

# **Geologic Resources Inventory Workshop Summary**

## **Blue Ridge Parkway and Carl Sandburg Home NHS**

*May 10-12, 2000*

### **National Park Service**

### ***Geologic Resources Division***

*and*

### ***Natural Resources Information Division***

Version: Draft of August 7, 2000

#### **EXECUTIVE SUMMARY**

An inventory workshop was held for Blue Ridge Parkway and Carl Sandburg Home NHS (BLRI & CARL) on May 10-12, 2000 to view and discuss the park's geologic resources, to address the status of geologic mapping by the North Carolina Geological Survey (NCGS), United States Geological Survey (USGS) and various academics for compiling both paper and digital maps, and to assess resource management issues and needs. Cooperators from the NPS Geologic Resources Division (GRD), Natural Resources Information Division (NRID), NPS Blue Ridge Parkway, NPS Carl Sandburg Home, and NCGS were present for the three-day workshop. ([See Appendix A, Blue Ridge Parkway and Carl Sandburg Home NHS Geological Resources Inventory Workshop Participants, May 10-12, 2000](#))

Day one involved a field trip throughout Blue Ridge Parkway led by NCGS Geologists Carl Merschhat and Mark Carter.

Day two involved a daylong scoping session to present overviews of the NPS Inventory and Monitoring (I&M) program, the Geologic Resources Division, and the on going Geologic Resources Inventory (GRI) for North Carolina.

Day three involved a half-day field trip to view the geology of Carl Sandburg Home NHS led by Warren Weber and Mark Carter.

Round table discussions involving geologic issues for Blue Ridge Parkway and Carl Sandburg Home NHS included interpretation, paleontologic resources, and the status of cooperative geologic mapping efforts, sources of available data, geologic hazards, and action items generated from this meeting. Brief summaries follow.

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### OVERVIEW OF GEOLOGIC RESOURCES INVENTORY

After introductions by the participants, Tim Connors and Joe Gregson presented overviews of the Geologic Resources Division, the NPS I&M Program, the status of the natural resource inventories, and the GRI in particular ([see Appendix B, Overview of Geologic Resources Inventory](#)).

They also presented a demonstration of some of the main features of the **digital geologic map** for the Black Canyon of the Gunnison NP and Curecanti NRA in Colorado. This has become the prototype for the NPS digital geologic map model as it reproduces all aspects of a paper map (i.e. it incorporates the map notes, cross sections, legend etc.) with the added benefit of being geospatially referenced. It is displayed in ESRI ArcView shape files and features a built-in help file system to identify the map units. It can also display scanned JPG or GIF images of the geologic cross sections supplied with the map. Geologic cross section lines (ex. A-A') are subsequently digitized as a line coverage and are hyperlinks to the scanned images.

The developing NPS theme browser was also demonstrated for adding GIS coverage's into projects "on-the-fly". With this functional browser, numerous NPS themes can be added to an ArcView project with relative ease. Such themes might include geology, paleontology, hypsography (topographic contours), vegetation, soils, etc.

The NPS GRI (Geologic Resources Inventory) has the following goals:

1. to assemble a bibliography of associated geological resources for NPS units with significant natural resources; "GRBIB",
2. to compile and evaluate a list of existing geologic maps for each unit,
3. to develop digital geologic map products, and
4. to complete a geological report that synthesizes much of the existing geologic knowledge about each park.

It is stressed that the emphasis of the inventory is **not** to routinely initiate new geologic mapping projects, but to aggregate existing information and identify where serious geologic data needs and issues exist in the National Park System. In cases where map coverage is nearly complete (ex. 4 of 5 quadrangles for Park "X") or maps simply do not exist, then funding may be available for geologic mapping.

### **GRBIB**

During the scoping session, each park is presented with a compiled, park specific geologic bibliography as compiled by GRI staff. The sources for this compiled information are as follows:

- AGI (American Geological Institute) GeoRef
- USGS GeoIndex
- ProCite information taken from specific park libraries

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These bibliographic compilations are then validated by NPS staff to eliminate duplicate citations and typographical errors, and check for applicability to the specific park. After validation, they become part of a Microsoft Access database parsed into columns based on park, author, year of publication, title, publisher, publication number, and a miscellaneous column for notes.

