WORLDS END STATE PARK
SULLIVAN COUNTY
GEOLOGIC FEATURES OF INTEREST

The Loyalsock Gorge

Worlds End State Park is located in a picturesque corner of the Allegheny High Plateau known as the "Sullivan Highlands." The striking scenery and spectacular gorge of Loyalsock Creek, which flows through the park, are products of the millions of years the creek has steadily drained these highlands.

The rock types found within the park are primarily shales, sandstones, and conglomerates. The highest points surrounding the gorge are capped with a highly resistant, gray, coarse-grained conglomerate and sandstone (Pottsville Group). Red shales (Mauch Chunk Formation) form the gorge rim and upper walls in most cases, and gray to buff sandstone (Burgoon Sandstone) lies below.

The base of the gorge and Loyalsock Creek are in less resistant, olive-gray sandstones and grayish-red shales (Huntley Mountain Formation) (Figure 1).

For millions of years, Loyalsock Creek has flowed through these highlands, following a path in the rocks having highest fracture density and structural weakness. It has worn through at least 800 feet of rock thickness to the present-day creek bed. The size of the creek has probably varied through geologic time, but its position has remained approximately the same.

Geologic History

About 350 million years ago, Sullivan County, like most of central Pennsylvania, was part of a series of deltas forming the coastline of a shallow sea covering western Pennsylvania, Ohio, and most of the interior lowlands of the central United States. These deltas were produced by rivers and streams carrying clays, sands, and gravels from highlands in eastern Pennsylvania, New Jersey, New York, and Delaware.

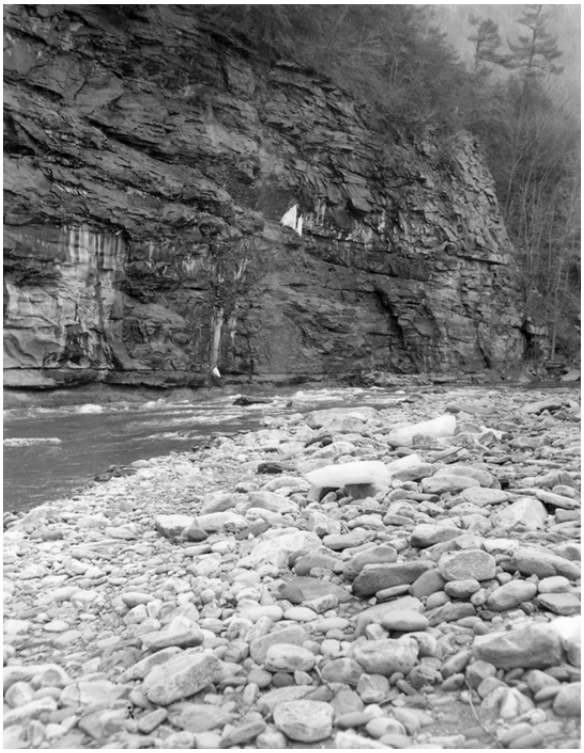


Figure 1. Huntley Mountain Formation at Loyalsock Creek.

For millions of years, Sullivan County remained a part of this deltaic series, and great thicknesses of sediment accumulated as the highlands to the east eroded. The clays, sands, and gravels supplied to the deltas by meandering and braided streams were deposited layer after layer. These sediments make up the rocks you see in the park today.

About 250 million years ago, the long period of deposition ended. Intense forces within the earth gently folded and raised these flat-lying sediments high above sea level. The same intense forces were also responsible for the series of large, more pronounced folds to the south and east of Sullivan County that today form Pennsylvania's long, parallel ridges and valleys. After uplift, these "new highlands" were subject to erosion. The Loyalsock Creek began to erode and carry away the sedimentary rocks that had been deposited in the ancient deltas. These highlands, which probably once stood thousands of feet higher, are still being eroded today.

