Endless Wall is a popular rock climbing area in the park's northern end. These cliffs are made of Nuttall sandstone and reach heights of 80 to 150 feet. Photo by Gary Hartley.

Love Rocks: Leave No Trace!

Though stone is tough, these surfaces can still be impacted by human activities. Leave natural rock as you find it by not moving, damaging, or altering these surfaces.

For more information: 1-800-332-4100 www.LNT.org

Wow! Did You Know...

- Total length of the New River: 320 miles
- Total size of the New River watershed: 6,965 square miles (encompasses 4,457,000 acres)
- Number of dams on the New River: seven (Fields Dam in Mouth of Wilson, VA; Fries Mill Dam in Fries, VA; Byllesby Dam in Austinville, VA; Buck Dam in Carroll County, VA; Claytor Dam in Dublin, VA; Bluestone Dam in Hinton, WV; and Hawk's Nest Dam in Ansted, WV)
- Highest point: Snake Mountain, North Carolina at 4,800 feet above sea level (south fork of the New River)
- Lowest point: Gauley Bridge, West Virginia at 680 feet above sea level. At this point the New and Gauley Rivers join together to form the Kanawha River.
- Length of New River in New River Gorge National River: 53 miles, established as a unit of the National Park Service in 1978 (encompasses over 70,000 acres)
- American Heritage River: the entire New River received this national designation in 1998
- The New River drops 750 feet between Hinton and Gauley Bridge, West Virginia (around 11 feet per mile)
- One of the widest sections of the river in New River Gorge National River: Sandstone Falls area, 1500 feet
- One of the narrowest sections of the river in New River Gorge National River: Fayette Station rapid, 200 feet
- One of the deepest sections of the river in New River Gorge National River: the pool between Upper and Lower Railroad Rapids, just downstream of the Cunard River Access, is thought to be at least 25 feet deep (NOTE: river level can vary up to 20 feet throughout the year)
- One of the shallowest sections of the river in New River Gorge National River: the flat area just above Sandstone Falls, with water depth an average of one foot (NOTE: river level can vary up to 20 feet throughout the year)
- Highest waterfall on the New River: Sandstone Falls, 25 feet high at the main falls
- Rock from a quarry in Sandstone, West Virginia was used to represent this state in the construction of the Washington Monument, a National Park Service site in Washington, DC

For Park Information:
New River Gorge National River
P.O. Box 246, Glen Jean, WV 25846
304-465-0508 www.nps.gov/neri

4/2012

Scan this QR code to visit the park website.

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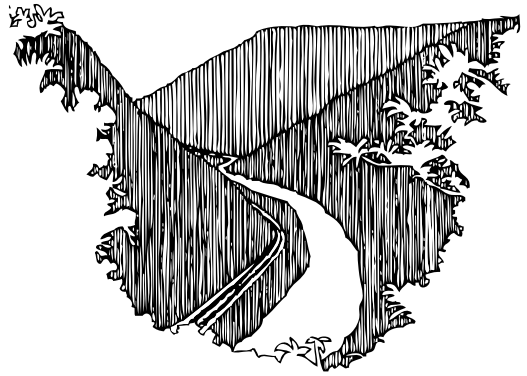
National Park Service
U.S. Department of the Interior

New River Gorge National River

New River Geology: Ribbon Through Time



Stand at any overlook in the New River Gorge and look into the canyon. These panoramas of the gorge are where it best presents itself, where it reveals the character of its natural sculpture and landscape. Notice the steep, V-shaped gorge walls and sandstone cliffs that characterize this area, with sides softened by lush Appalachian vegetation. The valley sides fall away steeply, between 900 and 1500 vertical feet. The river courses below, its roar diminished by distance.

For many, such a view provokes reflection, wonder of the scene before you and how it was formed. What was the strength that created such depths? How has this awe-inspiring place changed over time? You would not be the first to wonder such things with the New River Gorge stretched out before you. This is a place that has seen great change, where the study of the landscape tells one of America's older stories.

The answers to such questions come from geologists, whose science is not as simple or precise as we might wish. Take a closer look and focus on some basic and intriguing parts of the New River's geologic history, the story of this ribbon through time.

What's Old is the New

One of the most overlooked stories of this gorge is of the water and land. Time played quite a hand here, so do not be fooled by the modern name New River, for this waterway is quite old. The legend of its current name is a simple one. When Euro-Americans began to explore this region in the 1700s, they created maps to show the lay of the land. When these men came upon a river that was new to them, they simply marked their maps "a new river."Here the name stuck.