From the Access database, they are exported as Microsoft Word Documents for easier readability, and eventually turned into PDF documents. They are then posted to the GRI website at: <http://www2.nature.nps.gov/grd/geology/gri/products/geobib/> for general viewing.

### **EXISTING GEOLOGIC MAPS**

After the bibliographies were assembled, a separate search was made for any existing surficial and bedrock geologic maps for Blue Ridge Parkway and Carl Sandburg Home. The bounding coordinates for each map were noted and entered into a GIS to assemble an index geologic map. Separate coverage's were developed based on scales (1:24,000, 1:100,000, etc.) available for the specific park.

Numerous geologic maps at varying scales and vintages cover the area. In addition, the NCGS is currently involved in a comprehensive project to refine the mapping of BLRI and CARL, led by the Asheville office. See Appendix C ([Existing Geologic Maps for BLRI and CARL](#)) for a list of geologic quadrangle maps and their status.

### **DEVELOPING GEOLOGIC PRODUCTS**

#### **BLRI & CARL Perspective**

Some of the main geologic issues that BLRI & CARL staff are interested in are:

- Geologic hazards (landslides, debris flows, earthquakes);
- Complete geologic map coverage for all of BLRI & CARL at 1:24,000 scale;
- Interpretation of geologic features and processes for the visiting public to explain how landscapes have changed; and
- a definition of geologically "disturbed lands"
- what will be "monitored" geologically in the Inventory and Monitoring Program

Geologic hazards are a common theme at BLRI because of landslides and debris flows that can affect the visiting public and destroy park roads.

Earthquakes may also be of interest to park staff. Seismic stations in the area are sparse. At Great Smokies NP it was suggested to have one established in the park, as this is one of the higher earthquake activity areas east of the New Madrid Fault zone. Unfortunately, earthquakes usually only receive attention after they've occurred. The University of Tennessee at Knoxville (UTK) has a website on earthquake activity in the region at: <http://tanasi.gg.utk.edu/quakes.html>

BLRI & CARL do not have a staff geologist, so they are encouraged to work with the local experts of the NCGS Asheville office, who have volunteered their assistance to the

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parks at any time with regards to geologic mapping, mining issues and general understanding of geomorphic/geologic features and processes.

Bambi Teague (BLRI) is interested in discussing Disturbed lands issues with GRD Geologist Dave Steensen (Dave\_Steensen@nps.gov); the Disturbed Lands programs is highlighted at: <http://www2.nature.nps.gov/grd/distland/index.htm>

Methods for monitoring geological features and processes is being discussed currently by Bob Higgins of GRD and separate reports will be forthcoming in the future.

### **USGS Perspective**

The USGS was not represented at these meetings, but they are interested in the local geology and associated mapping projects. Scott Southworth is likely the main contact and is presently doing much work at Great Smokies NP. The USGS may be interested in a project to tie together the geology of Shenandoah NP, Blue Ridge Parkway and Great Smoky Mountain NP, according to Lindsay McClelland.

### **NCGS Perspective**

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Carl Merschat (NCGS) told the group that, through the years, the NCGS has been involved in cooperative mapping projects with the Tennessee Valley Authority (TVA), the USGS, and the USFS. Most of their efforts have been concentrated within the French Broad drainage basin.

Along the southern boundary of the GRSM NP, the NCGS has published only the Noland Creek quadrangle. The quad was originally mapped as part of a doctoral dissertation. Currently, the western half of the Asheville 1:100,000 sheet is slated for completion by 2003 and the eastern half by 2006. This sheet consists of 32 1:24,000 quadrangles. Scott Southworth expressed interest in further discussing this mapping project with NCGS staff for stratigraphic correlations and identification of similar map units. (THESE ARE CARL'S SUGGESTIONS FOR REVISION)

Carl Merschat (NCGS) told the group that the NCGS Asheville office has focused much of their efforts along the Blue Ridge Parkway. The NCGS is the oldest Geological Survey in the country (since ~1823) and the Asheville office has two geologists (Carl Merschat and Mark Carter). Their duties have involved making geologic maps and mineral resource summaries, as well as investigating mines and mining activity. These summaries have very detailed literature surveys that will be useful for the GRI.

