

Geologic Site of the Month
August, 2012

***Geology of Sentinel Mountain
Baxter State Park, Maine***



45 52' 12.08" N, 69 3' 55.58" W

Text by
Robert A. Johnston



Introduction

Sentinel Mountain is located in the southwestern corner of Baxter State Park, rising to the north of the West Branch of the Penobscot River (Figure 1). The mountain, which stands above the local terrain, can be reached by a hiking trail which leads from Kidney Pond (Figure 2).



Figure 1. Sentinel Mountain as seen from the summit of Mount OJI (3,434 ft). Kidney Pond is in the foreground.



Hiking Trail

The Sentinel Mountain Trail is a moderate hike of 3.1 miles to the summit (1,842 ft; Figure 2). Beginning at the day-use parking lot at Kidney Pond, it is a one mile hike to Sentinel Landing on the south shore of the pond, and from there a 2.1 mile hike to the summit (Kish, 2012).

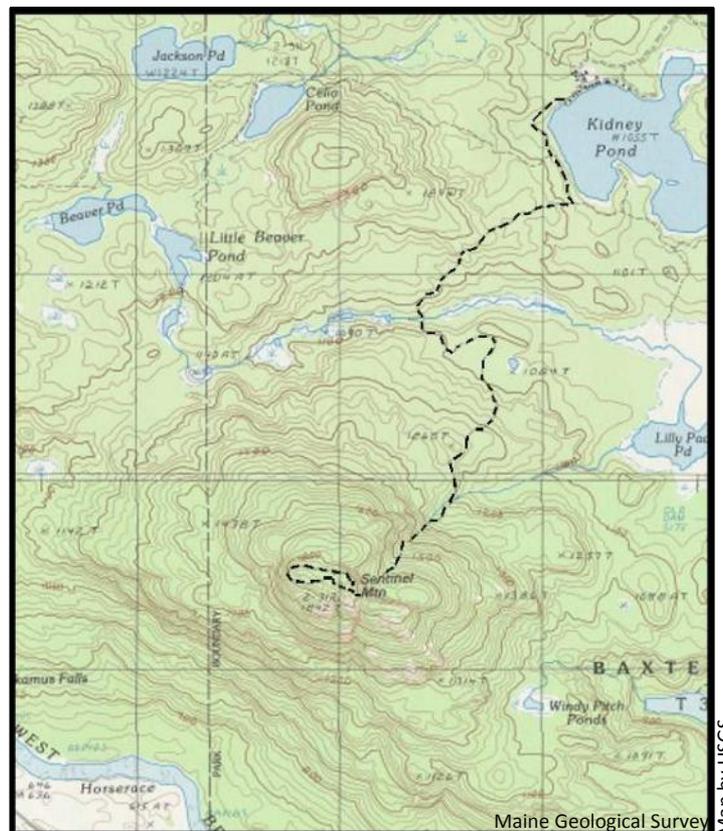


Figure 2. Hiking trail from Kidney Pond to the summit of Sentinel Mountain. Topographic map from sections of U.S. Geological Survey Doubletop Mountain and Rainbow Lake East 7.5' quadrangles.



View from the Summit

From the summit of Sentinel Mountain, hikers can enjoy spectacular views of the high peaks of Katahdin and Doubletop Mountain, and the valley of the Penobscot River drainage basin (Figure 3, Figure 4, and Figure 5).



Photo by Robert A. Johnston

Figure 3. View of Mount Katahdin (5,268 ft) from the summit of Sentinel Mountain. Lily Pad Pond is in the foreground.



View from the Summit



Figure 4. View north showing the south peak of Doubletop Mountain (3,455 ft) from the Loop Trail at the top of Sentinel Mountain.

View from the Summit



Figure 5. The view west from the summit of Sentinel Mountain. The West Branch of the Penobscot, Ripogonus Lake and Big Spencer Mountain are visible in the photo.



Bedrock Geology

The entire trail is underlain by the Katahdin Granite, the most common rock type found in Baxter State Park and named for exposures on Mount Katahdin (Rankin and Caldwell, 2010). The Katahdin Granite underlies an area about 40 by 22 miles and is estimated to be about 3 miles thick. It formed a mass of molten rock that solidified well underground (called a pluton) just over 400 million years ago. Subsequent erosion of the overlying rocks has exposed the granite and formed the mountains we see today. Two varieties of rock exist within the Katahdin Granite. The core of the pluton is a homogeneous, light-gray granite, made up mostly of grains of quartz, feldspar, and biotite (Figure 6).



Figure 6. Exposure of Katahdin Granite along the Loop Trail at the summit of Sentinel Mountain.



Bedrock Geology

This medium-grained variety of granite has mineral grains of uniform size (about 0.1 to 0.2 inch). As one climbs to higher elevations in the Park, the second variety of rock appears, noted by a change in color and a finer-grained texture (Figure 7).



Figure 7. Outcrop of pink to red, porphyritic, biotite-bearing finer-grained granite on the Loop Trail at the top of Sentinel Mountain.