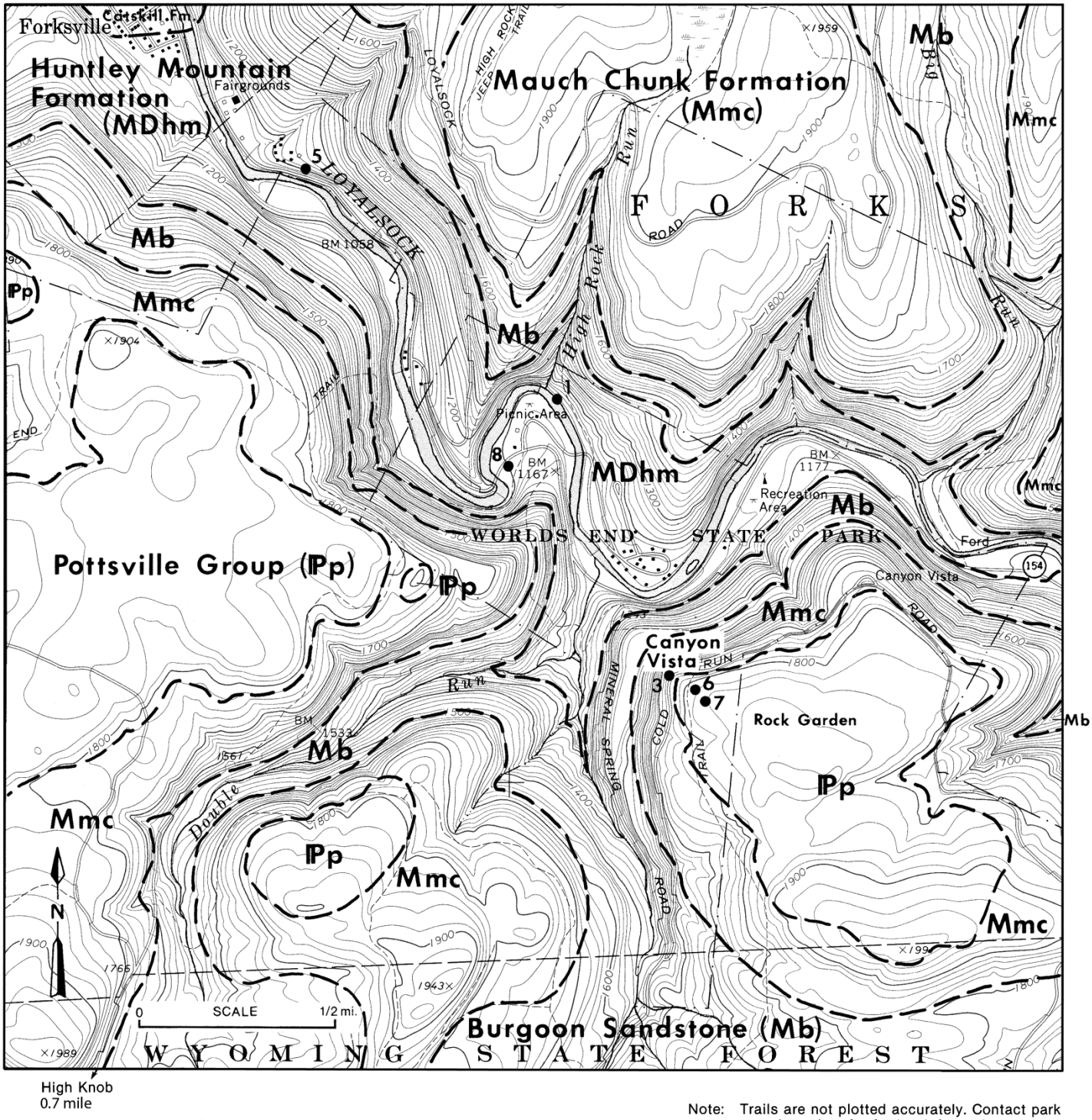
Many thousands of years ago, after the highlands had been worn down to nearly their present level, glacial ice spread into Pennsylvania from the northeast. However, its effect on the topography of this particular area was minimal. Glaciation is evidenced by displaced boulders strewn over a broad area, the existence of marshes and lakes where ice scoured the land surface, and deposits of mixed clay, sand, and gravel left by melted ice.