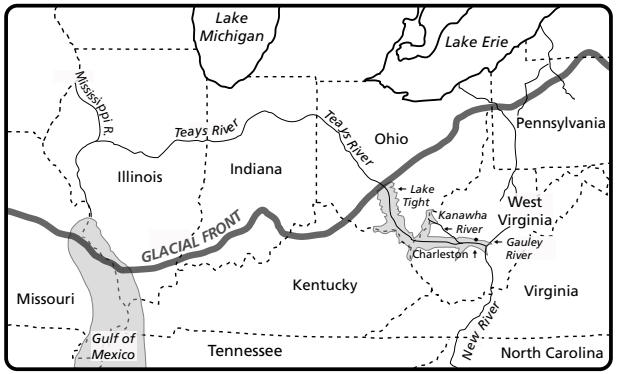
This river's origin is actually much older – by millions of years. Geologists believe that the New River is the one remaining part of the ancient Teays (pronounced "tayze") River. The age of the Teays River is greatly debated, but evidence preserved in the rock record dates the river to 320 million years ago, the Mississippian Period. Scientific studies of the rock and landscape provide clues to this age old story.

Fossils are part of the rock record and offer evidence of the gorge's ancient past, like this bark from a Lepidodendron, a common tree-like plant of the Carboniferous Period. National Park Service photo.

Making the Gorge: the Big Picture Story

How has time changed the local landscape? Over 300 million years ago the African and North American plates collided, thrusting upward the Appalachian Mountains. Streams flowed down the western slopes of these huge mountains, collecting in low basins to form vast swamps. Plants lived and died in these swamps. Over millions of years the vegetation accumulated as layers of peat, along with additional layers of sand and other sediments.

This period of mountain building lasted as much as 170 million years. As this uplift came to an end, erosion of the landscape continued. Sediment covered the lowlands, its weight compressed the peat into coal, and other layers into sandstone, siltstone, and shale. Over time, the mountains fully eroded away and sediments filled the valleys; an almost level plain remained. The Teays was one of the rivers that meandered northward across this plain (see graphic below). Over time, sediment buried the ancient Appalachians, yet erosion continued and exposed the roots of the mountains again. Softer rock eroded away, while more resistant strata remained as ridges – what geologists call "rejuvenated fold belts." The Appalachian Plateau uplifted now, so slowly that the Teays was able to cut through the emerging ridges at the same rate the land rose. The winding, V-shaped canyon of the gorge today shows the extent of the river's force.

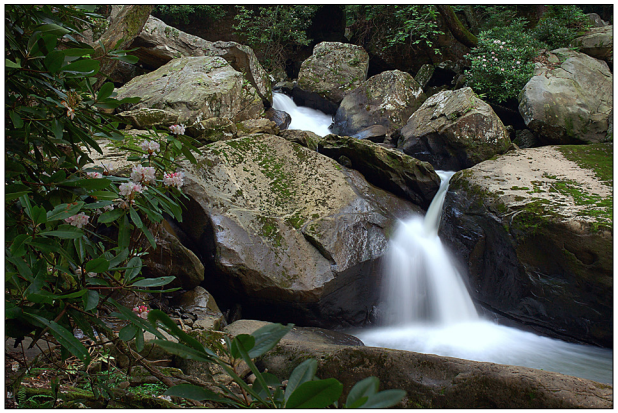


The route of the ancient Teays River and the most recent glacial front. Graphic based on a drawing by Harry Roberts.

Around two million years ago the earth began a cold period of glaciation during the Pleistocene Epoch. A huge ice sheet advanced south from modern-day Canada, crushing and scouring everything in its path. The glacial sheet covered the lower Teays River. Near the edge of this sheet, glacial till (deposits of glacial debris, including clay and rocks) dammed a segment of the north-flowing Teays River in what is now Ohio. A large, fingered lake formed, Lake Tight, in what is now part of Ohio, Kentucky, and West Virginia (see graphic above). This lake eventually overflowed and formed new drainage channels. This event marked the start of the modern Ohio River Valley's formation; this also impacted the path of the Teays River. The climate began to warm again 25,000 years later. The ice began to melt and recede, but the Teays River could not resume its former course, for the glaciers had filled the path with debris. The lake drained and filled with sediment. The river still flowed north, but along a slightly altered path. The forceful water continued to deepen its channel. Today this river is known as the Kanawha River, located downstream of the New River.

Grandview's spectacular horseshoe bend, known by geologists as an "entrenched meander." Photo by Jodi French-Burr.

Though scientific experts still debate the intricate details of the New River's geologic history, the cause and affects in this story are intriguing. Water has been and always will be a definitive force on this ever-changing landscape.



Wolf Creek is one example of the earth's continual erosion process in the park, the power of water on rocks. Photo by Gary Hartley.

