Bedrock Geology of the New River Gorge National River, West Virginia: Mapping Ten Quadrangles in the New River Gorge for the National Park Service

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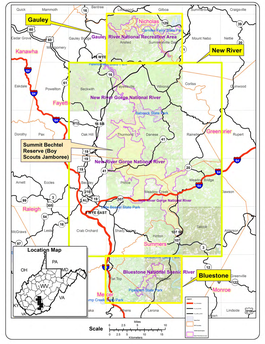

The Geologic Resources Division of the National Parks Service (NPS) contracted with the West Virginia Geological Survey (WVGES) to map the bedrock geology of fourteen contiguous 7½-minute quadrangles containing three NPS units: Gauley River National Recreation Area (two quadrangles in the north), Bluestone National Scenic (two quadrangles in the south), and New River Gorge National River (ten quadrangles in the middle). The NPS protects over 53 miles (85 km) of the New River Gorge within the park-unit boundary, from Hawks Nest Lake near Ansted in Fayette County to the Bluestone Dam near Hinton in Summers County. The study area is located in gently folded rocks of the Appalachian Plateau physiographic province and contains four West Virginia State Parks (Hawks Nest, Babcock, Bluestone, Little Beaver), the Army Corps of Engineers' Bluestone Lake and Dam, and a large portion of the new Boy Scouts of America's Summit Bechtel Reserve. The spectacular scenery of the New River Gorge is the result of erosion through the thick, resistant sandstones of the New River and Hinton formations.

The iconic New River Bridge

ACKNOWLEDGEMENTS
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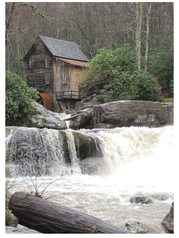
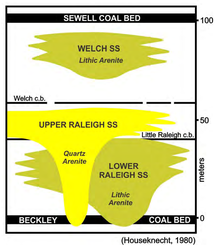
The New River Gorge from the Nuttall sandstone at Diamond Point



The Glade Creek Grist Mill on the Quinnimont sandstone at Babcock State Park



(Houseknecht, 1980)

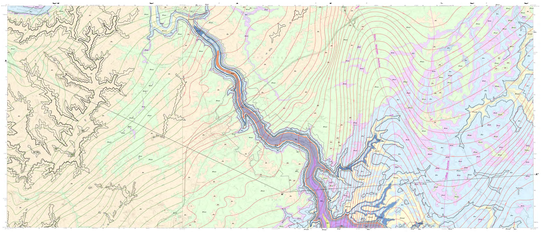
The Nuttall sandstone and the Upper Raleigh sandstone are paleovalley deposits, and this mapping helps define the extent of the paleovalleys in these two units. *(Figure modified by BM Blake.)*

Outcrop of Nuttall sandstone

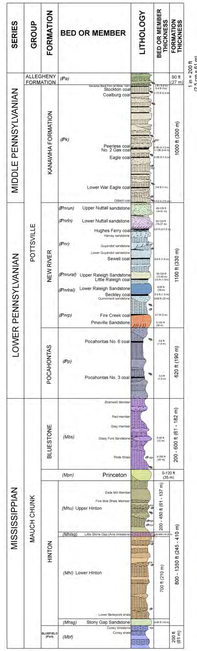
Upper Raleigh Sandstone rock bridge

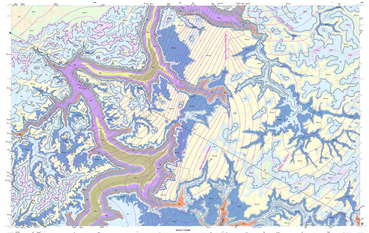
Old mine entrance with a pillar of No. 2 Gas coal left

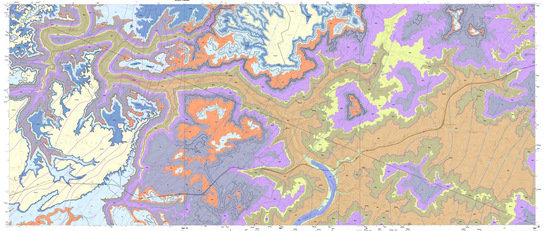
The map area was divided into four sheets, each containing two or three quadrangles printed at 1:24,000.

