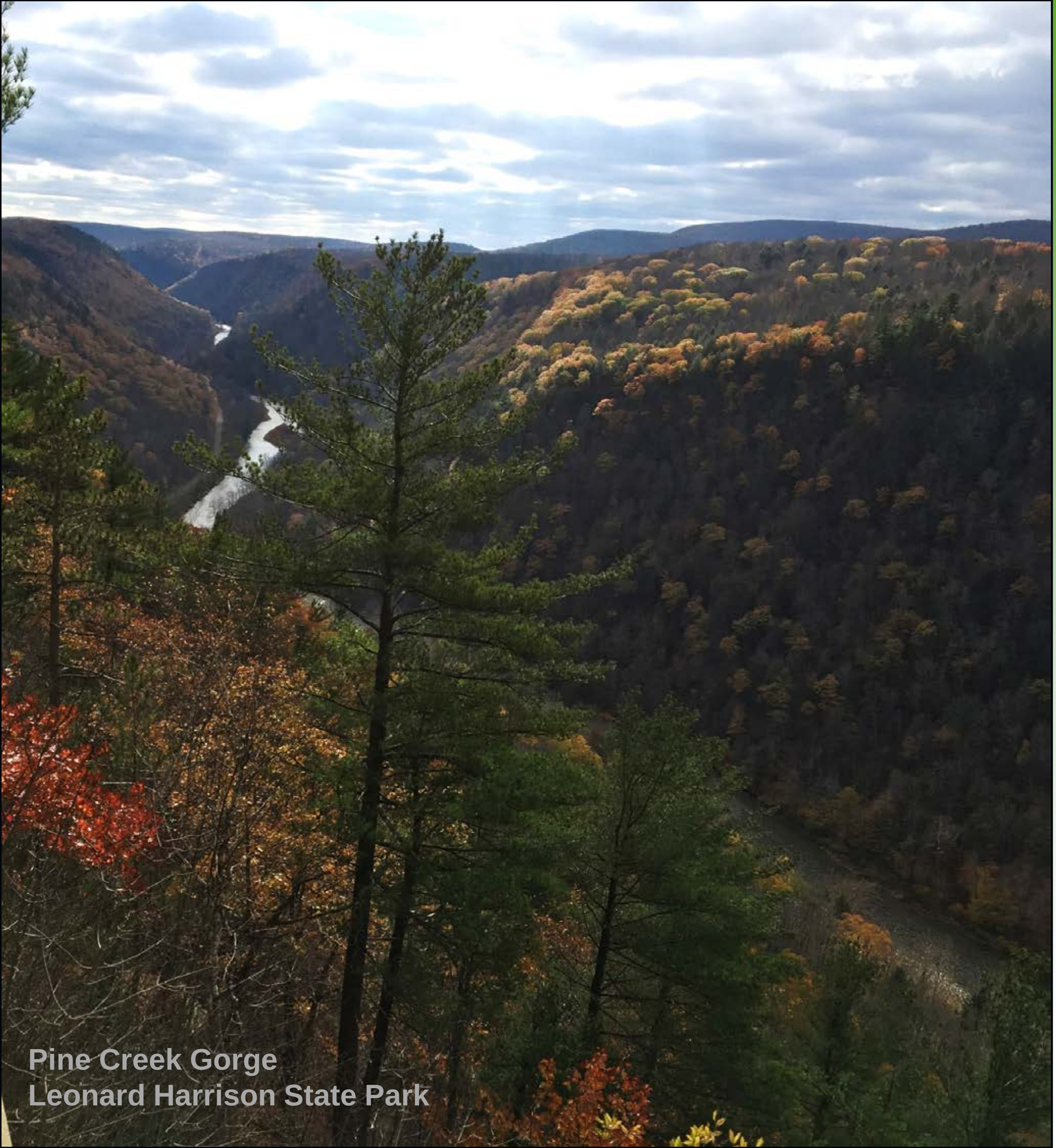
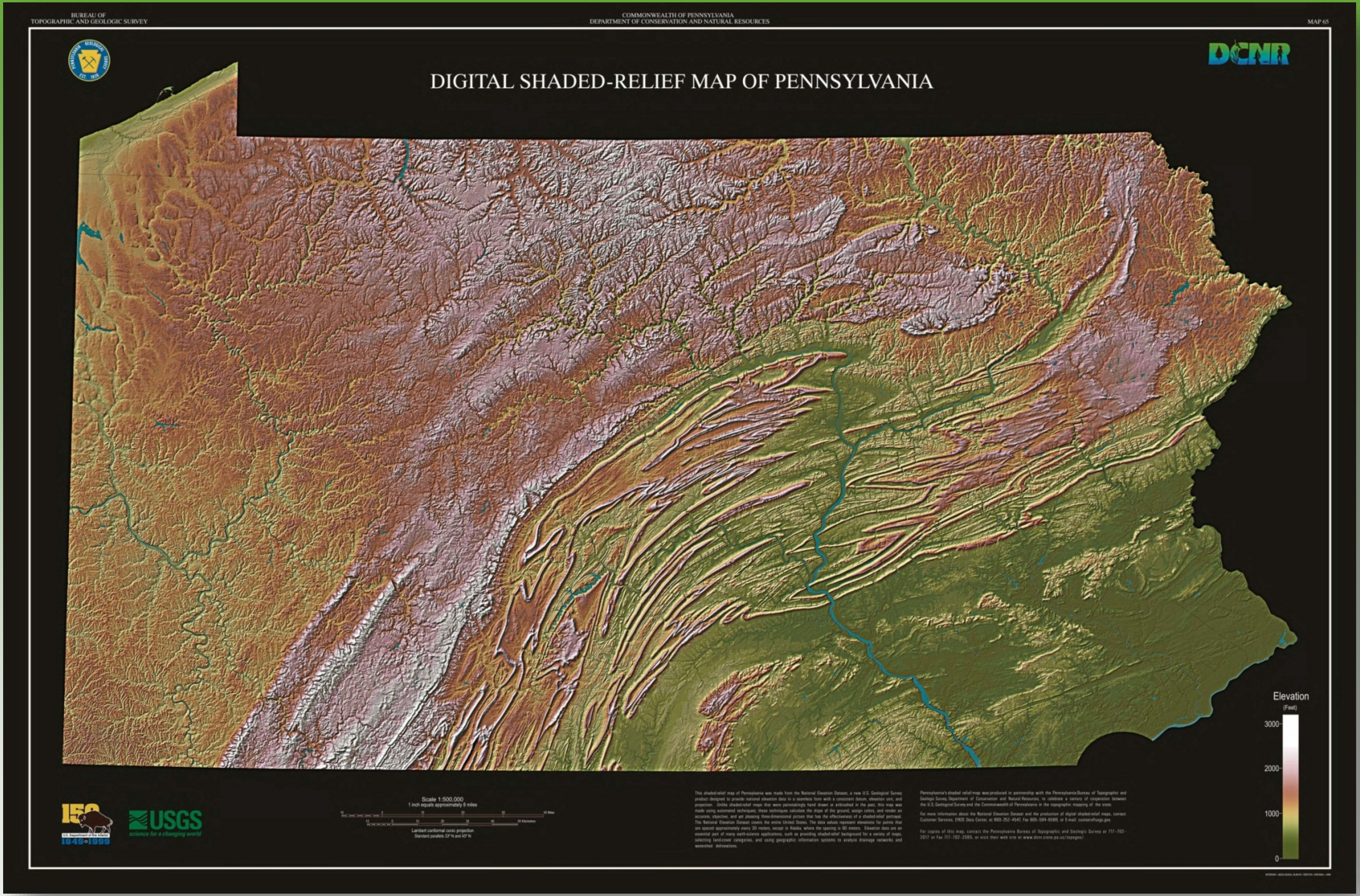


