



The National Park Service

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GEOLOGIC RESOURCE INVENTORY (UPDATED)

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The Natural Resource Inventory and Monitoring (I&M) Program was established to gather information and develop techniques for maintaining the integrity of the ecological communities in the approximately 250 National Park System units with significant natural resources. The details of the program are outlined in *Natural Resource Inventory and Monitoring in National Parks*, available from the address listed below.

Since its inception in 1992, the I&M Program has funded mapping of vegetation, soils, and geologic features; collection of base cartographic data; and compilation of automated park-based bibliographic and water-resource-related databases; initiation of several prototype monitoring programs; and development of data management standards and protocols. The fact sheet series of the Natural Resource Information Division provides updated information on the progress in each of these areas.

Geologic Resources

Bedrock and surficial geologic maps and information provide the foundation for studies of groundwater, geo-

morphology, soils, and environmental hazards. Geologic maps describe the underlying physical habitat of many natural systems and are an integral component of the geophysical inventories stipulated by the National Park Service (NPS) in its Natural Resources Inventory and Monitoring Guideline (NPS-75) and the 1997 NPS Strategic Plan. The NPS Geologic Resources Inventory is a cooperative endeavor by the Geologic Resources Division, Inventory and Monitoring Program (Natural Resource Information Division - NRID), U.S. Geological Survey, and state geological surveys to implement a systematic, comprehensive inventory of the geologic resources in National Park System units. The inventory consists of four main phases (Fig. 1):

(1) a bibliography of geologic literature and maps called GeoBib, (2) an evaluation of geologic maps, resources, and issues, (3) the production of digital map products and information, and (4) a report with basic geologic information, hazards and issues, and existing data and studies.

Status of the Geologic Resource Inventories

The Geologic Resources Division and the I&M Program sponsored a workshop in baseline geologic data in Denver in fall 1997 to receive information from the National Park Service, the U.S. Geological Survey, state survey personnel, and cooperators about needed basic geologic data that the I&M Program could provide. At the meeting, Colorado, North Carolina, and Utah were chosen as pilot project states to maximize cooperation among the agencies.

The collection of existing geologic maps and literature in each National Park System unit for the GeoBib and the publication of the data on the Internet are in progress. Index maps of the location of associated geologic maps are being prepared for the parks in Colorado and Utah. Upon determination of map coverage for each park, map products can be evaluated and potential mapping can be identified and initiated.

Pilot geologic-issues and map-scope meetings by Park Teams were organized in 1998 to evaluate the re-

Geologic Resources Inventory Process

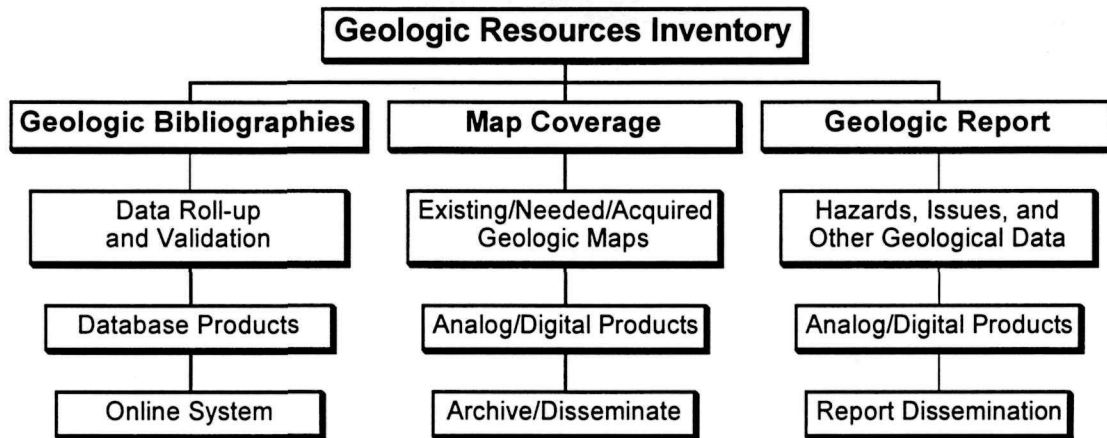


Figure 1. Geologic Resources Inventory Process

sources in Colorado parks and will be organized for parks in Utah during 1999. Park Teams will evaluate existing maps for digital products and identify needed geologic mapping. New geologic mapping may be initiated case-by-case after careful evaluation of needs, costs, potential cooperators, and funding sources. The co-operators of the Geologic Resources Inventory are developing geology-GIS standards to ensure uniform data quantity and quality for digital geologic maps. Pilot digitization will provide additional information for the digital map standards.