Currently, the NCGS is using StateMap and EdMap funding to get quadrangles published, as their source of funding these ventures was greatly diminished when the Tennessee Valley Authority stopped contributing.

The western half of the Asheville 1:100,000 sheet is slated for completion by 2006 and the eastern half by 2003. This sheet consists of 32 1:24,000 quadrangles. NCGS is

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working with Jonathan Burke (Western Carolina University) on this project. The Sam's Gap quadrangle is slated for completion in August 2000.

Carl also mentioned that the North Carolina portion of BLRI is mapped and published at 1:250,000 scale. The NCGS is willing and able to assist and review with any new mapping in North Carolina by academics, privates, or whomever.

### **VAGS Perspective**

Due to oversight on NPS-GRD's part, the Virginia Geological Survey was not represented at these meetings for their perspective on how they are mapping the Virginia part of BLRI. Nick Evans (VA-GS) has offered to assist the NPS on this matter.

### **Academic Perspective**

Bob Hatcher (UTK), though absent from these meetings, has had numerous students mapping in and around the North Carolina Piedmont area, and also BLRI & CARL region for many years. Some of the mapping was done at 1:12,000 and compiled at 1:24,000 scale. He has also published a guidebook based on the geology in the Carl Sandburg Home area entitled "*Studies of Inner Piedmont Geology with a focus on the Columbus Promontory*".

It may be desirable to fill in missing gaps with StateMap and EdMap funding with Bob as a contact.

### **COMPONENTS OF THE DIGITAL DATABASE**

For BLRI, it seems that the best approach for covering the entire parkway is to do the following:

- digitize existing small-scale quadrangles
- create a geologic strip map with one mile (approximately) buffers on either side.
- Obtain quadrangle based coverage for areas of special concern and extended buffers
- Create a position at BLRI for a combination Geologist-GIS type person who can do both

Any geologic database produced should be sufficient to answer questions like "Where are the greenstones, where is the colluvium that covers the greenstone, and how close is it to the waterfalls that contain fish X, and the rare plants".

The GIS should contain a hazards layer and buffered around the park boundary into populated areas.

BLRI has numerous quadrangles within its proper boundaries and CARL has one (Hendersonville); it is desired to have each one of these eventually mapped (if not already) at 1:24,000 scale and available digitally.

NRCS soils data should be able to integrate into the master geologic database

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Geochemistry layer to show influence on landscape and soil formation; maybe use pH as factor to produce chemical variability maps. Use NRCS data

Draw correlations between soil-bedrock-vegetation

### ***GEOLOGIC REPORT***

It is the desire of the GRI to produce an encompassing geologic report for each park containing the following elements:

- History of Geologic Exploration
- Geologic Setting
- Geologic History
- Structure
- Unique Geologic Features
- Paleontology
- Disturbed Lands
- Geologic Hazards and Issues
- Geologic Data
- References
- Future Research topics
- Other topics and sections as needed

The NCGS has published "***A Geologic Adventure along the Blue Ridge Parkway in North Carolina***" that is useful but does not cover all of the above topics adequately for NPS needs.

### **Other Issues**

#### ***Interpretation***

One goal of GRD is to promote geologic resource interpretation within the National Park Service. GRD has staff and technology to assist in preparation of useful materials including developing site specific bulletins, websites, and resource management proposal (RMP) statements appropriate to promoting geology. Jim Wood (GRD) and Melanie Moreno (USGS-Menlo Park, CA) have worked with several other NPS units in developing web-based geology interpretation themes, and should be considered as a source of assistance should the park desire. GRD has also received much positive recognition for the "Park Geology Tour of National Parks" and subsequent "Geology Field Notes" at <http://www2.nature.nps.gov/grd/tour/index.htm>. GRD posted these sites based on available park brochures, but they are always in need of fresh material. Park staff may wish to review these and suggest improvements to GRD.

#### ***Status of Soils Mapping***

*Note: Awaiting Pete Biggam (NPS-Soil Scientist) suggestions as of 2000-07-27*

#### ***Paleontology***

GRD provides support on policy and GPRA (government performance and results act) goals related to paleontological resources in parks. At the present time, Paleontology is

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*not* one of the main baseline natural resource inventories, but it has been included within the GRI.