Geoheritage Initiatives in Pennsylvania

Gale C. Blackmer
Director
PA Geological Survey

America's Geoheritage Workshop II
October 6, 2020

pennsylvania
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES



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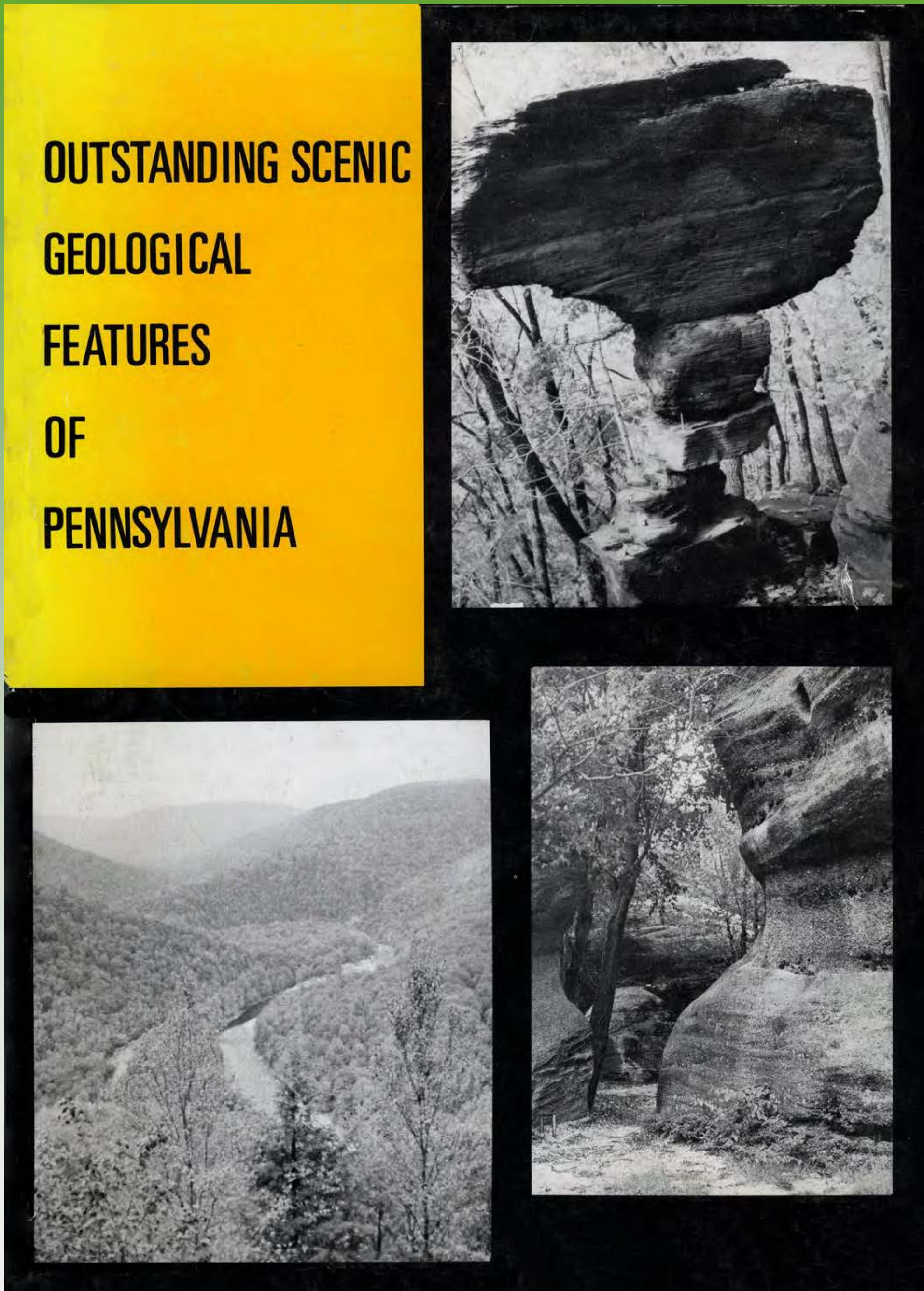
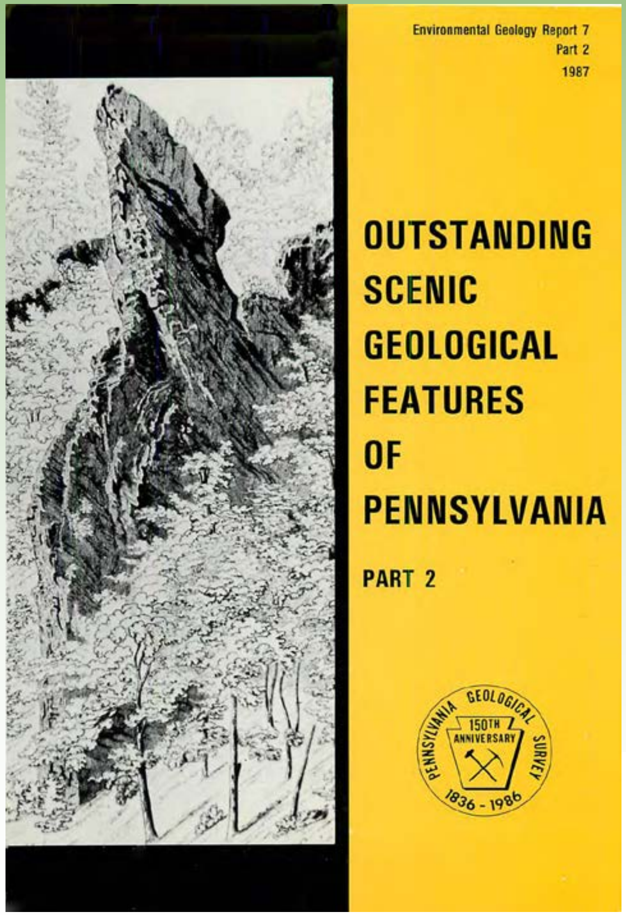