As you visit the overlooks at High Knob (Figure 2) and Canyon Vista (Figure 3), you will notice that the horizon appears generally flat and that the mountaintops form a "high plateau." This topography is the result of uniform weathering of the almost flat-lying sedimentary rocks. The "high plateau" you see is primarily shale and sandstone (Mauch Chunk Formation). Irregularities in the horizon are the result of differential weathering of more resistant sandstone or conglomerate ledges.

Figure 2. High Knob overlook.

Photo by Gary Smith

Figure 3. Canyon Vista overlook.



Note: Trails are not plotted accurately. Contact park superintendent for further information.

Geologic Map
Worlds End State Park

Fossils

About 350 million years ago, Sullivan County was part of a series of deltas. At this time, an ancestor to our modern-day lungfish existed in these shallow waters. Like today's lungfish, they possessed the capability of using atmospheric oxygen to carry them through periods of drought. At the approach of a dry period, when the deltaic muds would soon be exposed to the drying effects of sun and wind, the primitive lungfish would burrow tail first in the mud, leaving only a small opening to the surface for air (Figure 4). Once in the burrow, they would pass into a kind of “sleep” (aestivation), at which time all metabolic processes would be greatly reduced. When water returned to their natural habitat, they would “wake” and leave their burrows to return to normal aquatic life. Some of these burrows were later filled with sediment slightly harder than the muds into which the lungfish originally burrowed. Due to the process of differential weathering, remnants of these burrows can be observed in the red siltstones near Forksville (Figure 5).

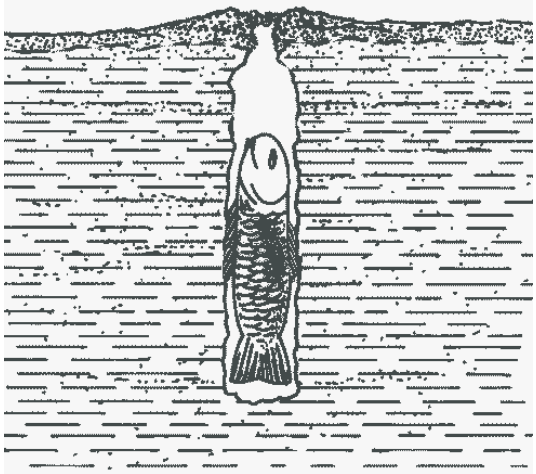


Figure 4. Primitive lungfish burrowed in mud.

Figure 5. Fossil lungfish burrows.

The Rock Garden

The highest plateau “tops” surrounding the gorge are capped by a highly resistant, coarse-grained sandstone and conglomerate (Pottsville Group). Frost action along vertical joints has produced a series of deep, narrow, interconnected crevices in the rock (Figure 6). The Rock Garden, located upslope from the Canyon Vista overlook, is the best example in the park of this type of erosion. As you visit this feature and wander through its blocky maze, you may observe crossbedding in some of the rock outcrops. Crossbeds are layers of sediment, such as sand, lying at an angle to the ordinary horizontal layering. In this sandstone and conglomerate outcrop (Figure 7), crossbeds were formed approximately 310 million years ago as rapid currents piled sands and gravels over an irregular streambed in the

delta environment. The inclined and flat sedimentary beds solidified through time to form rock.