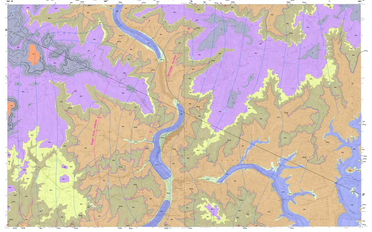


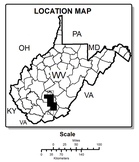
Generalized Stratigraphic Column for the Map Area

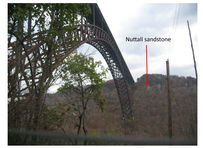








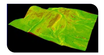




The New River Bridge foundation is in the Lower Raleigh sandstone, and the Nuttall sandstone crops out above the bridge.

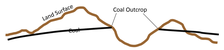
Old beltline at Nuttallburg (once owned by Henry Ford)

Traditional field mapping combined with subsurface data were used in a Geographic Information Systems (GIS) layout to project approximate unit contacts at the surface in areas where direct observation was not possible.



Step 1.
Create a structure surface (raster surface) on a marker bed from core data, outcrop data, or structure contours. Because we have good control on the major coal beds in this area, field observations were supplemented with data from cores and mines to construct our structure surface and structure contours.

Step 2.
Obtain a digital elevation model (DEM) for the area.

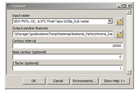


Step 3.
Subtract the marker bed raster surface from the DEM (topographic elevation) surface. In ArcMap 9.3 (Editor w/Spatial Analyst Extension) do the following:

- Toolbox>Spatial Analyst Tools>Math>Minus
- Input or Constant Value 1: your DEM raster
- Input or Constant Value 2: your structure raster
- Output Raster: name your raster (13 characters and cannot already exist)

Step 4.
Contour the raster you just created above:

- Spatial Analyst>Surface>Contour
- Input surface: raster you just created above
- Contour Interval: 10000 or some other unachievably high number (IMPORTANT!)
- Base Contour: 0
- Z factor: 1
- Output Features: name your shapefile

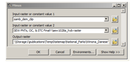


Step 5
Continue to create more outcrop lines based on estimated thickness. For example, if you know the base of the ABC Sandstone is 30 to 40 meters above the marker bed you contoured, you can create another surface, contour that, and then generate contacts in a similar way as follows:

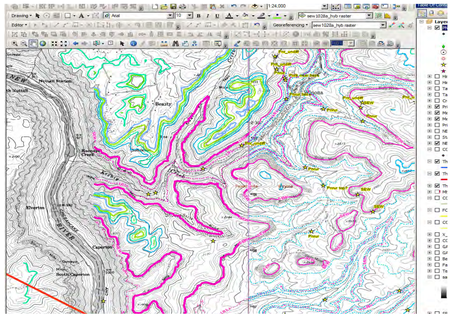
- Toolbox>Spatial Analyst Tools>Math>Minus
- Input or Constant Value 1: your new raster (created in Step 4)
- Input or Constant Value 2: -20 (essentially adding 20 meters to the raster surface)
- Output Raster: name your new raster (13 characters and cannot already exist)

Step 6
Then contour this raster surface: to create the outcrop pattern/contact lines

- Spatial Analyst>Surface>Contour
- Input surface: raster you just created above
- Contour Interval: 10000 or some other unachievably high number (IMPORTANT!)
- Base Contour: 0
- Z factor: 1
- Output Features: name your shapefile



Step 7. Turn off Spatial Analyst! (Tools>Extensions)



Projected contours in ArcMap(TM)

Iron banding in the Nuttall Sandstone

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