NPS Paleontologists are in favor of a mandate for protecting paleontological resources within federal lands. GRD staff have led refresher-training courses for NPS rangers at multiple parks to raise awareness for the protection of paleontological resources. Often a first step is for parks to determine whether they have paleontological resources, and then to have a baseline inventory completed.

Many parks have become interested in having Paleontological Surveys conducted. Surveys are already completed or in progress for Big Bend, Zion, Yellowstone and Death Valley. Vince Santucci ([Vince\\_Santucci@nps.gov](mailto:Vince_Santucci@nps.gov); NPS-GRD Paleontologist) is willing to discuss such matters with park staff, if they are interested.

Often, these surveys have shed valuable new information on previously unrecognized resources. These surveys involve a literature review and subsequent bibliography, as well as recognition of type specimens, species lists, and maps (which are unpublished to protect locality information), and also make park specific recommendations for protecting and preserving the resources.

Samples of existing paleontological surveys are available online at:  
<http://www2.nature.nps.gov/grd/geology/paleo/surveys/surveys.htm>

If a paleontological survey were conducted and yielded significant findings, the following might be derivative steps:

- Develop resource management plans including inventory and monitoring to identify human and natural threats to these resources;
- Incorporate findings or suggestions into park general management plans (GMP);
- train park staff (including interpreters and law enforcement) in resource protection; the fossil trade "black market" has become quite lucrative for sellers and often results in illegal collecting from federal lands;
- Collections taken from the area residing in outside repositories could be tracked down for inventory purposes;
- Fossils offer many interpretive themes and combine a geology/biology link and should be utilized as much as possible in interpretive programs.

### **OTHER SOURCES OF NATURAL RESOURCES DATA**

The NPS personnel were interested in seeing a demonstration of "Synthesis", the Natural Resources Program Centers system for storing and transmitting information on natural resources. Further questions regarding "Synthesis" should be directed to [Bruce\\_Nash@nps.gov](mailto:Bruce_Nash@nps.gov) or [Francine\\_Patterson@nps.gov](mailto:Francine_Patterson@nps.gov) .

### **ACTION ITEMS**

Many follow-up items were discussed during the course of the scoping session and are reiterated for quick reference.

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### **General:**

**Interpretation:** If desired consult with GRD's Jim Wood ([jim\\_f\\_wood@nps.gov](mailto:jim_f_wood@nps.gov)) or Melanie Moreno at the USGS-Menlo Park, CA ([mmoreno@usgs.gov](mailto:mmoreno@usgs.gov)) for additional assistance with various interpretation themes

### **Natural Resources:**

#### **Geologic Mapping:**

- consult Appendix C for the list of geologic maps for accuracy and status correctness
- NCGS submit proposal to complete mapping of CARL
- Review existing quadrangles for digitization and prioritize new large scale mapping areas for BLRI

### **Natural Resource Data Sources:**

**APPENDIX A**  
**Blue Ridge Parkway & Carl Sandburg Home NHS**  
**Geological Resources Inventory Workshop Participants**  
**May 10-12, 2000**

