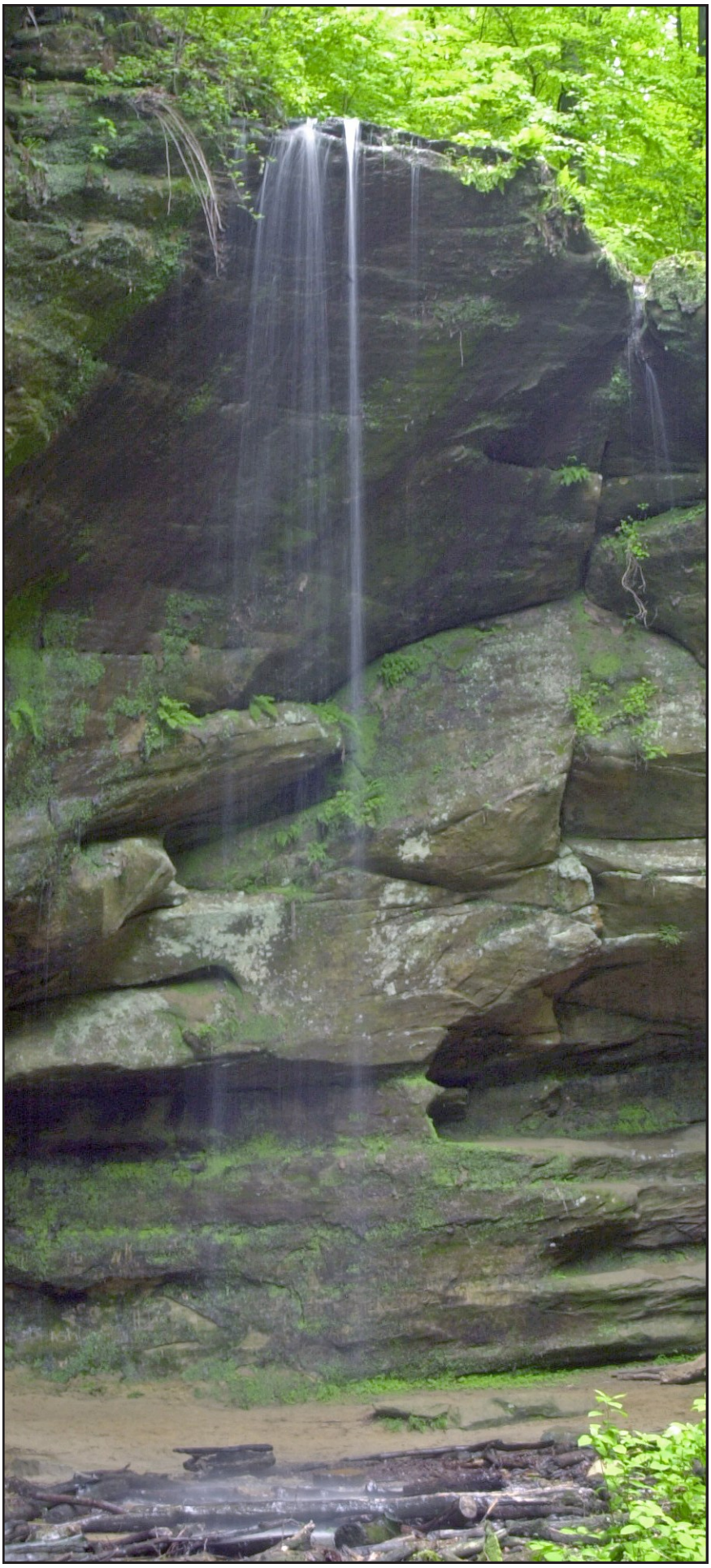

THE GEOLOGY OF MOHICAN STATE PARK

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Introduction

The geology of Mohican State Park bears the imprint of three vastly different ages in Ohio: the Mississippian Period (359–318 million years ago [m.y.a.]), when Ohio lay under tropical seas; the Pleistocene Epoch (2.6 m.y.a.–11,700 y.a.), when much of Ohio was ice bound and frozen; and the Holocene Epoch (11,700 y.a.–Present), when a more temperate climate and ongoing erosion have continued to work on the exposed bedrock of eastern Ohio. The evidence of each age is there to be seen by the visitor, who with the aid of geology can sort out the past and present foundations of the beauty of Mohican State Park.

