

Geologic Resources Inventory Scoping Summary Horseshoe Bend National Military Park, Alabama

Prepared by Katie KellerLynn
February 19, 2013

Geologic Resources Division
National Park Service
US Department of the Interior



The Geologic Resources Inventory (GRI), administered by the NPS Geologic Resources Division, provides each of 270 identified natural area National Park System units with a geologic scoping meeting and summary (this document), a digital geologic map, and a geologic resources inventory report. The purpose of scoping is to identify geologic mapping coverage and needs, distinctive geologic processes and features, resource management issues, and monitoring and research needs. Geologic scoping meetings generate an evaluation of the adequacy of existing geologic maps for resource management, provide an opportunity to discuss park-specific geologic management issues, and, if possible, include a site visit with local experts.

The Geologic Resources Division held a GRI scoping meeting for Horseshoe Bend National Military Park on March 21, 2012, at the headquarters building in Daviston, Alabama. Participants at the meeting included NPS staff from the park and Geologic Resources Division; and cooperators from the Geological Survey of Alabama, Auburn University, Colorado State University, Jacksonville State University, and University of West Georgia (see table 2, p. 15).

During the scoping meeting, Georgia Hybels (NPS Geologic Resources Division, GIS specialist) facilitated the assessment of map coverage and needs, and Bruce Heise (NPS Geologic Resources Division, GRI program coordinator) led the discussion regarding geologic features, processes, and issues. Dr. Mark Steltenpohl (Auburn University, Department of Geography and Geology, professor and department chair) provided a geologic overview of Alabama, with specific attention to the Brevard Zone—a major structural feature that extends for 600 km (965 mi) across the southern Appalachians, and runs “straight as an arrow” through Horseshoe Bend National Military Park. Dr. Steltenpohl also highlighted the rock units that are exposed in the park. During a site visit that followed the discussion portion of the scoping meeting, participants made stops at an outcrop of Kowaliga Gneiss, an overlook of the Tallapoosa River (tour stop 1; fig. 1), a slag pile of Kowaliga Gneiss developed during road construction, an overlook of the site of the barricade that was constructed for the Battle at Horseshoe Bend and nearby memorials (tour stop 2), inside meander of the Tallapoosa River near the Tohopeka village site (tour stop 3), and a quartzite ridge of Jacksons Gap Group developed within the Brevard Zone (between tour stops 4 and 5). As GRI team members were leaving the park, they stopped at the Alabama-49 bridge that spans the Tallapoosa River; base support structures of the adjacent historic Miller covered bridge remain (fig. 2).

This scoping summary highlights the GRI scoping meeting for Horseshoe Bend National Military Park and includes a description of the park and geologic setting; the GRI plan for providing a digital geologic map to the national military park; a discussion of significant geologic features, processes, and associated issues of resource management concern; and a record of meeting participants.

