numerous opportunities for exploration and discovery. By creating the NLCS, the BLM raised the profile of these areas and directed its managers to develop plans and programs designed to provide maximum protection of the areas while enhancing the public's knowledge and appreciation of them. This project exemplifies an integral part of the NLCS mission and, as such, maintains a very high priority throughout the BLM. The project offers an excellent opportunity for the USGS to serve an important public need and will also serve as a model for cross-agency cooperation.

PRODUCTS AND SCHEDULE: All written and digital products will be delivered at the close of the project, September 30, 2003. These products are:

1. Photographic and written inventory of geologic features within the Gunnison Gorge NCA. All photographs and site descriptions will be accurately referenced on a digital geologic map and incorporated into a GIS. All digital material will be accompanied by appropriate metadata.
2. A written description of the geologic history of the area, including illustrations that show various aspects of the history. The format will be an easy-to-use geologic guide suitable for sale to the interested public.
3. A final field trip to BLM managers and other interested parties that would highlight the major geological features included in the inventory and guidebook.

REFERENCES:

- Ellis, M.S., Gaskill, D.L., and Dunrud, C.R., 1987, Geologic map of the Paonia and Gunnison area, Delta and Gunnison Counties, Colorado: U.S. Geological Survey Map Coal Investigations Map C-109, scale 1:100,000.
- Hansen, W.R., 1968, Geologic map of the Black Ridge Quadrangle, Delta and Montrose Counties, Colorado: U.S. Geological Survey Geologic Quadrangle Map GQ-747, scale: 1:24,000.
- Hansen, W.R., 1971, Geologic map of the Black Canyon of the Gunnison River and vicinity, western Colorado: U.S. Geological Survey Miscellaneous Investigations Map I-584, scale 1:31,680.
- Hansen, W.R., 1987, The Black Canyon of the Gunnison—in depth: Southwest Parks and Monuments Association, Tucson, Arizona, 58 p.

BUDGET (FY 2002):

Operating expenses:

- Fieldwork
 - Per diem: 3 weeks @ area rate \$ 1,050.00
 - Vehicle: 3 weeks @ \$79.50/wk, \$.14/mi \$ 519.00

- Supplies and Equipment:
 - Raft rental: 7 days: \$ 700.00
 - Film and processing: \$ 100.00
 - Miscellaneous office supplies: \$ 100.00
 - Preparation of digital geologic map
by Biologic Resources Division: \$ 300.00

- Publication costs:
 - Geologic guide (USGS Bulletin) \$ 2,000.00

- Salaries:
 - GS-14-10 for 6 PP \$27,411.00

- SUBTOTAL: \$32,180.00

- Assessments (@23.75 %) \$ 7,643.00

- **TOTAL \$39,823.00**