Bedrock Geology

The covered bridge is a good point of departure for visitors who want to reconstruct the Mississippian-age landscapes. A small parking lot south of the covered bridge is the trailhead for the Lyons Falls trail and other trails.

The Lyons Falls trail winds through some of the best exposures of Black Hand Sandstone in the park. Heading towards the dam, low cliffs of the coarse, pebbly sandstone gradually rise higher and higher above the river. If everything above the Black Hand Sandstone were stripped away, it would reveal the wedge shape of this deposit (fig. 1). In the park the wedge is thickest near the dam and pinches out at about the covered bridge.

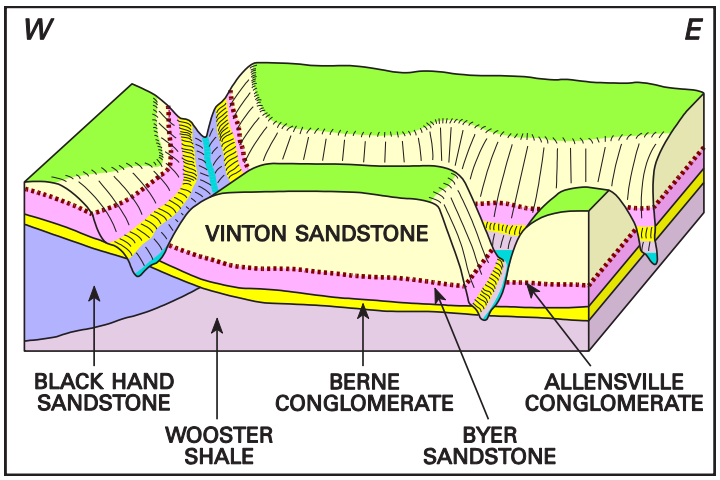

Figure 1. Bedrock geology in Mohican SP.

Geologists have interpreted the Black Hand deposit in the park as part of a barrier bar that was located offshore from the great Black Hand delta. The delta stretched across eastern Ohio from south to north and probably derived its sediments from highlands located east of Ohio. The barrier bar stood like a rampart before the delta and protected the waters behind the bar. These warm, quiet waters were full of marine life. The organic-rich muds that settled behind the bar became the fossiliferous Wooster Shale, exposed in the walls of the Clear Fork gorge downstream from the covered bridge. Fossil hunters will find gastropods, brachiopods, and trilobites.

The wedge shape of the Black Hand is also revealed in the exposures at the three waterfalls in this area. The cliffs at Little Lyons Falls and Big Lyons Falls display flat-lying beds of sandstone; but the cliffs at Tipping Rock Falls clearly dip to the east and down the back of the old barrier bar.

Recently, some geologists have developed an alternative hypothesis as to the formation of the Black Hand. They speculate that the Mississippian Period was a time of pronounced sea level changes due to glaciations elsewhere in the southern hemisphere. As ocean levels dropped, stream valleys were deeply down-cut or incised. Subsequently, later streams deposited coarse sand and gravel in these incised valleys and these deposits formed what we now refer to as the Black Hand Sandstone. This theory has been applied to much of southern Ohio where the Black Hand is prominent, including the Hocking Hills area; but the Mohican region has not been researched enough to test this theory in that part of the state.

The sediments in the barrier bar settled following deposition and the bar began to sink beneath the waves. The waves reworked the coarse pebbly sands on the tip of the barrier bar and spread them across the back-barrier muds to create a deposit which became the Berne Conglomerate (fig. 1). The Berne forms a ledge above the less-resistant Wooster Shale downstream from the covered bridge.

Over the Berne Conglomerate, the sea deposited fine-textured sands that became the Byer Sandstone. These sands frequently retained ripple marks from currents and storms. Outstanding exposures of ripple marks can be found in streambeds less than a half mile from the covered bridge parking lot.