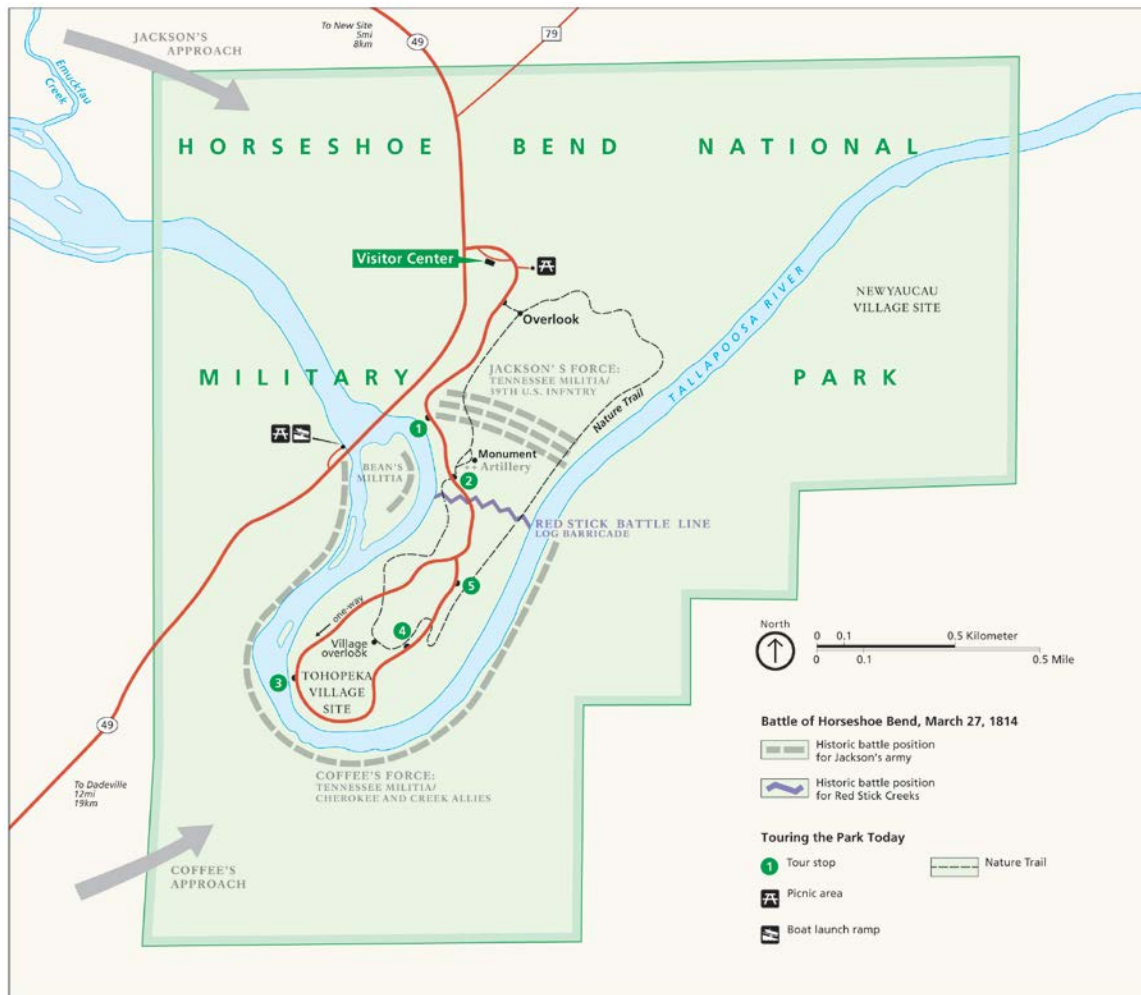


Figure 1. Map of Horseshoe Bend National Military Park. Horseshoe Bend National Military Park encompasses 826 ha (2,040 ac), all of which are under federal administration. The primary natural feature in the park is the Tallapoosa River (fig. 3). The park contains the battlefield and Tohopeka Village sites, a 4.5-km (2.8-mi) nature trail, 5-km (3-mi) tour road, visitor center, two picnic areas, and a boat launch ramp. National Park Service graphic.



Figure 2. New bridge and old bridge. Alabama 49 runs through the northwestern part of Horseshoe Bend National Military Park. The Alabama-49 bridge crosses over the Tallapoosa River. Miller covered bridge once provided access over the river. Construction of the present-day bridge was completed in 1956. The covered bridge collapsed in 1963, a year after this photograph was taken. Base support structures of the covered bridge remain. Photograph (right) by Katie KellerLynn (Colorado State University). National Park Service photograph (left, ca. 1962) available at <http://www.nps.gov/hobe/photosmultimedia/Miller-Covered-Bridge.htm> (accessed November 2, 2012).

Park and Geologic Setting

Horseshoe Bend National Military Park in north-central Tallapoosa County, Alabama, was established to commemorate the Battle of Horseshoe Bend—the decisive battle in the Creek Indian War (1813–1814). On March 27, 1814, U.S. forces under General Andrew Jackson defeated the Red Stick Creek Indians at this location. For Jackson, victory at Horseshoe Bend was the first step on the road to national fame and the White House (National Park Service 2007). Nine months later on January 8, 1815, U.S. troops led by Jackson defeated British troops at the Battle of New Orleans, the last major battle of the War of 1812, which is commemorated at Chalmette Battlefield in Jean Lafitte National Historical Park and Preserve in Louisiana. Horseshoe Bend National Military Park was authorized on July 25, 1956, and encompasses 826 ha (2,040 ac), all of which are under federal administration. In addition to the battlefield, the park contains the site of the Tohopeka Village, a 4.5-km (2.8-mi) nature trail, 5-km (3-mi) tour road, visitor center, two picnic areas, and a boat launch ramp near the Alabama-49 bridge (see fig. 1).

The name “Horseshoe Bend” pertains to a horseshoe-like bend, or meander, in the Tallapoosa River that runs through the park (fig. 3). The river drains into Lake Martin a few kilometers downstream to the southwest, and is part of the larger Mobile River watershed. The largest nearby town to Horseshoe Bend National Military Park is Alexander City (population ~16,000), which is about 20 km (13 mi) to the west and adjacent to Lake Martin. Birmingham is about 145 km (90 mi) northwest of the park; Montgomery is about 113 km (70 mi) southwest; and Atlanta, Georgia, is about 177 km (110 mi) northeast.

Horseshoe Bend National Military Park is in the region where the eastern Blue Ridge physiographic province meets the Piedmont physiographic province, in the immediate vicinity of the Brevard Zone, a large strike-slip fault zone, last active about 325 million years ago (GRI scoping notes, March 21, 2012). The exact nature of the Brevard Zone is enigmatic (Tweet et al. 2009a), and geologists continue to debate its structure, significance, and the nature and direction of ancient fault movement. Bobyarchick et al. (1988) noted 31 interpretations between 1905 and 1987. Citations housed in the GeoRef database reveal the continuation of the debate to the present day (see “Brevard Zone” section).



Figure 3. Aerial view of Horseshoe Bend National Military Park. Horseshoe Bend National Military Park was the site of the final battle of the Creek Indian War on March 27, 1814. The horseshoe-like bend in the Tallapoosa River illustrates the reason for the names of the battle and park. National Park Service photograph.

In a general way, the Brevard Zone forms the boundary between the Blue Ridge and Piedmont physiographic provinces. The Blue Ridge is northwest of the Brevard Zone, and the Piedmont is southeast. Horseshoe Bend National Military Park is on the northwest side of the zone, and contains rocks associated with both the Blue Ridge and Brevard Zone. Jacksons Gap Group (phyllite, schist, and quartzite) is part of the Brevard Zone (Szabo et al. 1988). Emuckfaw Group (schist and gneiss) and Kowaliga Gneiss are part of the Blue Ridge. Zana Granite intruded the Kowaliga Gneiss in the vicinity of the park. The Emuckfaw Group was named for exposures along Emuckfaw Creek, northwest of the park. Spelling appears as “Emuckfau” on the park map (see fig. 1), but the USGS National Geologic Map Database and Geographic Names Information System use the spelling “Emuckfaw,” which is used throughout this summary. During the site visit, scoping participants examined the Kowaliga Gneiss in an outcrop north of tour stop 1 and a slag pile south of this tour stop, as well as quartzite of the Jacksons Gap Group in a ridge between tour stops 4 and 5 (fig. 4).



Figure 4. Rocks of Horseshoe Bend National Military Park. Horseshoe Bend National Military Park contains rocks of the Blue Ridge physiographic province and the Brevard Zone. Kowaliga Gneiss (left) is part of the Blue Ridge; quartzite of Jacksons Gap Group (right) is part of the Brevard Zone. Photographs by Rebecca Port (left) and Katie KellerLynn (right) (Colorado State University).