Part 1 published 1979

Part 2 published 1987

Total of 514 features



PA Natural Heritage Program

- Inventories plant and wildlife species, plant communities, and geologic features for which there is a conservation concern.
- Includes more than 200 geologic features.
- Currently 19 classifications:

Anticlines
Boulder belts
Drainage patterns
Erosional remnant
Esker
Fossil plants
Invertebrate fossil animals
Kettlehole
Life history
Meandering channels
Mineralization materials
Paleozoic earth history
Pingo scar
Potholes
Sand dune
Springs
Tufa
Vertebrate fossil animals
Waterfalls and rapids

Heritage Geology Site Criteria

- Scenic
- Educational, scientific
- Recreational
- Social/historical
- Sense of place
- Significance
- Conservation

Trail of Geology Series
94 Outstanding Geologic Features

OUTSTANDING GEOLOGIC FEATURE OF PENNSYLVANIA

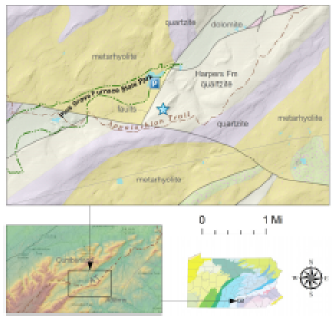
POLE STEEPLE, CUMBERLAND COUNTY

Stuart O. Reese, 2016

Trail of Geology
16–090.0

Location

Michaux State Forest, Cumberland Co., Cooke Twp.,
lat: 40.03841, lon: -77.26998 (Pole Steeple trail parking lot);
lat: 40.03237, lon: -77.26744; Dickinson 7.5-minute quadrangle



Recommended Reading

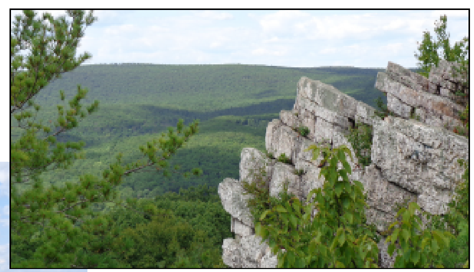
Way, J. H., 1986, Your guide to the geology of the Kings Gap area, Cumberland County, Pennsylvania: Pennsylvania Geological Survey, 4th ser., Environmental Geology Report 8, 31 p.

Michaux State Forest and Pine Grove Furnace State Park web pages of DCNR.

Geology

Pole Steeple is a resistant pinnacle of rock that provides a spectacular view of the South Mountain section of the Ridge and Valley physiographic province. The spires are strongly resistant, light-gray quartzite of the Montalto Member of the Harpers Formation. To the north, less resistant rocks around Laurel Lake are metarhyolite and dolomite. These two rock types were faulted upward against the quartzite, and because they erode more rapidly than the quartzite, they now occupy a lower topographic position. Evidence for faulting can be seen in the slickenside surfaces along the base of Pole Steeple, where rock slid on rock and polished it to a smooth surface. There are also abundant trace fossils of *Skolithos*, vertical sand-filled worm burrows made before the sediment was hardened into rock. The quartzite is thought to have been deposited in coastal areas during the Neoproterozoic Era, about 550 million years ago.