A thin blanket of Allensville Conglomerate separates the Byer Sandstone from the Vinton Sandstone, which very closely resembles the Byer (fig. 1). Although the genesis of the Allensville is unclear, the sediments probably came from the same source area as the Berne and Black Hand. The Allensville represents a temporary but widespread change from conditions that laid down the Byer and Vinton Sandstones, which form cliffs at the overlook on the east end of the park.

The Mississippian seas receded from Ohio and were succeeded by the formation of coal and other rocks during the Pennsylvanian Period (318–299 m.y.a.). Although Pennsylvanian-age rocks are not prominent in the park, coal was mined only three miles south of Clear Fork gorge.

Glacial Geology

The next impressive geologic development in the park region came during the Pleistocene Epoch. Where the Clear Fork gorge runs today, two streams used to flow in opposite directions from a drainage divide that ran between the present locations of the Forestry Office and the Youth Camp (fig. 2a). At some time during the Ice Age, the west-flowing stream was dammed by a wall of ice that probably stood near the present location of the Pleasant Hill dam (fig. 2b).

Cover image: *Big Lyons Falls, Mohican State Park.*

The water in the west-flowing stream collected in the dammed valley until it backed up over the drainage divide. The escaping water cut down into the divide until the two valleys had joined to form the Clear Fork gorge (fig. 2c). After the ice dam melted away, waters in the region continued to flow eastward through the narrow Clear Fork gorge.

The clue for geologists reconstructing this history was the hourglass shape of the gorge (fig. 3). Most stream valleys widen downstream, but Clear Fork gorge narrows and then widens again. Visitors can see the site of the old drainage divide from the picnic shelter west of the Forestry Office. The gorge is narrowest here. Interestingly, glaciers rimmed the park on three sides during the Pleistocene but never flowed in the gorge.

The processes shaping the park did not stop when the glaciers melted away. The Clear Fork of the Mohican River continues to cut down into the base of its gorge and carry away the sediments weathered from its walls. Along the Hemlock Gorge trail, between the Class B campground near the covered bridge and the Class A campground at the east end of the park, hikers will find treeless areas and mounds of rubble at the bases of the steepest slopes in the gorge. The river is undercutting its outer banks on each bend, and the land tends to slump wherever the bedrock is weak. This kind of erosion might eventually remove the hourglass shape of the gorge and obscure the evidence of the previous landscapes.

Years of research by many geologists made possible the interpretation of the geologic history of the park. Evidence from all over Ohio and neighboring states helped create a coherent picture of past landscapes. Like a jigsaw puzzle, small pieces of information only make sense within the whole picture, and the whole picture must be reconstructed with the clues. In studying its rocks and landforms, visitors can experience the excitement and discovery of seeing the history of the area revealed.