All the rocks within Horseshoe Bend National Military Park are Paleozoic in age (542 million–251 million years ago). About 500 million years ago, the Piedmont and Blue Ridge physiographic provinces were part of a stable carbonate margin similar to the present-day Bahamas. They became deformed during the Taconic Orogeny about 450 million years ago, although the exact timing of this mountain-building event has not been determined for the rocks in Alabama (GRI scoping notes, March 21, 2012). About 300 million years ago, the rocks of the Piedmont and Blue Ridge physiographic provinces, along with the Coastal Plain physiographic province to the south, collided during the formation of the supercontinent Pangaea that stretched from pole to pole (fig. 5). All of the landmasses that make up today’s major continents were part of Pangaea. The final assembly of Pangaea involved the collusion of proto–North America, called “Laurentia,” and “Gondwanaland,” composed of Africa and South America. The Brevard Zone in the Horseshoe Bend area is thought to separate North American continental material on the northwest side of the zone from land added during the formation of Pangaea (Sterling et al. 2005), which was responsible for enormous upheavals during the Alleghany Orogeny (325 million–265 million years ago). In the eastern United States, the result was the Appalachian Mountains. In the western United States, the Ancestral Rocky Mountains formed at this time.

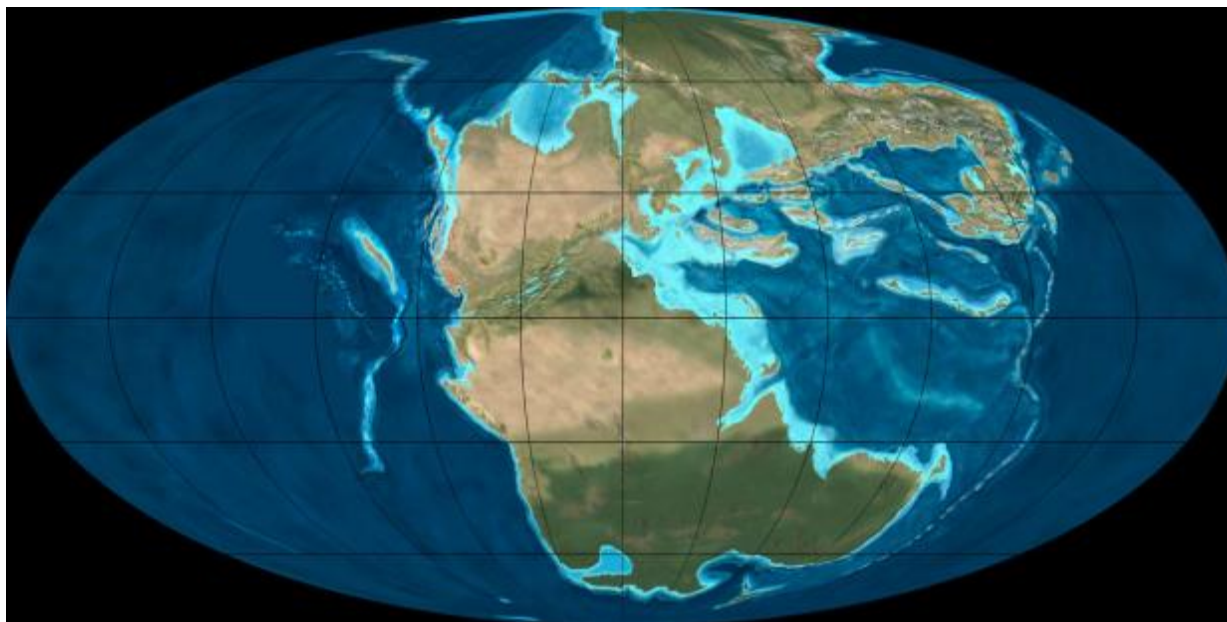


Figure 5. Pangaea. North America was once part of the supercontinent Pangaea. The C-shaped landmass stretched from pole to pole, and cupped the Tethys Ocean. The spine of the "C" was adjacent to a long subduction zone (a convergent plate boundary where one plate slides deeply beneath another). Much of Earth's surface was covered by a large ocean called Panthalassa. Base paleogeographic image by Ron Blakey (Northern Arizona University), available at <http://jan.ucc.nau.edu/~rcb7/index.html> (accessed 26 October 2011).

Geologic Mapping for Horseshoe Bend National Military Park

During the scoping meeting, Georgia Hybels (NPS Geologic Resources Division, GIS specialist) showed some of the main features of the GRI Program's digital geologic maps, which reproduce all aspects of paper maps, including notes, legend, and cross sections, with the added benefit of being GIS compatible. The NPS GRI Geology-GIS Geodatabase Data Model incorporates the standards of digital map creation for the GRI and allows for rigorous quality control. Staff members digitize maps or convert digital data to the GRI digital geologic map model using ESRI ArcGIS software. Final digital geologic map products include data in geodatabase and shapefile format, layer files complete with feature symbology, Federal Geographic Data Committee (FGDC)–compliant metadata, a help file that captures ancillary map data, and a document that displays the map and provides a tool to directly access the help file. Final data products are posted at <http://science.nature.nps.gov/nrdata/>. The data model is available at <http://science.nature.nps.gov/im/inventory/geology/GeologyGISDataModel.cfm>.