Pole Steeple is in Michaux State Forest, south of Laurel Lake, which is in Pine Grove Furnace State Park. It can be accessed by the 0.75-mile-long Pole Steeple Trail from the lake or from the Appalachian Trail.



Above: View to the northeast of the Harpers Formation, Montalto Member quartzite.

Left: View to the north of Laurel Lake and the South Mountain ridge in the distance. Pole Steeple is about 565 feet above Laurel Lake.

Published by the Pennsylvania Geological Survey.

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Trail of Geology Series
94 Outstanding Geologic Features

OUTSTANDING GEOLOGIC FEATURE OF PENNSYLVANIA

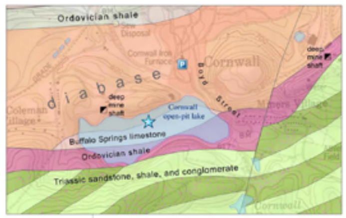
CORNWALL MINES, LEBANON COUNTY

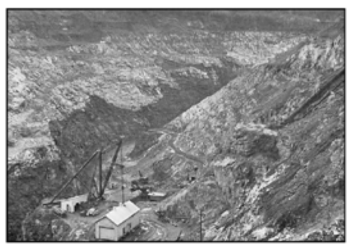
Stuart O. Reese and Michael Weber, 2020

Trail of Geology
20–120.0

Location

Cornwall Mines, Lebanon Co., Cornwall Borough, lat: 40.27072, lon: -76.40700 (Cornwall Iron Furnace parking); Lebanon 7.5-minute quadrangle





View to the west of the pit in 1952 showing the dark ore zone at the base of the left wall (Lapham, 1972, p. 8).

Southwest winter view of the Cornwall open-pit lake.

Published by the Pennsylvania Geological Survey.
(Weber is from the Pennsylvania Historical and Museum Commission.)

Geology

Near Cornwall in 1732, stone mason Peter Grubb found rich iron-ore deposits now known as the Cornwall mines or banks. Long before the ore formed, this area had a complex history of deposition, mountain building, and erosion. Later, Triassic rifting associated with the opening of the Atlantic Ocean formed the Gettysburg-Newark Lowland basin and allowed sediments to pour in. As the continental crust was stretched, sills of magma pushed into the older folded and faulted limestone, dolomite, and shale rocks of the Great Valley. The magma metamorphosed the Cambrian Buffalo Springs limestone and Ordovician shale.

The magma cooled into solid diabase at the beginning of the Jurassic Period (200 million years ago). Released heat produced hydrothermal fluids in the overlying metamorphosed rocks, which at the time were thousands of feet below the surface. The fluids deposited massive metallic ores, including iron oxides (especially magnetite) and sulfides (especially pyrite and chalcopyrite). Millions of years of erosion would eventually expose the ore deposits on three hilltops for Grubb to discover. Mining operations would ultimately merge to become a large open pit, which today is filled by water.

The Cornwall Iron Furnace (built by Grubb) operated from 1742 until 1883 and, among other things, produced cannon for the Continental Navy. Cornwall became the largest mine in America and remained so until the 1880s. In addition to iron, the mines produced cobalt, copper, silver, and gold. When the mines closed in 1973, an estimated 106 million tons of ore had been hauled from surface pits and two underground workings.

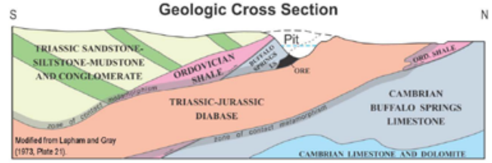
Recommended Reading

Lapham, D. M., and Gray, Carlyle, 1973, Geology and origin of the Triassic magnetite deposit and diabase at Cornwall, Pennsylvania: Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 56, 343 p.

Lapham, D. M., 1972, Cornwall—The end of an era: Pennsylvania Geology, v. 3, no. 5, p. 2–9.

Cornwall Iron Furnace website.