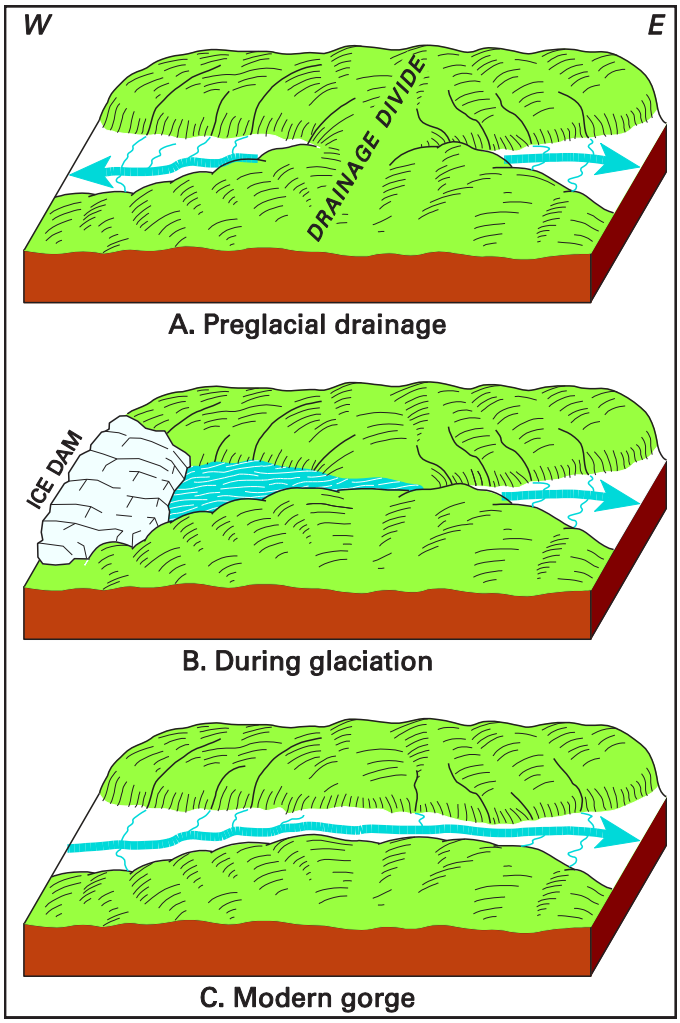

Figure 2. Creation of Clear Fork Gorge.

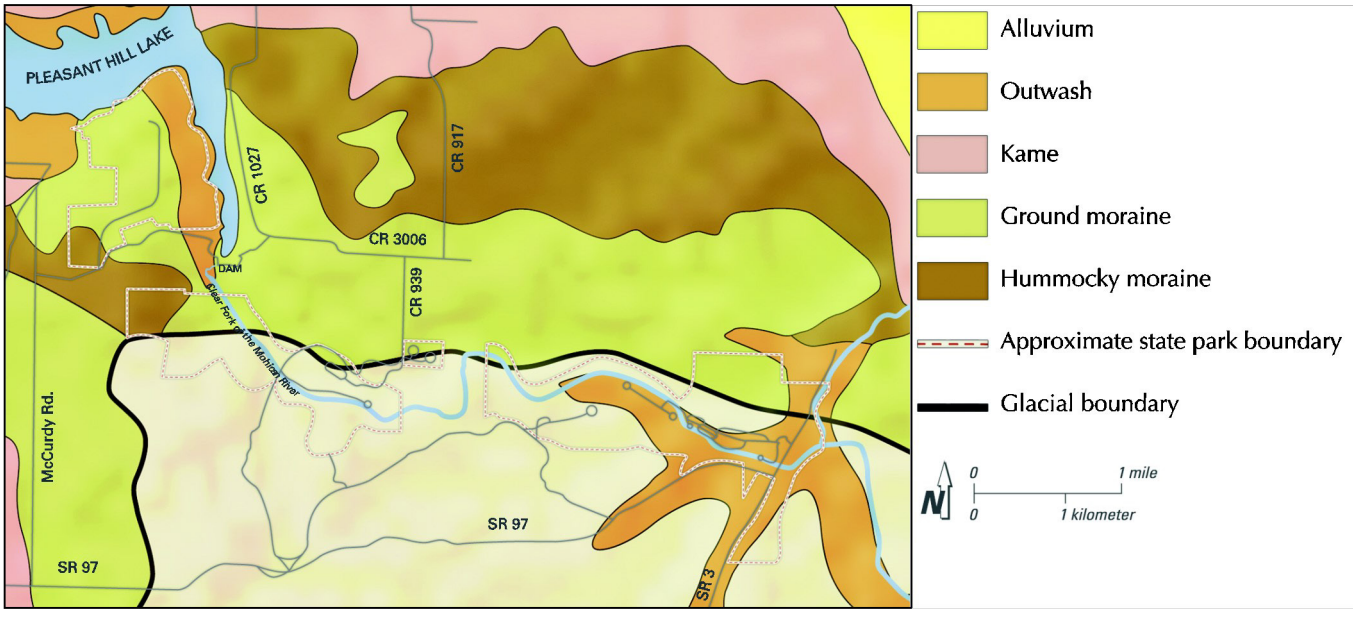

Figure 3. Glacial geology map of Mohican SP and State Forest area. Note that the glacial boundary runs through the middle of the park. Modified from White, 1982.

Further Reading

Hansen, M.C., 2008 (revised), The Ice Age in Ohio: Columbus, Ohio Department of Natural Resources, Division of Geological Survey Educational Leaflet 7.

White, G.W., 1977, Glacial geology of Ashland County, Ohio: Columbus, Ohio Department of Natural Resources, Division of Geological Survey Report of Investigations No. 101, color map (with text), scale 1:62,500.