When possible, the GRI Program provides large scale (1:24,000) digital geologic map coverage for each park's area of interest, which is often composed of the 7.5-minute quadrangles that contain parklands (fig. 6). Horseshoe Bend National Military Park has two quadrangles of interest: Jacksons Gap and Buttston. Maps of this scale (and larger) are useful for resource management because they capture most geologic features of interest and are spatially (horizontally) accurate within 12 m (40 ft). The process of selecting maps for resource management begins with the identification of existing geologic maps (table 1) that cover the identified quadrangles of interest. Scoping participants then select appropriate source maps for the digital geologic data, or, if necessary, discuss proposals for new mapping.

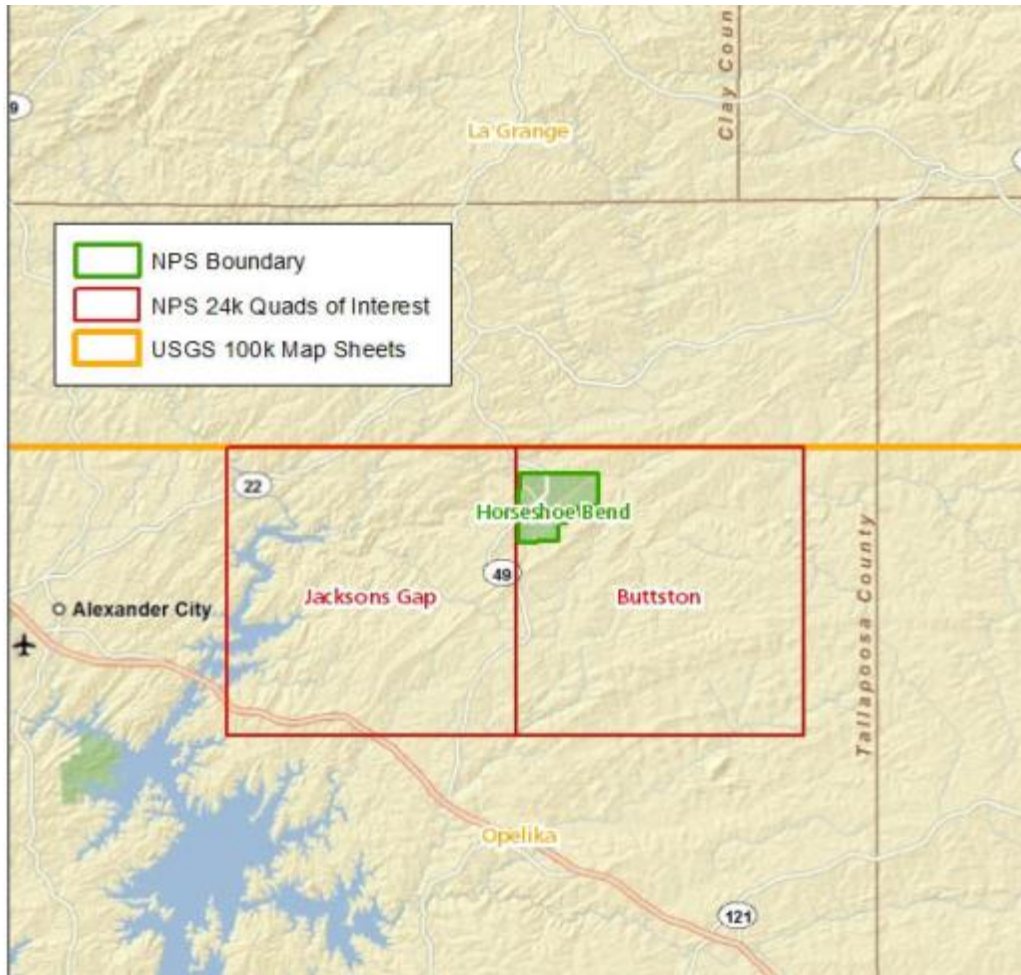


Figure 6. Quadrangles of interest for Horseshoe Bend National Military Park. Horseshoe Bend National Military Park has two quadrangles of interest: Jacksons Gap and Buttston, which are outlined and labeled in red. These are 7.5-minute (scale 1:24,000) quadrangles. The green outline on the graphic indicates the park boundary. National Park Service graphic, compiled by Georgia Hybels (NPS Geologic Resources Division).

Table 1. Potential Source Maps for Horseshoe Bend National Military Park GRI Data

Covered Quadrangles	GMAP ¹	Citation ²	Scale	Format	Assessment	GRI Action
Jacksons Gap and Buttston	68191	Beg, M. A. (1988)	1:126,720	paper	Scale is too coarse for resource management purposes.	None
Jacksons Gap and Buttston	74487	Geological Survey of Alabama (2006)	1:250,000	digital	Scale is too coarse for resource management purposes.	None

¹GMAP numbers are unique identification codes used in the GRI database.

²See "Literature Cited" section for full citations.

During the scoping meeting, participants deemed geologic mapping by Beg (1988) and the Geological Survey of Alabama (2006) inadequate for resource management purposes. However, Mark Steltenpohl (Auburn University) and his students are currently mapping in the area.

Specifically, Kevin Jones (Auburn University) is mapping part of the Buttston quadrangle for his senior thesis, to be completed in fall 2012, and will be working on the entire quadrangle for his M.S. thesis. Josh Poole, an incoming student to Auburn University, was to begin mapping the Jacksons Gap quadrangle in August 2012; the completion date had not been determined. Bruce Heise (NPS Geologic Resources Division) felt confident that the GRI could support mapping of the Buttston quadrangle, in which Horseshoe Bend National Military Park is situated, and was reasonably certain the GRI could support mapping of the Jacksons Gap quadrangle, the quadrangle of interest to the west, and mentioned the possibility of providing funding for these new mapping projects through the Geoscientists-in-the-Parks (GIP) Program (see <http://nature.nps.gov/geology/gip/index.cfm>), which the NPS Geologic Resources Division administers. The program collaborates with the Geological Society of America's GeoCorps America program for providing geologic expertise to meet park needs. Working with Auburn University is likely the best opportunity to get 1:24,000-scale geologic mapping for Horseshoe Bend National Military Park.