<b>NAME</b>	<b>AFFILIATION</b>	<b>PHONE</b>	<b>E-MAIL</b>	<b>Field Trip BLRI<sup>1</sup></b>	<b>Scoping Session</b>
Joe Gregson	NPS, Natural Resources Information Division	(970) 225-3559	<a href="mailto:Joe_Gregson@nps.gov">Joe_Gregson@nps.gov</a>	<b>x</b>	<b>x</b>
Tim Connors	NPS, Geologic Resources Division	(303) 969-2093	<a href="mailto:Tim_Connors@nps.gov">Tim_Connors@nps.gov</a>	<b>x</b>	<b>x</b>
Warren Weber	NPS, CARL	(828) 693-4178	<a href="mailto:Warren_Weber@nps.gov">Warren_Weber@nps.gov</a>	<b>NO</b>	<b>x</b>
Bambi Teague	NPS, BLRI	(704) 271-4779 ext. 209	<a href="mailto:Bambi_Teague@nps.gov">Bambi_Teague@nps.gov</a>	<b>NO</b>	<b>x</b>
Mark Carter	North Carolina Geologic Survey	(828) 251-6208	<a href="mailto:Mark.Carter@ncmail.net">Mark.Carter@ncmail.net</a>	<b>X</b>	<b>x</b>
Carl Merschat	North Carolina Geologic Survey	(828) 251-6208	Carl.Merschat@ncmail.net	<b>X</b>	<b>x</b>
Chris Ulrey	NPS, BLRI	828-298-0291 ext. 209	<a href="mailto:Chris_Ulrey@nps.gov">Chris_Ulrey@nps.gov</a>	<b>X</b>	<b>X</b>
Lindsay McClelland	NPS, GRD	202-208-4958	<a href="mailto:Lindsay_McClelland@nps.gov">Lindsay_McClelland@nps.gov</a>	<b>X</b>	<b>X</b>
David Anderson	NPS, BLRI	828-271-4779 ext. 217	<a href="mailto:J_David_Anderson@nps.gov">J_David_Anderson@nps.gov</a>	<b>No</b>	<b>X</b>
Scott Southworth	USGS-Reston	703-648-6385	<a href="mailto:Ssouthwo@usgs.gov">Ssouthwo@usgs.gov</a>	<b>No</b>	<b>No</b>
Nick Evans	Virginia Geologic Survey	804-951-6345	<a href="mailto:nevans@geology.state.va.us">nevans@geology.state.va.us</a>	<b>No</b>	<b>No</b>

<sup>1</sup> On Friday May 12<sup>th</sup>, Connors, Gregson, Carter and Weber were present at CARL for half-day field trip

## APPENDIX B

### Overview of Geologic Resources Inventory

The NPS Geologic Inventory is a collaborative effort of the NPS Geologic Resources Division (GRD) and Inventory and Monitoring Program (I&M) with assistance from the U.S. Geological Survey (USGS), American Association of State Geologists (AASG), and numerous individual volunteers and cooperators at NPS units, colleges, and universities.

From the perspective of the servicewide I&M Program, the primary focus (Level 1) of the geological inventory is

1. to assemble a bibliography of associated geological resources for NPS units with significant natural resources,
2. to compile and evaluate a list of existing geologic maps for each unit,
3. to develop digital geologic map products, and
4. to complete a geological report that synthesizes much of the existing geologic knowledge about each park. The emphasis of the inventory is not to routinely initiate new geologic mapping projects, but to aggregate existing information and identify where serious geologic data needs and issues exist in the National Park System.

The NPS Geologic Resources Division is an active participant in the I&M Program and has provided guidance and funding in the development of inventory goals and activities. GRD administers the Abandoned Mine Lands (AML) and Geologists In Parks (GIP) programs which contribute to the inventory. NPS paleontologists, geologists, and other natural resource professionals also contribute to inventory planning and data. A major goal of the collaborative effort is to provide a broad baseline of geologic data and scientific support to assist park managers with earth resource issues that may arise.

For each NPS unit, a cooperative group of geologists and NPS personnel (the Park Team) will be assembled to advise and assist with the inventory. Park Teams will meet at the each NPS unit to discuss and scope the geologic resources and inventory, which is the subject of this report. If needed, a second meeting will be held at a central office to evaluate available geologic maps for digital production. After the two meetings, digital geologic map products and a geologic report will be produced. The report will summarize the geologic inventory activities and basic geology topics for each park unit. Due to the variety of geologic settings throughout the NPS, each report will vary in subject matter covered, and section topics will be adapted as needed to describe the geologic resources of each unit. Whenever possible the scientific sections of the report will be written by knowledgeable cooperators and peer reviewed for accuracy and validity.