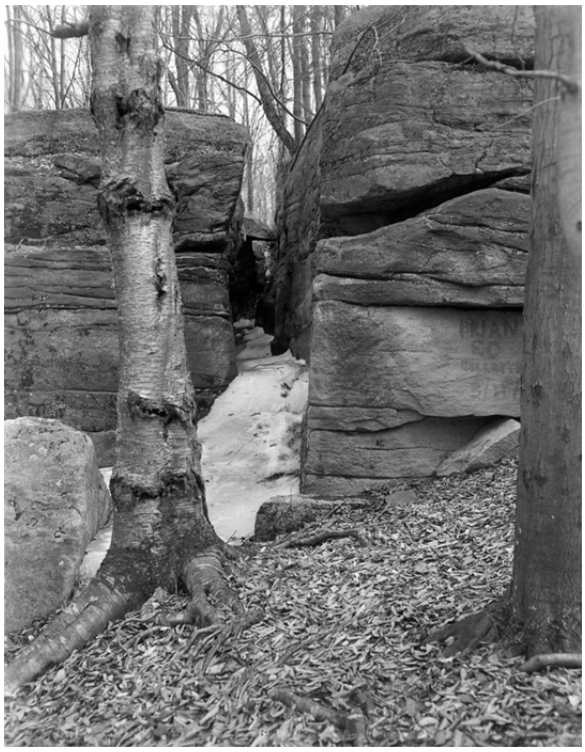


Figure 6. Extensive weathering along vertical joints.

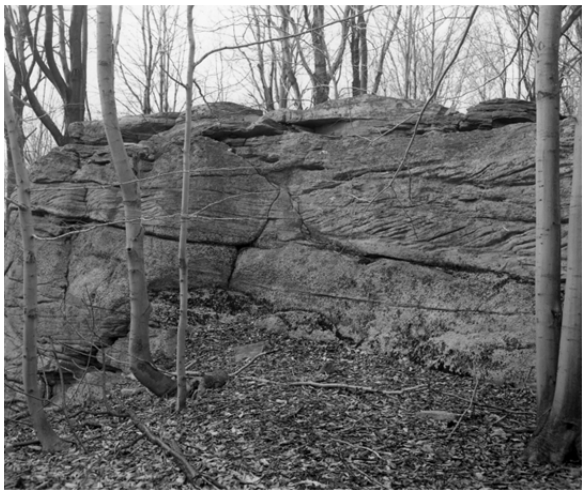


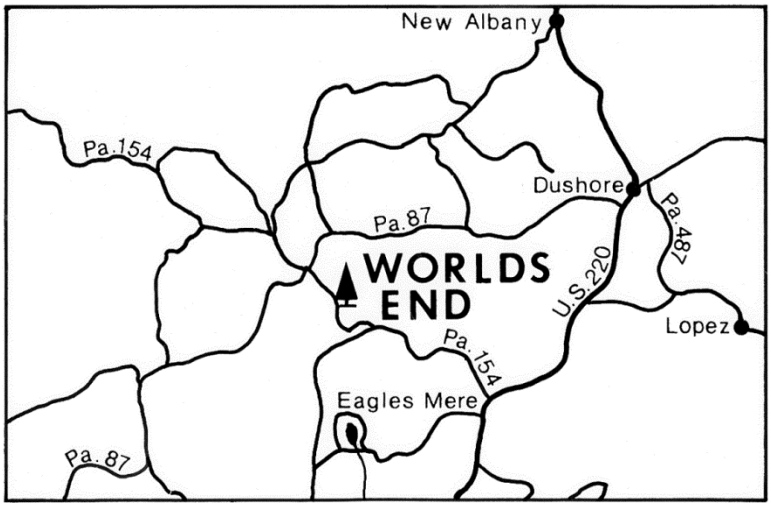
Figure 7. Crossbeds in the Pottsville Group.

The Worlds End

The Loyalsock Creek, in its search for the path of least resistance to flow, at one place bends back on itself at such an acute angle that it creates a large eddy or whirlpool (Figure 8). Originally, there existed a single road through the gorge, on the west side of the creek, a few hundred feet above the water. When travelers arrived at this bend, the turn in the road was so sharp it suggested a place for jumping off to end it all; thus the name Worlds End. Since that time, the valley has been cleared, the old road abandoned, and safer roads constructed, but the name has stayed with the area and has been adopted by this state park.

Figure 8. Whirlpool in Loyalsock Creek.

—Denise W. Royer, Geologist
Pennsylvania Geological Survey
1980



LOCATION MAP

Park Manager
Worlds End State Park
82 Cabin Bridge Road
Forksville, PA 18616
Phone: (570) 924–3287

PREPARED BY

Department of Conservation and Natural Resources
Bureau of Topographic and Geologic Survey