Since the scoping meeting, the GRI provided funding for a GeoCorps America project by Kevin Jones, who mapped the areal extent of Horseshoe Bend National Military Park. Kevin's work was presented at the Geological Society of America Annual Meeting in Charlotte, North Carolina, November 4–7, 2012. This map will be provided to the GRI team for conversion into the NPS data model and delivered to park managers in early 2013. While a reduced fiscal year (FY) 2013 GRI budget makes funding additional mapping for Horseshoe Bend National Military Park unlikely, the Geologic Resources Division has provided a letter of support to Dr. Steltenpohl for a U.S. Geological Survey EDMAP proposal for mapping the Buttston quadrangle in 2013. EDMAP is the educational component of the National Cooperative Geologic Mapping Program (NCGMP) (see <http://ncgmp.usgs.gov/about/edmap.html>; accessed November 29, 2012). The program is administered by the U.S. Geological Survey and is the primary source of funding for the production of geologic maps in the United States.

Geologic Features, Processes, and Issues

The scoping session for Horseshoe Bend National Military Park provided the opportunity to develop a list of significant geologic features and processes, many of which have associated management issues. During the scoping meeting, participants identified and discussed the following:

- Brevard Zone
- Fluvial Features and Processes
- Mass Wasting
- Cave Features and Processes
- Seismic Activity
- Mining and Minerals
- Paleontological Resources

Brevard Zone

The Brevard Zone is a major structural feature that crosses Horseshoe Bend National Military Park and is responsible for topographic relief in the area. A notable feature of the Brevard Zone is the juxtaposition of many different rock types by numerous faults. The Katy Creek and

Abanda faults are two in the area, and bound the Jacksons Gap Group of rocks (Steltenpohl et al. 1990). The Jacksons Gap Group, which occurs within the Brevard Zone, contains phyllite, schist, and quartzite. Quartzite, which is very resistant to weathering, forms distinctive ridges such as Cherokee Ridge in the area. Phyllite, which is more easily eroded than quartzite, forms ravines.

During scoping, Mark Steltenpohl (Auburn University) described the Brevard Zone as a right-lateral, strike-slip fault, similar to the San Andreas fault in California today; some normal-fault movement also occurs (fig. 7). Movement along faults in the Brevard Zone caused the rocks of the Blue Ridge, for example the Emuckfaw Group and Kowaliga Gneiss, to “pop up” in the Horseshoe Bend area. These units dip to the east, with the Emuckfaw Group overlying the Kowaliga Gneiss (Neathery and Reynolds 1975).



Figure 7. Types of faults. Faulting within the Brevard Zone in the vicinity of Horseshoe Bend National Military Park was primarily strike-slip, similar to the San Andreas fault today, where two tectonic plates slide horizontally past each other (left). Normal faulting also occurred, where crustal blocks move vertically with respect to each other (right). The “hanging wall” of a normal fault appears to move downward in relation to the “foot wall.” The angle of offset is usually 45°–90° on a normal fault. Graphics by Trista Thornberry-Ehrlich (Colorado State University).

Fluvial Features and Processes

The Tallapoosa River is the most prominent natural feature in Horseshoe Bend National Military Park (Burkholder and Rothenberger 2010). From its headwaters in northwest Georgia, the river flows for 314 km (195 mi) south–southwest through Alabama until it joins the Coosa River near Montgomery to form the Alabama River. A 5.9-km (3.7-mi) segment of the Tallapoosa River flows through Horseshoe Bend National Military Park. The park also contains a small spring-fed perennial stream, which flows near tour stop 1 (fig. 8), and several intermittent streams, which are commonly dry creek beds and only run during floods.

Horseshoe Bend National Military Park was named for the horseshoe-like bend in the Tallapoosa River. The bend is a meander in the river’s course that formed as the channel shifted over time. Meandering streams swing back and forth across broad, level accumulations of sediment in the floodplain, usually with little or no downcutting. However, according to scoping participants, the Tallapoosa River channel is now incised into bedrock, making Horseshoe Bend an “incised” or “entrenched” meander. The formation of incised meanders suggests rejuvenation of a meandering stream under conditions of rapid vertical uplift or lowering of base level (Neuendorf et al. 2005). Entrenched meanders preserve the meander pattern with very little modification to the overall form. Scoping participants suggested that the Tallapoosa River eroded into phyllite—an easily eroded rock type of the Jacksons Gap Group.

As rivers evolve and incise their channels, they may leave a distinct record of landforms, namely stream terraces. Terraces mark the positions of earlier streams and can be thought of as past

floodplains. They show where a river paused in its downcutting. Multiple terrace levels indicate that incision of a valley was not steady (Connell et al. 2005). Though a formal study has not been conducted at Horseshoe Bend National Military Park, scoping participants thought two terrace levels were likely preserved within the park (fig. 9).



Figure 8. Perennial stream in Horseshoe Bend National Military Park. In addition to the Tallapoosa River, a perennial spring-fed stream runs in the park. The stream is located near tour stop 1 (see fig. 1). Photograph by Katie KellerLynn (Colorado State University).



Figure 9. Possible stream terrace. Horseshoe Bend National Military Park may contain two levels of stream terraces that record the evolution of the Tallapoosa River over time. Photograph by Rebecca Port (Colorado State University).

Terraces at Horseshoe Bend National Military Park may be of archeological interest because these landforms generally provide adequate soil development, extent, and drainage for farming. Also, they are high above the modern floodplain and provide suitable areas for camping or habitation. Thus, terraces may preserve evidence of past human activities and occupation.