Upon completion of an inventory in a park, the available geological literature and data from the National Park Service, U.S. Geological Survey, state, and academic institution will be documented in a summary report. The content, format, and database of such reports are being developed and are outlined in a later section.

Relation with Existing Data Standards and Programs

The ideal baseline inventory goal of bedrock and surficial geologic maps of each park at 1:24,000 scale is compatible with similar scales of base cartography, soils maps, and vegetation maps. However, acceptable geologic map scales must be determined with case-by-case evaluations of existing products, park needs, and mapping costs. Many agencies are digitizing maps, but scales vary, and digitized coverage of all National Park System units can probably not be completed without in-house or contracted work by the National Park Service.

Geologic Resource Bibliographies (GeoBib)

The bibliographies of parks are collected and the data are posted in a secure database on the Intranet of the National Park Service. The bibliographic searches of databases (Georef and Geoindex) for each park

by the U.S. Geological Survey were converted to Procite data files. These files must still be converted for the Intranet system, and the citations must be edited for validity and duplicate entries. The completed GeoBib is expected to contain about 100,000 citations of geologic resource literature in an on-line database.

Bibliographies for 27 parks in the three pilot states have been edited, and data for an additional 15 western parks have been converted and loaded into the database for editing. After validation, lists of geologic map references will be prepared for each park and used to develop index maps of associated geologic maps. The lists and index maps will be converted to word processing documents for transfer to cooperators.

NPS Geologic Resource Inventory Report Outline	
Executive Summary	
History of Geologic Exploration	
•	For cultural and interpretive information
Geologic Setting	
•	General summary of park geology
Stratigraphy	
•	Stratigraphic column (web and printable graphics)
•	Rock unit names, abbreviations, and descriptions (digital geologic map attributes)
•	General stratigraphic information helps populate separate NPS Geologic Lexicon
•	Cross sections/fence diagrams
Structure	
•	General description map(s) and cross section(s)
Unique Geologic Features (summary or map)	
•	Landforms
•	Type localities
Paleontology	
•	Summary and reference to fossil list in NPSpecies DB
Disturbed Lands	
•	Summary and reference to AML/GRD data
Geologic Hazards and Issues	
•	Summary from literature and scoping meetings
Geologic Data	
•	References
•	Links to GeoBib, Geologic Lexicon, NPSpecies, etc.
•	Metadata for geology GIS coverage(s)
Other Sections and Topics as needed	

Figure 2. Outline of Geologic Report

Geologic Resource Workshops

Because of their proximity to the Natural Resource Program Center and the offices of the U.S. Geological Survey, parks in Colorado were selected for the first workshops in the assessment of the quality and extent of geologic information in each park. Each workshop included a field trip by an authority on the park's geology and an

on-site meeting to review the four inventory items. The participants discussed inventory needs, deliverable products, and tentatively assigned cooperator responsibilities.

The workshops facilitated a better understanding of the geology in the parks and revealed several applications for their management. Examples include the use of geologic data to

construct fire histories, the identification of habitat for rare and endangered plant species, the identification of areas with cultural and possibly paleontological resources, and the location of potential hazards for park roads, facilities, and visitors. Digital geologic maps in conjunction with other digital data will enhance the development of precise models of hazards and resources.

Geologic Mapping and Digitizing

The Inventory and Monitoring Program shared the cost of new geologic mapping in Zion National Park with the state of Utah. Completion of the geologic maps of Curecanti National Recreation Area, Mesa Verde National Park, and Yucca House National Monument in 1999 is proposed. Digitizing of four USGS geologic maps of Craters of the Moon National Monument in a pilot project has been contracted, and proposals were generated for the digitization of maps of Black Canyon and Yucca House national monuments, Curecanti National Recreation Area, and Mesa Verde National Park. Digitization of geologic maps of other parks in Colorado in 1999 is planned.

Baseline Geologic Inventory Report

The inventory report will contain summaries of the exploration history, geology, unique features, paleontology, disturbed lands issues, geologic data, geologic hazards, and other issues to describe the basic geologic resources of each park (Fig. 2). Several sections, such as stratigraphic columns and geologic cross section graphics, will incorporate available literature. Other sections will be summaries of ongoing programs such as the resto-

ration of disturbed lands and paleontological inventories. A database system is being developed to provide online access for report development and dissemination.

The Geologic Resources Inventory is being developed in cooperation with the U.S. Geological Survey and states but may reveal many other opportunities for collaboration with other agencies or institutions. Good, uniform digital map standards that are adaptable to diverse geological conditions and firm guidance for map developers must still be developed. The diversity of geologic resources in the National Park System will provide a continuing challenge for management. The geologic resource inventory, GIS, and digital geologic products will provide essential tools for natural resource management in NPS units throughout the country.

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