I've known rivers ancient as the world and older than the flow of human blood in human veins.

- Langston Hughes, American Poet

Seeing Stones: Rock Layers Tell a Story

Exposed bedrock is seen in the gorge today. These bedrock layers formed 320 to 330 million years ago in the geologic Mississippian and Pennsylvanian Periods, part of the Paleozoic Era. Rocks and the fossils they contain, tell part of the story of the gorge's geologic history. In the northern part of the gorge near Fayetteville, most of the bedrock exposed in the gorge and in the hills above were deposited in the Pennsylvanian Period. In the park's southern end near Hinton, most bedrock is Mississippian with Pennsylvanian rocks capping the highest hills outside of the gorge. The sediments that are now stone were originally deposited horizontally, but the mountain building process forced these layers to fold, forming a geologic feature immediately east of the gorge named the Mann Mountain Anticline. Much more recent sediments, which include impressive landslide deposits, can be found in the gorge. These tell the more recent history of the gorge over the past tens of thousands of years.

Large sandstone boulders and rocks create the character of the river the length of the gorge. Photo by Leah Perkowski-Sisk.

The dramatic drop at Sandstone Falls is one of the park's best examples of exposed Stony Gap Sandstone. Photo by Gary Hartley.

In the southern reaches of the National River, rock layers of the Mississippian Period can be found. These layers are made up mostly of non-marine shale, but include some relatively thin marine shale and limestone beds; this shale is highly erodible, more easily worn away – geologically speaking . While some sandstone is also present, it is not well cemented or glued together and is thinly layered or bedded. Here in the park's southern end, the gorge walls are less steep and in some places present a more pastoral view of the gorge with rolling hills and grassy bottom lands. A drive along River Road between Hinton and Sandstone Falls offers a good example of the rich bottom lands along the river's edge. Thinly bedded shales and coals found throughout the park hold many plant fossils, though it is not permitted to dig or collect such fossils in the park. One noteworthy exposure in the park is Sandstone Falls, a dramatic 25 foot drop in the river created of Stony Gap Sandstone at the base of the Hinton Formation of the Mauch Chunk Group.

The exposed rock layers found in the park's northern end are Early Pennsylvanian in age and are correlated with the Pottsville Group of northern West Virginia, which includes the Pocahontas, New River, and Kanawha formations (see the geologic rock layer column in Figure 1). Some of the most sought after bituminous coal on the planet was found in this area. Coal beds of the New River Formation are generally referred to as "the New River coals," and include the Sewell and Fire Creek seams. These seams or layers averaged three feet thick. The most prominent rock layers of the Pennsylvanian Period are sandstone, layers highly resistant to weather and erosion because of its high quartz content. Some of this sandstone formed vertical and near vertical cliffs that are prominent throughout the gorge. One of these units, the Upper Nuttall sandstone is especially popular with rock climbers today. The gorge's resistant sandstone was also used in building construction and as a source of silica (in the case of the Lower Nuttall sandstone) during the area's industrial boom years from the late 1800s to the 1950s. The stone outcrops at Grandview are composed of Raleigh Sandstone. Plant fossils can be found in the shale layers above and below the coal beds.

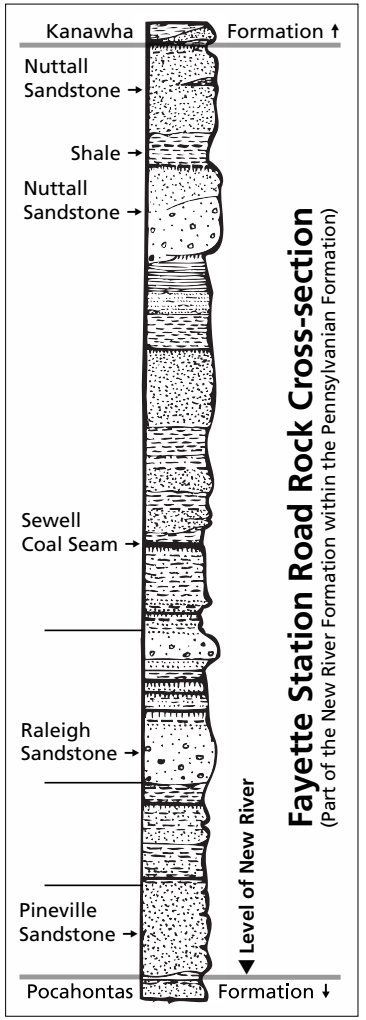


Figure 1: Rock layers of the New River Gorge at Lansing, West Virginia.

The "smokeless" bituminous coal from the Sewell seam can be seen along the park's Kaymoor Trail. Photo by Jodi French-Burr.