The segment of the Tallapoosa River within Horseshoe Bend National Military Park is located between two end-of-river impoundments: Harris Lake is about 32 km (20 mi) upstream, and Lake Martin is about 40 km (25 mi) downstream. The Alabama Power Company built and operates the dams at these impoundments for hydroelectric power. Construction of the dams also minimized flooding on the Tallapoosa River. As a result of dam construction and operation, river flow is now highly regulated. The National Park Service has no control over the sometimes extreme artificial flow patterns (Burkholder and Rothenberger 2010). Since Harris Dam was constructed upstream in 1980, the river segment downstream, including the park area, has been subjected to changes in river flow from as low as zero to 16,000 cubic feet per second (cfs) (Burkholder and Rothenberger 2010). However, scoping participants did not note any significant erosion as a result of dam releases, perhaps because the river has incised its channel at this location.

Bank Erosion and Sedimentation

Banks along the Tallapoosa River within Horseshoe Bend National Military Park are minimally disturbed with various degrees of natural stream bank erosion, or sloughing. The stream bank along the river at the Tohopeka Village site appears less stable than other areas and may be related to removal of trees (Brown et al. 2004). Mass wasting is not threatening any park infrastructure.

The Tallapoosa River basin within the vicinity and including Horseshoe Bend National Military Park is predominantly rural with mostly forested land cover (Burkholder and Rothenberger 2010). Sedimentation as a result of increased clear cutting of forested lands is a concern for water quality in the basin (Burkholder and Rothenberger 2010).

Cave Features and Processes

By and large, Horseshoe Bend National Military Park is not known for its cave and karst resources, which generally occur in sedimentary rocks such as limestone. Most of the rocks at Horseshoe Bend National Military Park are metamorphic, with possibly some igneous (i.e., Zana Granite). Occasionally caves occur in metamorphic rocks such as marble, for instance, at Oregon Caves National Monument in Oregon (see KellerLynn 2011). Moreover, huge voids have formed in the marble in the Brevard Zone, but not within Horseshoe Bend National Military Park.

The cave resources at Horseshoe Bend National Military Park consist of at least one rock shelter, referred to as “Wilson’s Rock,” which occurs in overhanging bedrock on the western side of the park. Commonly, rock shelters form as a result of weathering of crystalline bedrock, with easily weathered minerals such as feldspar or mica providing the means for cave formation. Wilson’s Rock was not explored during the site visit, and its origins are unknown.

Often, rock shelters are features where geological and archeological resource concerns come together. Rock shelters, for example at Chattahoochee River National Recreation Area in

Georgia, were used by prehistoric peoples, often as temporary hunting camps (Byrd 2009). The cultural significance of Wilson's Rock is unknown.

Seismic Activity

The U.S. Geological Survey (USGS) Earthquake Hazards Program posts online information about seismic activity in Alabama, including earthquake history, seismic hazard maps, notable earthquakes, recent earthquakes, and state and regional institutions where earthquake data are stored (<http://earthquake.usgs.gov/earthquakes/states/?region=Alabama>; accessed November 6, 2012). This online information documented a magnitude 2.3 (on the Richter scale) earthquake, 4 km (2 mi) east of Oxford, Alabama, on October 15, 2012; this quake serves as an example of recent seismic activity in the Horseshoe Bend area. Oxford is about 100 km (60 mi) north of Horseshoe Bend National Military Park. According to scoping participants, earthquakes are occasionally felt within the park.

Seismic activity, which can affect groundwater flow, resulting in the lowering of groundwater levels and the loss of water to wells, is a concern in the Horseshoe Bend area. Scoping participants suggested Sandy Ebersole (Geological Survey of Alabama, geologist and contact for geologic hazards information) as a source of earthquake information for park managers.

Scoping participants mentioned the Fort Payne earthquake as significant for Horseshoe Bend National Military Park. On April 29, 2003, a magnitude 4.9 earthquake occurred near Fort Payne, Alabama, about 210 km (130 mi) north of Horseshoe Bend National Military Park. The quake was felt in 13 states, but was deep enough to suppress significant damage in Fort Payne (the closest town), though shaking did damage weaker chimneys and cause cracks in some structures (Ebersole 2007). The Fort Payne earthquake caused the development of sinkholes and minor landslides, and muddied the underground water supply for the town of Valley Head, causing the pumps to shut down (Ebersole 2007).

The largest historic earthquake in Alabama was the Irondale earthquake—a magnitude 5.1 quake on October 18, 1916. At Irondale, which is about 145 km (90 mi) northwest of Horseshoe Bend National Military Park, 14 chimneys in a two-block area were partly destroyed, and six chimneys on a brick store were leveled almost to the roof. Many other chimneys were leveled to the roofs or cracked so badly that they had to be rebuilt (Stover and Coffman 1993).

Scoping participants also mentioned the New Madrid earthquake (1811–1812) as significant for Horseshoe Bend National Military Park. The New Madrid quake was likely felt in the Horseshoe Bend area. It also has some associated Native American lore and connections with the War of 1812. The New Madrid Seismic Zone lies within the central Mississippi Valley and extends through northeast Arkansas, southeast Missouri, and western Tennessee. Historically, this area has been the site of some of the largest earthquakes in North America. Three main shocks occurred during the New Madrid swarm: an estimated magnitude 7.7 on December 16, 1811; an estimated 7.5 on January 23, 1812; and an estimated 7.7 on February 7, 1812. Shaking during the last main shock was felt over 5 million km² (2 million mi²), ringing bells in Boston, rattling furniture in the White House, and causing the Mississippi River to run backwards (Ebersole 2007). This last effect was noted during GRI scoping in Vicksburg National Military Park in Mississippi (see KellerLynn 2010). With respect to cultural legend, the New Madrid earthquake

and the Indian leader Tecumseh have become linked. “Tecumseh’s War” and the New Madrid earthquakes occurred during the same time period. Tecumseh was the leader of a large tribal confederacy, known as “Tecumseh’s Confederacy,” that opposed the United States during Tecumseh’s War in the Great Lakes region and the War of 1812. He is credited with making several predictions, including the first of the New Madrid earthquakes. During his prediction, Tecumseh remarked that when he stomped, the earth would shudder. On December 16, 1811, upon his arrival in Detroit (Siege of Detroit, War of 1812), the first of the New Madrid earthquakes struck. Tecumseh has become an iconic folk hero in American, Aboriginal, and Canadian history (Bumsted 2009).

