



## The Geologic Mystery of Pulpit Rock

By Richard B. Moore

*Richard Moore is a resident of Bedford and is chairman the Pulpit Rock Subcommittee of the Bedford Conservation Commission.*

In 1988 on my first trip to Pulpit Rock, my father-in-law, Harry N. Tufts, challenged me. He said, "You're a geologist with an interest in glacial geology, why don't you figure out what caused the formation of Pulpit Rock?" At the time I thought that I never would, but five years later I was defending my research before groups of scientists who study the geology of the Ice Age and ancient floods. At the end of May 1993, more than 60 geologists from universities, private companies, and government gathered in Concord for the 56th annual meeting of an organization known as the Friends of the Pleistocene. The Pleistocene is the name given by geologists to the Ice Age. The group examined sites that illustrate the history of the area during the time about 14,000 years ago when the last great glacier here was melting back (retreating) to the north. The two day conference, held on Saturday and Sunday, May 22 and 23, 1993, took participants to 11 sites, mainly in the Contoocook and Piscataquag River basins of southwestern New Hampshire. The conference, organized by Carol Hildreth of the New Hampshire State Geologist's Office and myself of the U.S. Geological Survey, then culminated with a visit to Pulpit Rock.

To understand the geologic explanation for why so much sediment laden meltwater emerged from the glacier and carved out the huge pothole known as Pulpit Rock, one needs to look westerly to the Contoocook River Basin. The Contoocook River basin is the largest river basin that drains north in New Hampshire and is similar to northwardly draining parts of the Piscataquag and Souhegan River basins. It is of special interest to glacial geologists because at least eight different glacial lakes formed and drained successively in the basin as the glacier melted back to the north.

During the retreat of the ice, the drainage divide between adjacent drainage basins acted as a dam, and lakes formed behind it, trapped between the glacial ice and the land. At first, as the glacial margin melted back (northward), two small lakes formed successively and then filled in with sediment. As the glacial ice continued to melt farther northward, new outlets were uncovered at lower altitudes along the drainage divide. This resulted in catastrophic draining of the lakes, catastrophic because the lakes drained very rapidly as the new outlets were exposed.

Of particular interest to the residents of Bedford is that this complex history of the formation of successive glacial lakes finally provides us an explanation of how “the Pulpit” was carved. This huge pothole is similar to the Basin at Franconia Notch, but the Pulpit is much larger. Although it is partly buried by sediments, the exposed part measures 42 feet high and about 23 feet wide. One wall has part of a cavity in it that is said to resemble a pulpit and gives the place its name.

The Pulpit developed at the base of a cascade or waterfall where swirling water filled with sediment eroded the pothole. The swirling slurry of water and sediment, including sand and gravel, acted like “liquid sandpaper” carving the pothole out of the bedrock. The circular basin was thus eroded into the bedrock, as were several smaller potholes downstream from the Pulpit.

Today's Pulpit Brook only drains less than one square mile above Pulpit Rock. But for a time during the Pleistocene and the retreat of the glacier, it drained two huge lakes to the west in the Contoocook and Piscataqua River basins. At that time, the lake in the Contoocook drainage basin (now much of Peterborough, Greenfield, and Hancock) drained into the lake in the South Branch of the Piscataqua drainage basin (New Boston), which then drained out to Pulpit Rock. The lake level of the lower of the two lakes was about 100 feet higher in altitude than the top of the Pulpit. This provided the hydraulic pressure for the swirling water that exited, with an enormous amount of energy, from the glacial ice margin at the Pulpit. And thus the mystery was solved.