Geologic Cross Section



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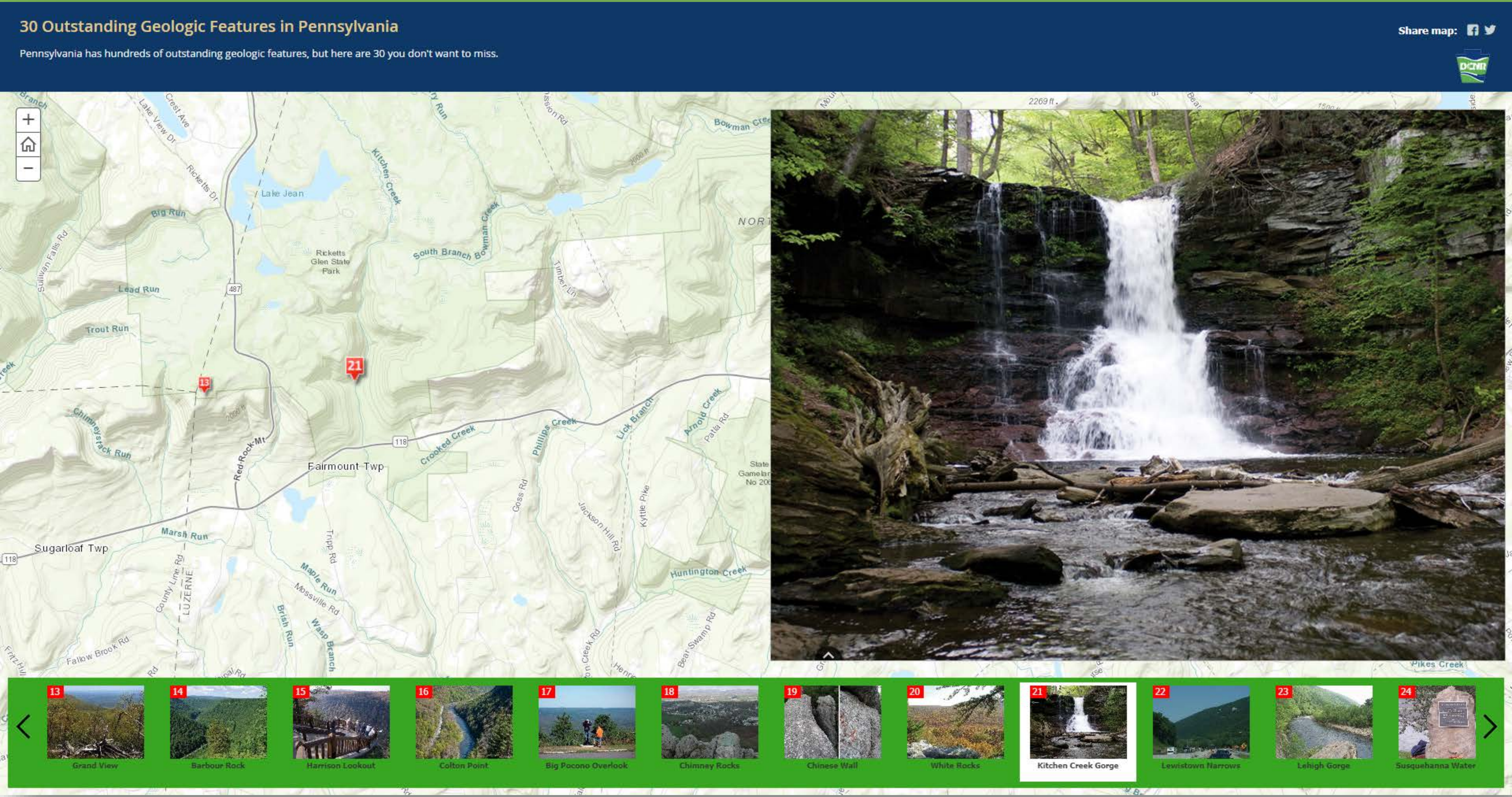
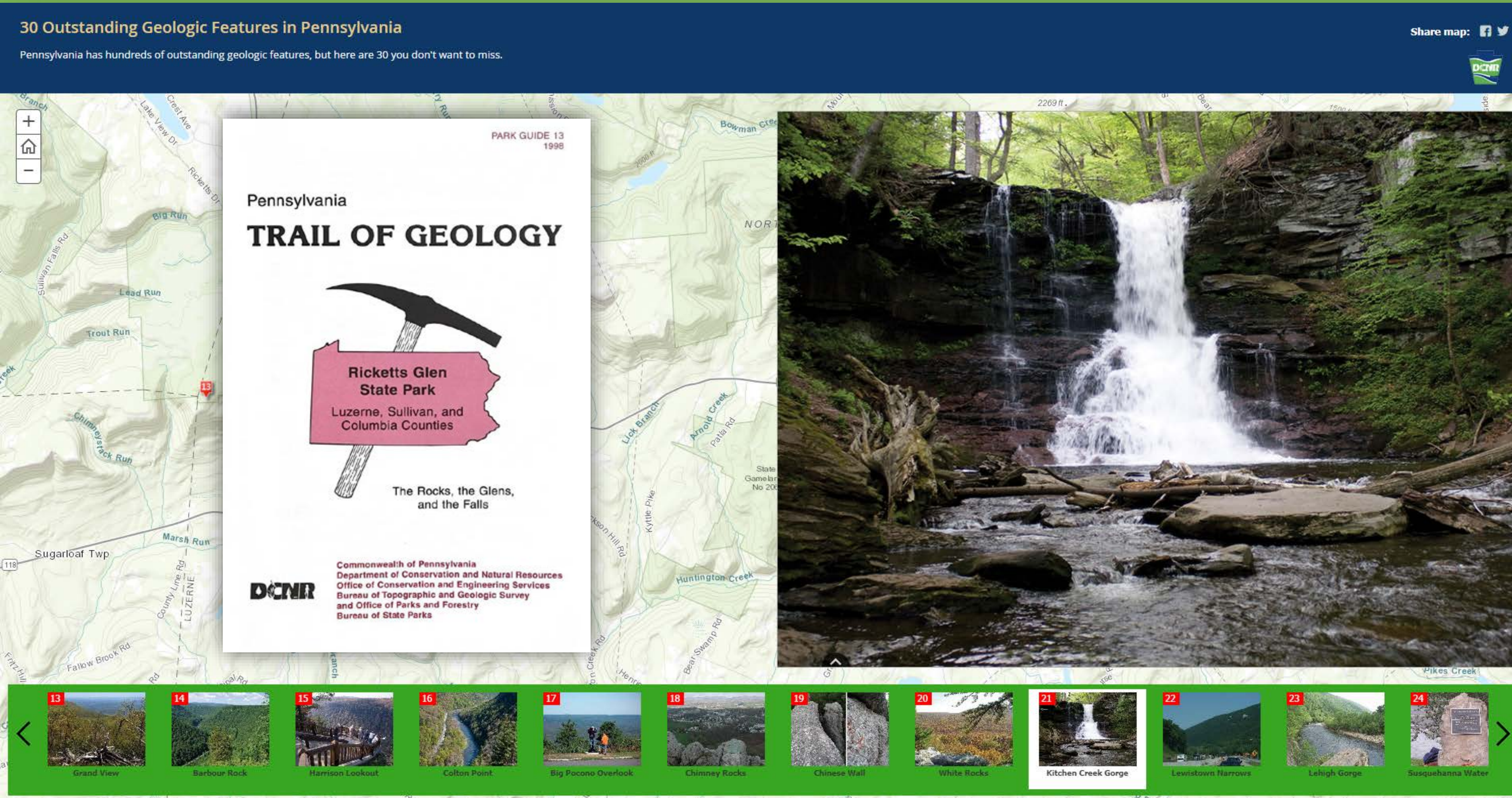
Story Map of Outstanding Geologic Features