Mining and Minerals

Historically, the Brevard Zone has been the site of sporadic gold prospecting and minor production (Steltenpohl et al. 1990). At least 52 small gold mines and prospects are known within the Brevard Zone in Alabama and Georgia (Yeates et al. 1896; Jones 1909; Pardee and Park 1948). The most notable prospects in Alabama are within the Eagle Creek (Brewer 1896) and Devil’s Backbone districts (Phillips 1892; O’Neill and Vallely 1970), in northeastern, and central and south-central Tallapoosa County, respectively. These areas are north of Horseshoe Bend National Military Park. Gold mining operations were carried out in Tallapoosa County from 1842 to 1936 (Guthrie 2009). No commercial mining is currently planned, and there is minimal recreational interest (GRI scoping notes, March 21, 2012). Lewis Dean (Geological Survey of Alabama, geologist and resources information contact) tracks the occurrence of mineral operations and interest throughout the state. Doyle Sapp (Horseshoe Bend National Military Park, superintendent) contacts Louis Dean annually about potential activity near Horseshoe Bend National Military Park. Another source of information for park managers is the Alabama Department of Environmental Management, which is in charge of permitting in the state.

Horseshoe Bend National Military Park has one area of past mining within its boundaries. Gravel was mined from a pit to supply road materials. The pit is long unused, and mature trees now grow on it. Assistance with restoration from the Geologic Resources Division is not required.

Paleontological Resources

Northeast–southwest-trending swaths of Emuckfaw Group, Kowaligia Gneiss, and Jacksons Gap Group cross Horseshoe Bend National Military Park, with Emuckfaw Group exposed in the northwest corner of the park, Jacksons Gap Group in the southeast corner, and Kowaligia Gneiss sandwiched between. According to Tweet et al. (2009b)—a paleontological resource inventory for the Southeast Coast Network, including Horseshoe Bend National Military Park—none of these rock units are known to contain fossils. The only fossils to potentially occur within Horseshoe Bend National Military Park are Quaternary (the last 2.6 million years) in age and associated with Tallapoosa River deposits. If present, such fossils (e.g., algal cysts, pollen, leaves, and wood) could be useful for paleoclimatological and paleoecological studies (Tweet et al. 2009b). These types of fossils have been found in former marshy areas at Congaree National Park, another Southeast Coast Network park with active rivers (Tweet et al. 2009b).

Literature Cited

- Beg, M. A. 1988. Mineral resources of Tallapoosa County, Alabama (scale 1:126,720). Special map 204. Geological Survey of Alabama, Tuscaloosa, Alabama, USA.
- Bobyarchick, A. R., S. H. Edelman, and J. W. Horton Jr. 1988. The role of dextral strike-slip in the displacement history of the Brevard Zone. Pages 53–104 *in* Southeastern geological excursions: guidebook for geological excursions held in connection with the meeting of the Southeastern Section of the Geological Society of America, Columbia, South Carolina, April 4–10, 1988. Geological Society of America, Boulder, Colorado, USA.
- Brewer, W. M. 1896. Upper gold belt of Alabama, part 1. Bulletin 5. Geological Survey of Alabama, Tuscaloosa, Alabama, USA.
- Brown, R., G. Lackaby, and A. Chappelka. 2004. Natural resource program assessment, Horseshoe Bend National Military Park. Task order number J5480 03 0011. Auburn University, School of Forestry and Wildlife Sciences, Auburn, Alabama, USA.
- Bumsted, J. M. 2009. The peoples of Canada: a pre-Confederation history. Oxford University Press, Don Mills, Ontario, Canada.
- Burkholder, J. M., and M. B. Rothenberger. 2010. Assessment of water resources and watershed conditions in Horseshoe Bend National Military Park, Alabama. Natural resource report NPS/SECN/NRR—2010/268. National Park Service, Fort Collins, Colorado, USA.
<http://www.nature.nps.gov/publications/nrpm/nrr.cfm#2010> (accessed November 6, 2012).
- Byrd, B. W. 2009. Sope Creek, Chattahoochee River National Recreation Area, cultural landscape report. National Park Service, Southeast Regional Office, Cultural Resources Division, Atlanta, Georgia, USA.
- Connell, S. C., J. W. Hawley, and D. W. Love. 2005. Late Cenozoic drainage and development in the southeastern Basin and Range of New Mexico, southeasternmost Arizona, and western Texas. Pages 125–150 *in* S. G. Lucas, G. S. Logan, and K. E. Zeigler, editors. New Mexico's ice ages. Bulletin 28. New Mexico Museum of Natural History and Science, Albuquerque, New Mexico, USA.
- Ebersole, S. 2007. Earthquakes in Alabama. Brochure available online. Geological Survey of Alabama, Tuscaloosa, Alabama, USA.
http://www.gsa.state.al.us/documents/misc_gsa/AL_EQ_Brochure-small2.pdf (accessed November 6, 2012).
- Geological Survey of Alabama. 2006. Geologic map of Alabama (scale 1:250,000). Special map 220A. Digital version 1.0. Geological Survey of Alabama, Tuscaloosa, Alabama, USA.
http://ngmdb.usgs.gov/Prodesc/proddesc_76870.htm (accessed November 7, 2012).
- Guthrie, G. M. 2009. Emplacement of gold deposits in the eastern Blue Ridge and Brevard Zone, Alabama Piedmont. Guidebook. Alabama Geological Society, 46th Annual Field Trip,