Life Though Rock: the Human Story

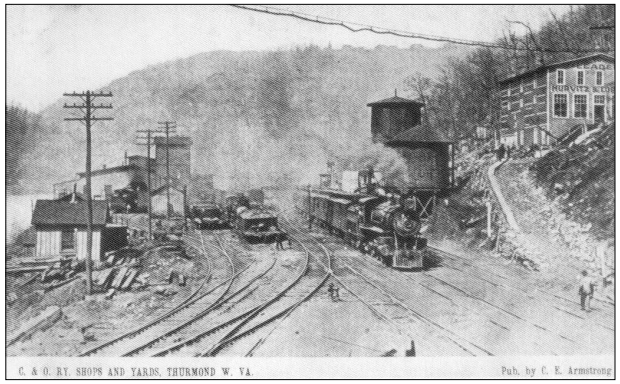
In comparatively recent history, humans made a life in the New River Gorge, where they utilized the many resources of the landscape. Archeological evidence found in the park indicates that pre-historic American Indians, Paleo Indians, lived here 10,000 to 15,000 years ago, and more recent native people hunted and fished here. The landscape of this gorge made large settlement a challenge.

The first Euro-Americans began to explore and sparsely settle this area in the late-1700s. Completed in 1790, the "Old State Road" crossed the New River just upstream of the park's current Cunard River Access. People crossed the New River here at Bowyer's Ferry, which operated at the mouth of Mann's Creek. Due to the rugged terrain, most early settlers had to be self-sufficient on small farms.

Coal is a rich fuel resource found underground in the gorge. This "black gold" attracted many developers to the area in the late 1800s. As the nation grew, so did its need for this fuel and coke for metals production. America's industrial revolution had begun and the New River Gorge proved a vital part of it with fuels for the iron and steel furnaces, as well as the trains that crisscrossed the land.

The industrial boom in the New River Gorge began in earnest in 1873, with the completion of the Chesapeake and Ohio (C. & O.) Railway. The railroad made the gorge's coal resources accessible to mine. Coal and railroad towns quickly developed and by the 1920s there were over one hundred communities in the gorge. The

Railroad workers often had to cut through walls of sandstone to complete line construction, like this stone on the Rend Line, which was finished in 1904 near Thurmond. Photo by Jodi French-Burr.



Coal was the lifeblood of historic railroad towns like Thurmond, where steam trains ran the rails and coal revenue was shipped on the tracks. Postcard courtesy of the C. & O. Historical Society.

bituminous coal found in the New River coal fields was clean-burning, high quality, low-sulphur, and low-ash, some of the finest quality coal in the world. This industrial boom lasted for over eighty years, with over 18 million tons of coal mined here in 1916 alone. Some coal was also processed into coke; this metallurgical coal was cooked in the absence of oxygen in large, beehive-shaped ovens for two to three days to create this by-product, a fuel and reducing agent used in iron and steel production.

Kaymoor coal miner in the early 1900s. National Park Service photo.

By the 1960s, most of these gorge industries had run out of resources and many towns had closed their doors. But a new industry was on the horizon, another that would take advantage of local geology. In 1968 the first white water rafting company offered guided trips down the wild rapids of the New River. As interest in the landscape and its heritage grew, so did a new exploration of the New River Gorge. This National Park Service (NPS) site, New River Gorge National River, was established in 1978 and provides opportunities to explore geology to this day. Be it on the New River in a raft or fishing boat, going for a hike or bike ride on a gorge trail, or a climb on the rock cliffs, these rocks provide a strong foundation for discovery.

The rocky New River drops 750 feet in fifty miles, which creates rapids like this one at Fayette Station. National Park Service photo.

The Future of Old Rocks: Local Projects

There are several current geology projects in New River Gorge National River. Natural gas is still in production in the northern part of the park. These natural gas plays, an industrial term that refers to the source of gas extraction, are inventoried and monitored within the park.

No active coal mines operate in the park today, but abandoned mine lands are inventoried and monitored. Historically, both underground and contour surface mining occurred here. Today the remains of old coal mine sites provide a fascinating glimpse into the history of the land and the industrialization of our nation. Stabilization or reclamation of these sites are done as needed. Mineral rights for coal on park owned lands are not leased, so existing coal will remain in the ground for as long as the National Park Service administers this land. The NPS also reviews active mine permits for lands adjacent to the park, to identify potential impacts on park lands.

Some old mines in the National River are now home to area wildlife, including several rare and endangered species of bat. Several mine entrances are closed with bat gates, so wildlife can come and go. Wildlife biologists conduct bat surveys to determine species and ecosystem health. Resource inventory studies are also conducted on soils and paleontology, the study of fossils and ancient life forms.