White, G.W., 1982, Glacial geology of northeastern Ohio: Columbus, Ohio Department of Natural Resources, Division of Geological Survey Bulletin 68, 75 p., color map (scale 1:250,000).

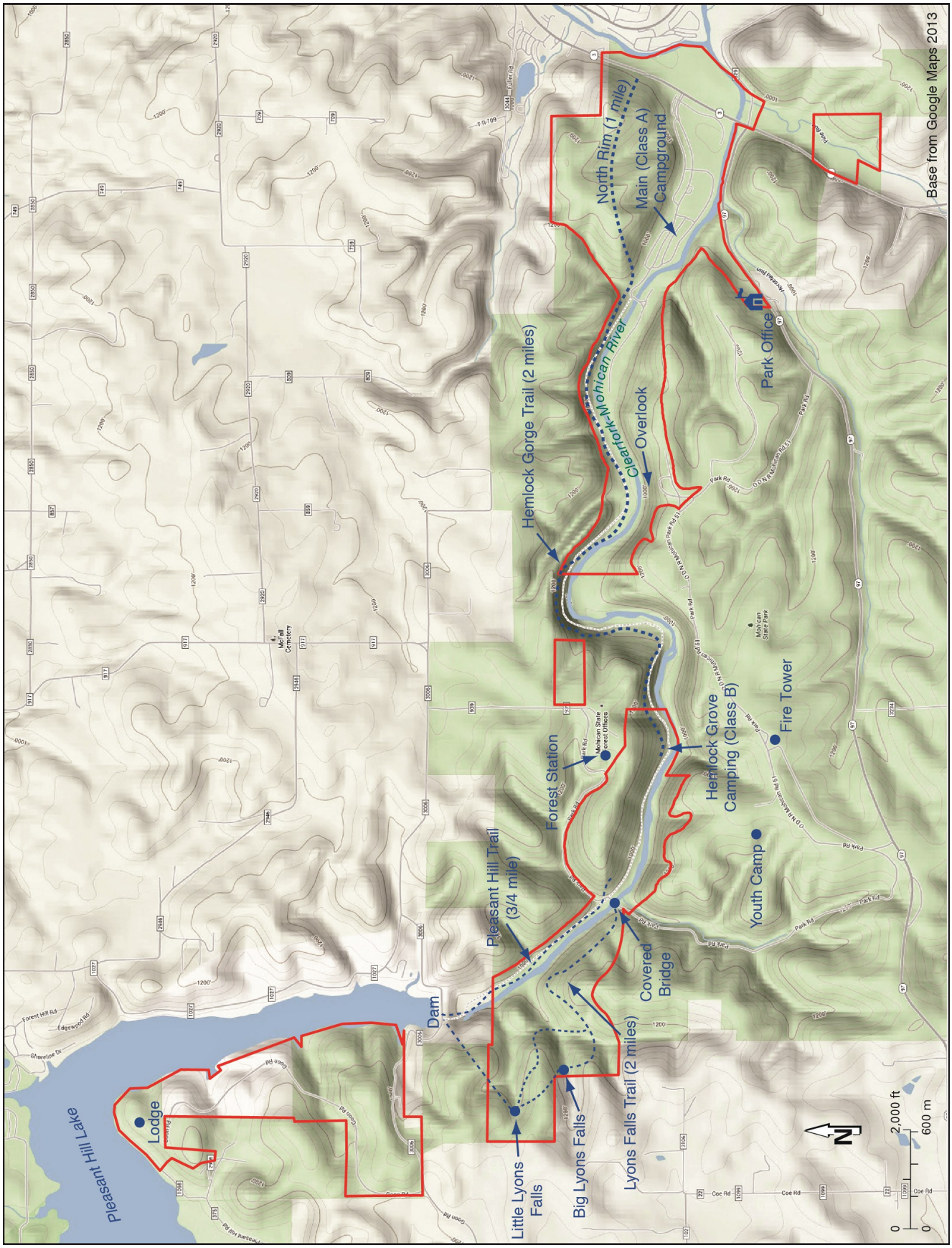

Figure 5. Map of Mohican SP area showing trails and geologic sites discussed in the text.