## APPENDIX C

### Existing Geologic Maps for BLRI and CARL

Scale	Quadrangle	Author	Year	Digital	Acceptable	Pub #
24000	Bakersville-Plumtree	Kulp, J.L., and Brobst, D.A.	1956			MF-97
24000	Bat Cave	Lemmon, R.E., and Dunn, D.E.	1973			NCDNER 0202-NE
24000	Celo	Howell, David E.	1973			unpublished
24000	Craggy Mountain (Mineral)	Lesyre, F.G., Grosz, A.E., Williams, B.B., and Gazdik, G.C.	1982			USGS Bul 1515
24000	Cruso	Morrow, Hyland B.	1977			unpublished
24000	Dolly Ann Roadless	Lesure, F.G.	1981			MF-1358-A
24000	Dolly Ann Roadless (Mineral)	Lesure, F.G., and Jones, J.G.	1983			MF-1358-D
24000	Dunsmore Mountain	Dabbagh, A.E.	1972			unpublished
24000	Flint Mill Roadless	Duttweiler, K.A., Cooley, E.F., Griffins, W.R., and Whitlow, J.W.	1983			OF-83-714
24000	Franklin (Preliminary)	Lesure, F.G., and Force, E.R.	1993			MF-2223
24000	Fruitland	Lemmon, R.E., and Dunn, D.E.	1973			NCDNER- 0202-NW
24000	Hendersonville	Lemmon, R.E.	1978			unpublished
24000	James River Face Wilderness	Brown, C.E., and Spencer, E.W.	1981			MF-1337-A
24000	James River Face Wilderness (Mineral)	Brown, C.E., and Gazdik, G.C.	1982			MF-1337-D
24000	Little Switzerland	Lewis, S.E., and Butler, R.J.	1981			unpublished
24000	Oteen	Nelson, D.E., and Bundy, J.L.	1972			NCGS MRS- 201-SW
24000	Rich Hole Roadless	Lesure, F.G., and Nicholson, S.W.	1985			MF-1760-A
24000	Shining Rock Wilderness	Lesure, F.G.	1981			MF-1290-A
24000	Skyland	Dabbagh, A.E., and McDaniel, R.D.	1981			NCGS MRS- 193-NE
24000	Spruce Pine District	Brobst, D.A.	1962			USGS Bul 1122-A
31680	Jonesville District	Miller, R.L., and Brosge, W.P.	1950			OM-104
48000	Linville Gorge Wilderness	D'Agostine, J.P., Whitlow, J.W., and Siems, D.F.	1986			MF-1610-A
48000	Rough Mountain Roadless	Lesure, F.G., Nicholosl, S.W.	1986			MF-1811
48000	Shining Rock	Lesure, F.G.	1981			MF-1290-A
48000	Tennessee (Northeasternmost)	King P.B., Ferguson H.W., Hamilton, W.	1960			USGS PP 311
62500	Blowing Rock	Bryant, B.	1963			GQ-243
62500	Grandfather Mountain	Bryant, B. Reed, J.C.	1970			USGS PP 615
62500	Great Smoky Mountains (Eastern)	Hadley, J.B., Goldsmith, R.	1963			USGS PP 349-B
62500	Lenoir	Reed, J.C.	1964			GQ-242
62500	Linville	Bryant, B.	1965			GQ-364
100000	Radford 30' x 60'	Schultz, A.; Bartholomew, M.J.; Lewis, S.E.	1991			I-2170-A
125000	Asheville Folio	Keith, Arthur	1904			GF-116

## APPENDIX C

### Existing Geologic Maps for BLRI and CARL

Scale	Quadrangle	Author	Year	Digital	Acceptable	Pub #
125000	Mount Mitchell Folio	Keith, A.	1905			GF-124
125000	Nantahala Folio	Keith, Arthur	1907			GF-143
125000	Pisgah	Keith, Arthur	1907			GF-147
125000	Staunton	Darton, N.H.	1894			GF-14
250000	Central North Carolina (Siliceous Rocks)	Carpenter, P.A.	1986			MF-1817
250000	Charlotte 1 degree by 2 degrees	Goldsmith, R.; Milton, D.J.; Horton, J.W.	1988			I-1251-E
250000	Great Smoky Mountain NP	King, P.B.; Neuman, R.B.; Hadley J.B.	1968			USGS PP 587
250000	Shenandoah Valley	Hack, J.T.	1965			USGS PP 484
250000	Winston-Salem	Rankin, D.W.; Espenshade, G.H.; Neuman, R.B.	1972			I-709-A