Bedrock Geology

With an increase in elevation, the granite changes from a light gray to a white and pink, then salmon, and finally a brick red color. The red color comes from microscopic grains of iron oxide (hematite) found within the feldspar crystals. It is thought that this upper portion of the pluton was close to the cooler bordering rocks and therefore cooled more quickly than the interior parts of the granite, producing finer-grained rocks. At high elevations, small cavities can be seen in the granite. These openings are often filled with small crystals of quartz, epidote, tourmaline, and sometimes fluorite.



Surficial Geology

During the last ice age, glaciers shaped the landscape in Baxter State Park. As the glacier moved over the land, debris ranging in size from dust particles to large boulders became frozen into the ice. When the glacier melted, this material was deposited across the land surface. The most common surficial material found along the Sentinel Mountain trail is till. Till is deposited directly from glacial ice and is composed of small pebbles to boulders in a mixture of clay, silt, and sand. More evidence of the power of the glaciers can be seen a few tens of yards down the Sentinel Mountain Trail from the day-use parking lot at Kidney Pond. A large boulder, approximately 20 feet in diameter (Figure 8), is hidden in the woods. It was transported there by glacial ice. Fittingly, this boulder is called the Kidney Stone!



Photo by Robert A. Johnston

Figure 8. The "Kidney Stone," a large boulder moved by glacial ice.



Surficial Geology

During glaciation, many mountains were oversteepened by the ice plucking rocks from their southern faces. After the glaciers melted, unstable debris was left scattered on steep mountain slopes. Gravity, along with freezing and thawing of water in cracks, causes material to loosen and move downslope. Avalanches and rockslides are common on many of the steep slopes in the park (Figure 9).

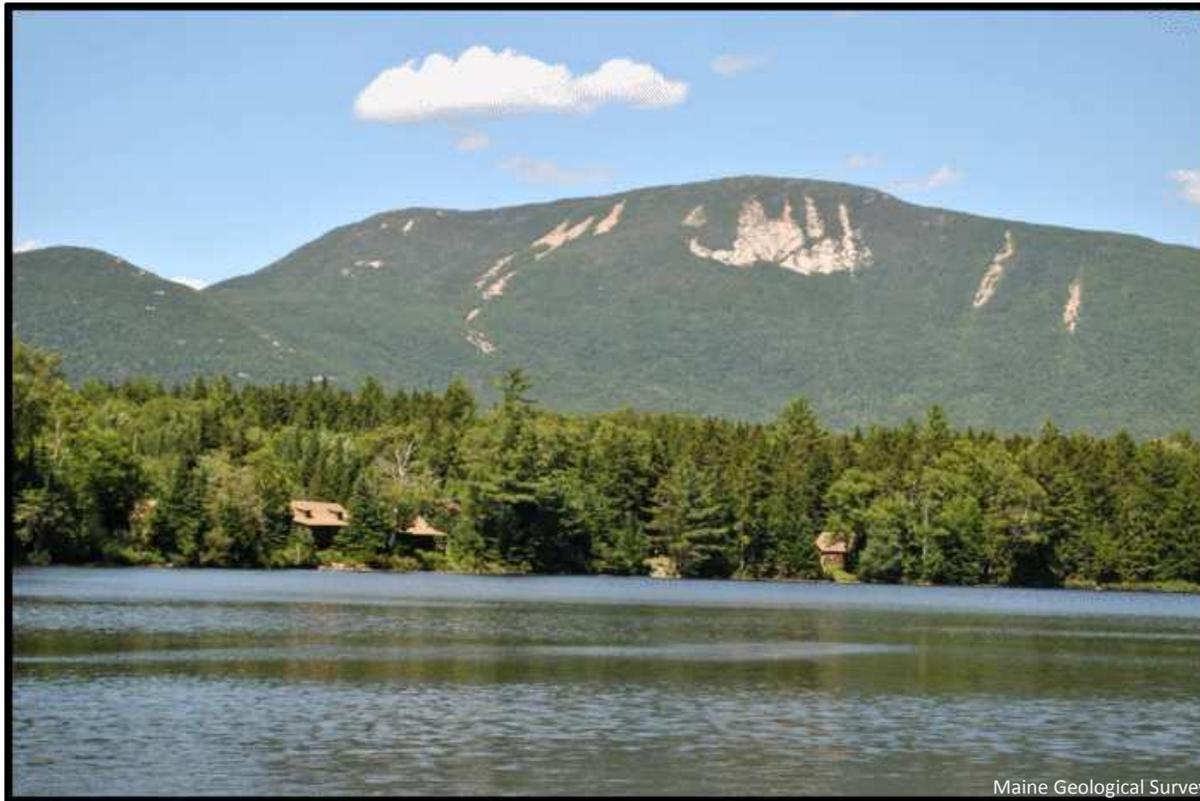


Figure 9. View of rockslides on Mount OJI across Kidney Pond. Photo is from the trail up Sentinel Mountain.



References and Additional Information

Kish, C. M., 2012, AMC Maine mountain guide (10th edition): Appalachian Mountain Club Books, Boston, 402 p.

Rankin, D.W., and Caldwell, D.W., 2010, A guide to the geology of Baxter State Park and Katahdin: Maine Geological Survey, Bulletin 43, 80 p., 2 maps.