- December 4th and 5th, 2009, Sylacauga, Alabama. The Alabama Geological Society, Tuscaloosa, Alabama, USA.
- Jones, S. P. 1909. Second report on the gold deposits of Georgia. Bulletin 19. Georgia Geological Survey, Atlanta, Georgia, USA.
- KellerLynn, K. 2010. Geologic resources inventory scoping summary, Vicksburg National Military Park, Mississippi and Louisiana. National Park Service, Geologic Resources Division, Lakewood, Colorado, USA.
http://www.nature.nps.gov/geology/inventory/publications/reports/VICK_GRI_scoping_summary_2010-0804.pdf (accessed November 6, 2012).
- KellerLynn, K. 2011. Oregon Caves National Monument: geologic resources inventory report. Natural resource report NPS/NRSS/GRD/NRR—2011/457. National Park Service, Fort Collins, Colorado, USA.
http://www.nature.nps.gov/geology/inventory/publications/reports/orca_gri_rpt_view.pdf (accessed May 22, 2012).
- Neathery, T. L., and J. W. Reynolds. 1975. Geology of the Lineville East, Ofelia, Wadley North, and Mellow Valley quadrangles, Alabama. Bulletin 109. Alabama Geological Survey, Tuscaloosa, Alabama, USA.
- Neuendorf, K. K. E., J. P. Mehl Jr., and J. A. Jackson. 2005. Glossary of geology. Fifth edition. American Geological Institute, Alexandria, Virginia, USA.
- O'Neill, J. F., and J. L. Vallely. 1970. Gold values of sample from the Devil's Backbone area, Tallapoosa County, Alabama. Circular 67. Geological Survey of Alabama, Tuscaloosa, Alabama, USA.
- Pardee, J. T., and C. F. Park Jr. 1948. Gold deposits of the southern Piedmont. Professional paper 213. U.S. Geological Survey, Washington, D.C., USA.
- Phillips, W. B. 1892. Preliminary report on a part of the lower gold belt of Alabama, in the counties of Chilton, Coosa, and Tallapoosa. Bulletin 3. Geological Survey of Alabama, Tuscaloosa, Alabama, USA.
- Steltenpohl, M. G., G. M. Guthrie, and R. B. Cook. 1990. Geology of the Brevard Zone at Jacksons Gap, Alabama (field trip VII). Pages 101–109 in M. G. Steltenpohl, S. A. Kish, and M. J. Neilson, editors. Geology of the southern Inner Piedmont, Alabama and southwest Georgia. Guidebook for field trips, Geological Society of America, Southeastern Section, 39th Annual Meeting, April 5–6, 1990, Tuscaloosa, Alabama, USA.
- Sterling, J. W., M. G. Steltenpohl, R. B. Cook Jr., P. Mueller, and A. L. Heatherington. 2005. Geological re-evaluation of the southernmost Brevard Zone, Alabama: implications for Appalachian evolution. Geological Society of American Abstracts with Programs 37(7):72–73.

Stover, C. W., and J. L. Coffman. 1993. Seismicity of the United States, 1568–1989. Professional paper 1527. U.S. Geological Survey, Washington, D.C., USA.

Szabo, E. W., W. E. Osborne, C. W. Coopeland Jr., and T. L. Neathery. 1988. Geologic map of Alabama (scale 1:250,000). Special map 220, sheet 4 of 5: Northeast sheet. Geological Survey of Alabama, Tuscaloosa, Alabama, USA.
http://ngmdb.usgs.gov/Prodesc/proddesc_55859.htm (accessed November 7, 2012).

Tweet, J. S., V. L. Santucci, and J. P. Kenworthy 2009a. Chattahoochee River National Recreation Area. Pages 73–77 *in* Paleontological resource inventory and monitoring Southeast Coast Network. Natural resource technical report NPS/NRPC/NRTR—2009/197. National Park Service, Fort Collins, Colorado, USA.

Tweet, J. S., V. L. Santucci, and J. P. Kenworthy 2009b. Horseshoe Bend National Military Park. Pages 157–161 *in* Paleontological resource inventory and monitoring Southeast Coast Network. Natural resource technical report NPS/NRPC/NRTR—2009/197. National Park Service, Fort Collins, Colorado, USA.

Yeates, W. S., S. W. McCalley, and F. P. King. 1896. A preliminary report on a part of the gold deposits of Georgia. Bulletin 4-A. Georgia Geological Survey, Atlanta, Georgia, USA.

Table 2. Scoping Meeting Participants

Name	Affiliation	Position
Joel Abrahams	Auburn University	Graduate Student
Jim Cahill	Horseshoe Bend National Military Park	Chief Ranger
Kelly Gregg	Jacksonville State University	Geologist
John Hawkins	Auburn University	Graduate Student
Bruce Heise	NPS Geologic Resources Division	Geologist/GRI Program Coordinator
Georgia Hybels	NPS Geologic Resources Division	Geographer/GIS Specialist
Kevin Jones	Auburn University	Undergraduate Student
Katie KellerLynn	Colorado State University	Geologist/Research Associate/Report Writer
Ed Osborne	Geological Survey of Alabama	Geologist/Program Director
Josh Poole	University of West Georgia	Undergraduate Student
Rebecca Port	Colorado State University	Research Associate
Doyle Sapp	Horseshoe Bend National Military Park	Superintendent
Mark Steltenpohl	Auburn University	Department of Geography and Geology, Professor and Chair

Note: Contact information is retained by the Geologic Resources Division.