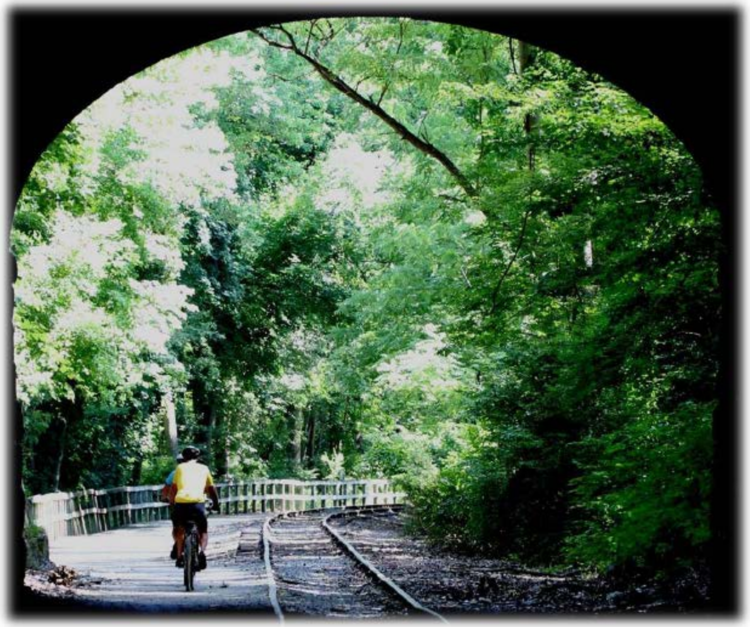
Story Map of Outstanding Geologic Features



Trail of Geology Series
4 Trail Guides

A guide for the geologic tourist to the

York County Heritage Rail Trail



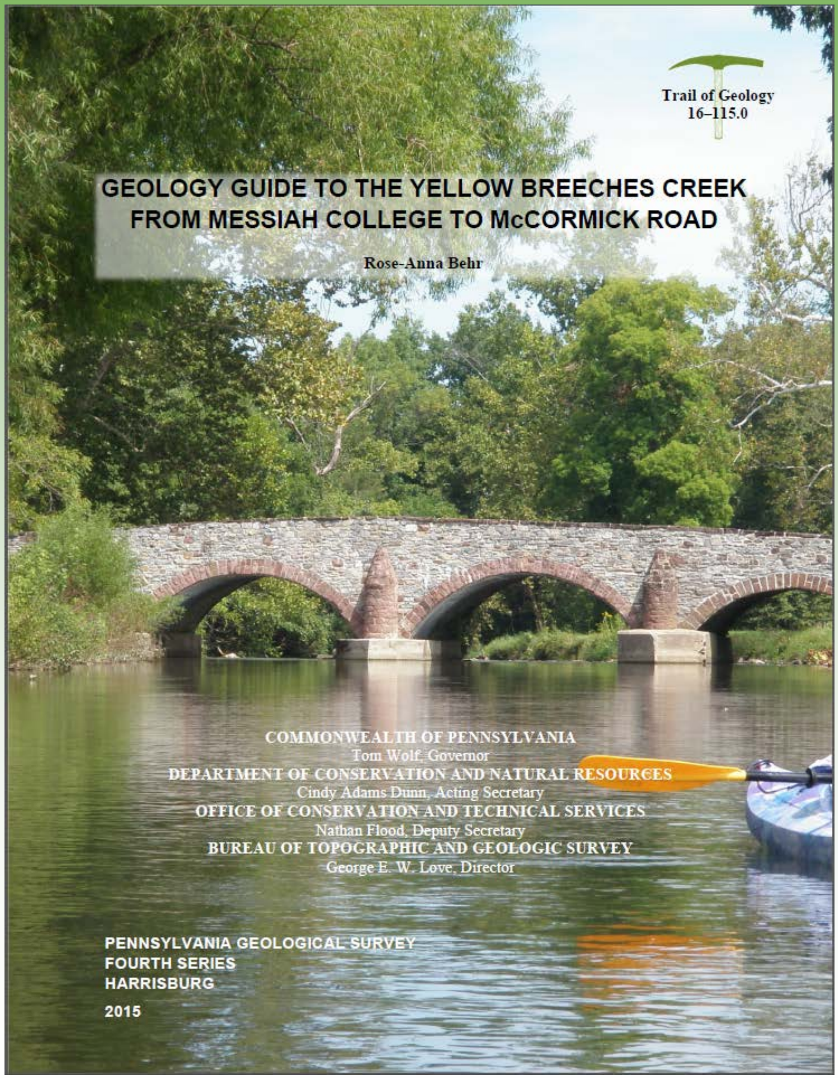
Jeri L. Jones, York County Department of Parks & Recreation

Rose-Anna Behr, Bureau of Topographic and Geologic Survey

Trail of Geology
17–119.0

		 They are bumpy like a pillow on your bed, but not so soft. Pillow lava is the result of lava cooling under water. Also, there are occasional red bands of the iron-mineral hematite. It was extracted during the 19th century at the nearby Help Mine. You may notice some folds in the layers, and a well-developed joint set. Joints are just fracture planes without any movement. The dominate joints are northeast-southwest and east-west.
0.28	4.41	Cross Glen Brook Court and unnamed tributary on overpass.
0.25	4.66	**Stop 5. Best Folds in Town** 39.7761/-76.7228 On the west side of the trail is the best example of folding along the entire rail trail. Imagine the pressure involved in deforming the rock! We are still in the schists of the Octoraro Formation, but my, they have been wrinkled! 

Trail of Geology Series
2 Water Trail Guides


Trail of Geology
16–115.0

GEOLOGY GUIDE TO THE YELLOW BREECHES CREEK
FROM MESSIAH COLLEGE TO McCORMICK ROAD

Rose-Anna Behr

COMMONWEALTH OF PENNSYLVANIA
Tom Wolf, Governor
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
Cindy Adams Dunn, Acting Secretary
OFFICE OF CONSERVATION AND TECHNICAL SERVICES
Nathan Flood, Deputy Secretary
BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY
George E. W. Love, Director

PENNSYLVANIA GEOLOGICAL SURVEY
FOURTH SERIES
HARRISBURG

2015


Figure 14. Bishop Bridge was built in 1898. Photo by K. Hand.

1.77	A nice little eddy forms in the river at the beginning of a long outcrop of hard red well-jointed claystone. Some of the joints anastomose. Downstream are more fanglomerate beds forming large cliffs. As you float along this riffle, enjoy the huge exposure of the youngest Triassic rocks of the basin. You are crossing the basin-bounding fault!
	Two mills and a distillery all operated between here and Bowmansdale.
2.05	Enter the Ordovician carbonates
2.08	River was straightened when the Philadelphia & Reading Railroad was built.
2.38	Old abutments from Bishop Road.
2.40	**Stop 5 River Left**- Just upstream of the bridge is a three-foot outcrop of limestone of the Epler Formation. This is our only stop outside the rift basin. Beds are finely laminated, medium gray to medium dark gray to medium bluish gray (Figure 15). They weather blue gray to dove gray with elephant skin texture. Joints are spaced every two to six inches. Dolomitized worm burrows, lenses of fossil fragments, dark gray to pink gray chert, and pink limestone are locally reported (Root, 1977). Typically, it is thought that the Triassic basin is bounded on the northern edge by a normal fault. This is true overall, but in the area we are in, the sediments actually on-lap the Ordovician carbonates (Figure 4). The normal fault, or more likely a series of normal faults, are further south. These Triassic sediments in the area near this bridge are the youngest in the entire basin!

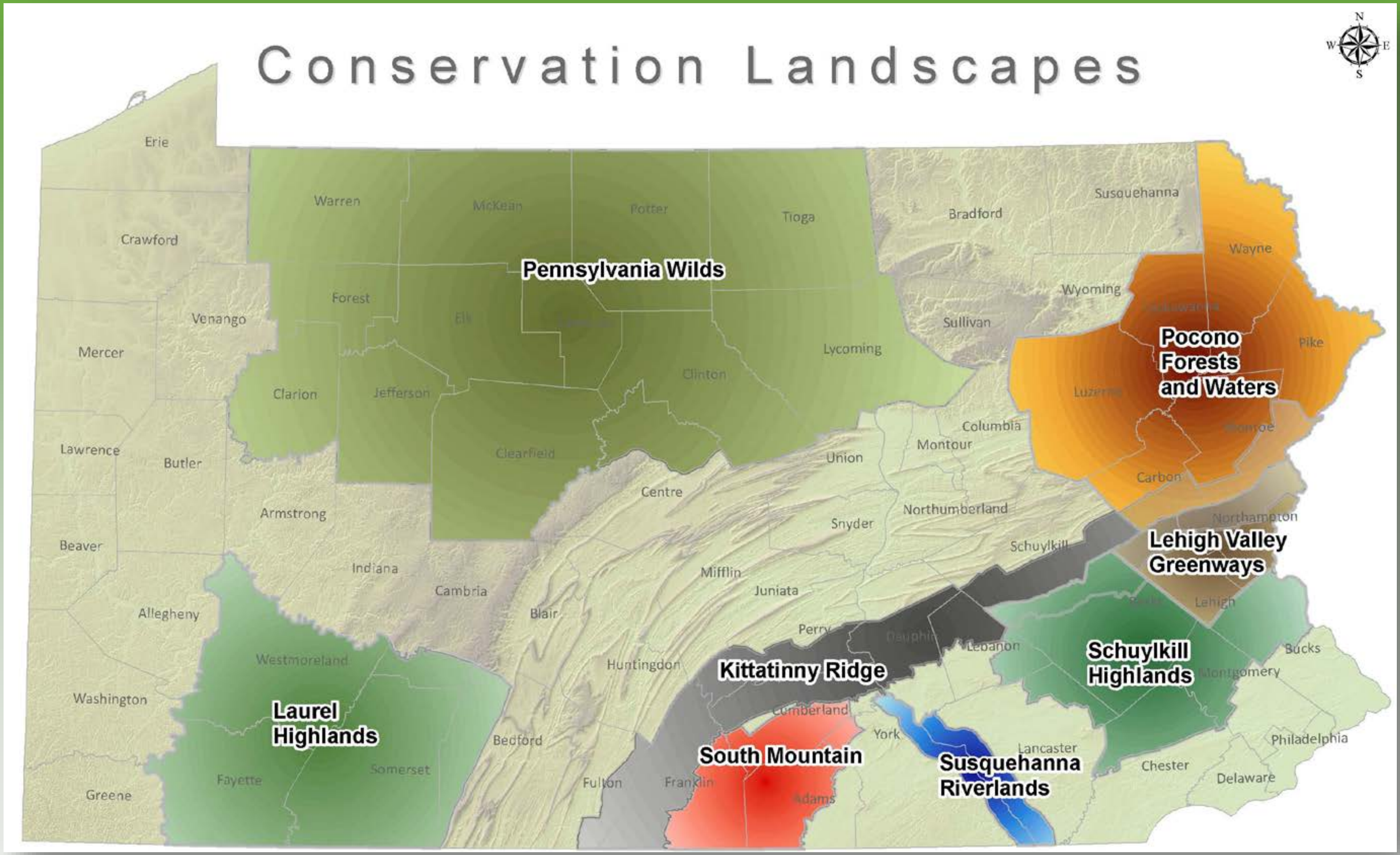

Figure 15. Finely laminated limestone beds of the Ordovician Epler Formation indicate we have left the Triassic basin. Hammer head for scale. Photo by R. Behr.

DCNR Conservation Landscapes

Regions working together to drive strategic investment and actions around sustainability, conservation, community revitalization, and recreation.

Located where there are strong natural assets, local readiness and buy-in, and state level investment and support.

Results: land conservation, trails, enhanced recreational opportunities, economic development, community partnerships, enhanced sense of place



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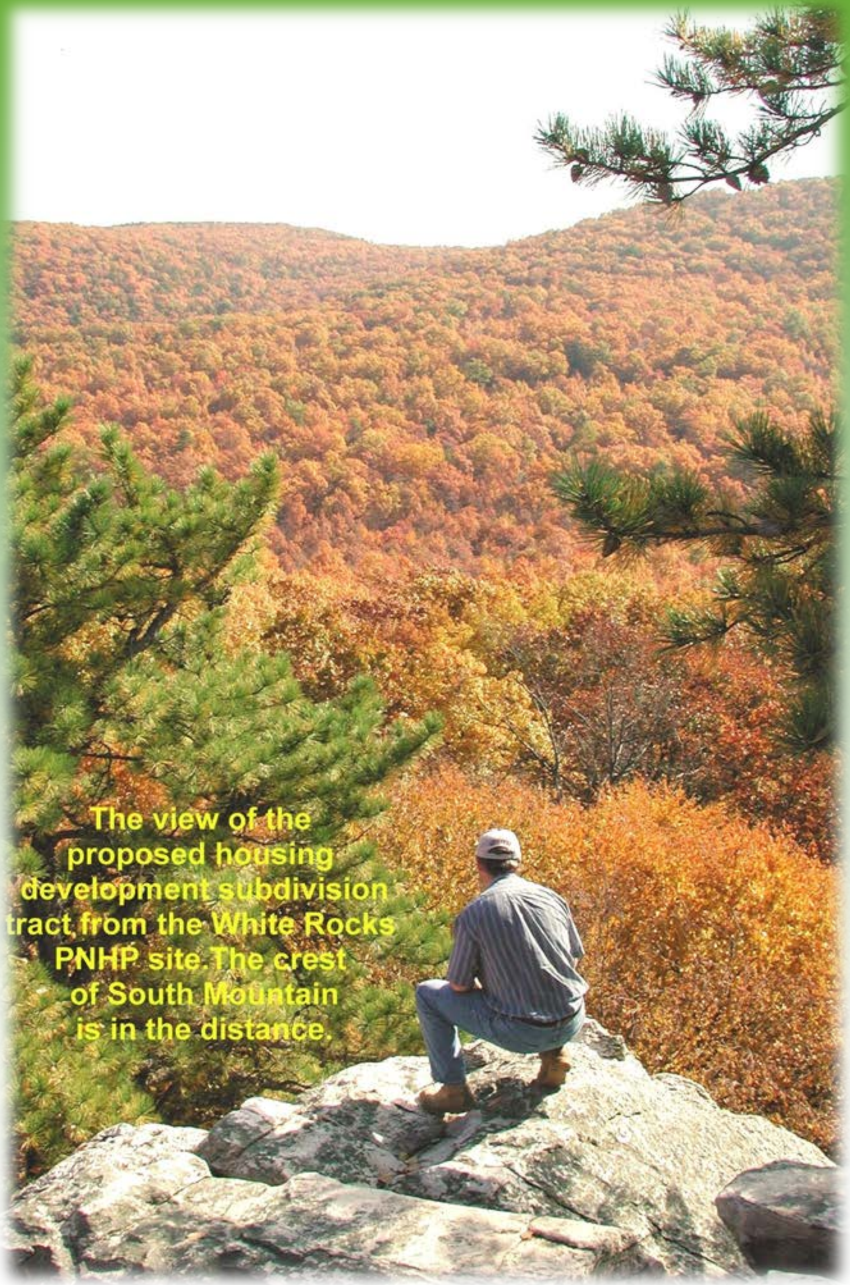

White Rocks

The geoheritage site that launched the South Mountain Conservation Landscape

Questions?

Ohiopyle Falls
Ohiopyle State Park