Maine Geologic Facts and Localities

November 2024

Ledges Trail
Baxter State Park

46° 6’ 34” N, 68° 54’ 6” W

Text by:
Lindsay J. Theis

Introduction

Maine Geological Survey

The Ledges Trail is an approximately 1.2-mile, easy to moderate loop hike from South Branch Pond Campground in Baxter State Park. Directions to the trailhead and park entrance information can be found on the Maine Trail Finder or Baxter State Park websites.

Bedrock and glacial geology, along with beautiful views of the South Branch Ponds Valley, can be observed from this trail which begins just north of the day use parking lot and loops back on the campground access road (Fig. 1 and Fig. 2).

For more detailed information about the geology of Baxter State Park and the South Branch Ponds area, see Rankin and Caldwell (2010) and Johnston and Theis (2023).

Figure 1. Ledges trailhead sign.

Introduction

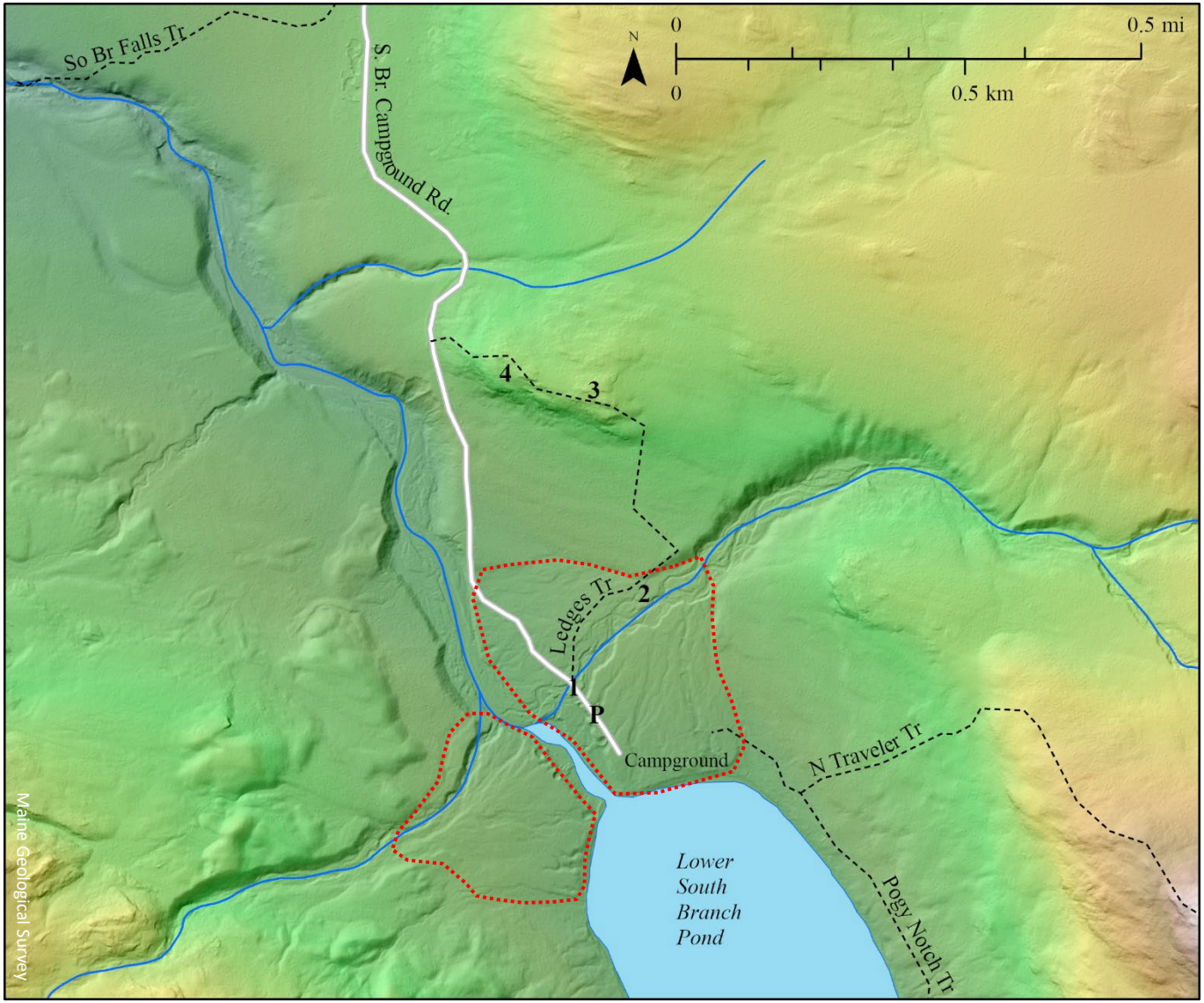

Figure 2. Ledges Trail lidar hillshade map with elevation color ramp (green is lower, red is higher elevation). Dashed black lines = trails; P = parking; numbers = suggested trail stops described in this guide; red dotted lines outline alluvial fans described on page 7. Map data source: Maine Office of GIS.

Introduction: Bedrock Geology

The Ledges Trail (and many other trails that depart from South Branch Pond Campground) is underlain by the Black Cat Member of the Traveler Rhyolite (Fig. 3). This rock formed about 400 million years ago when froth (magma and volcanic gas), ash, and pumice from a series of volcanic eruptions settled onto an ancient sea floor, compacted, and cooled. Individual white plagioclase feldspar crystals (phenocrysts) stand out from the fine-grained gray rock mass. Flattened tan pumice fragments provide evidence of compaction, creating a linear orientation in the rock known as compaction foliation.

Figure 3. An example of Traveler Rhyolite from Rankin and Caldwell (2010). The white specks are feldspar phenocrysts, and the tan streaks are compacted pumice fragments.

Introduction: Bedrock Geology

As the layers of erupted materials rapidly cooled to form rock, they contracted and fractures (joints) formed perpendicular to the layers, eventually separating the rock into hexagonal columns – a characteristic known as "columnar jointing" (Fig. 4). The rocks were also deformed at some point in the past, which tilted the layers of Traveler Rhyolite to the northeast in the Ledges Trail area.

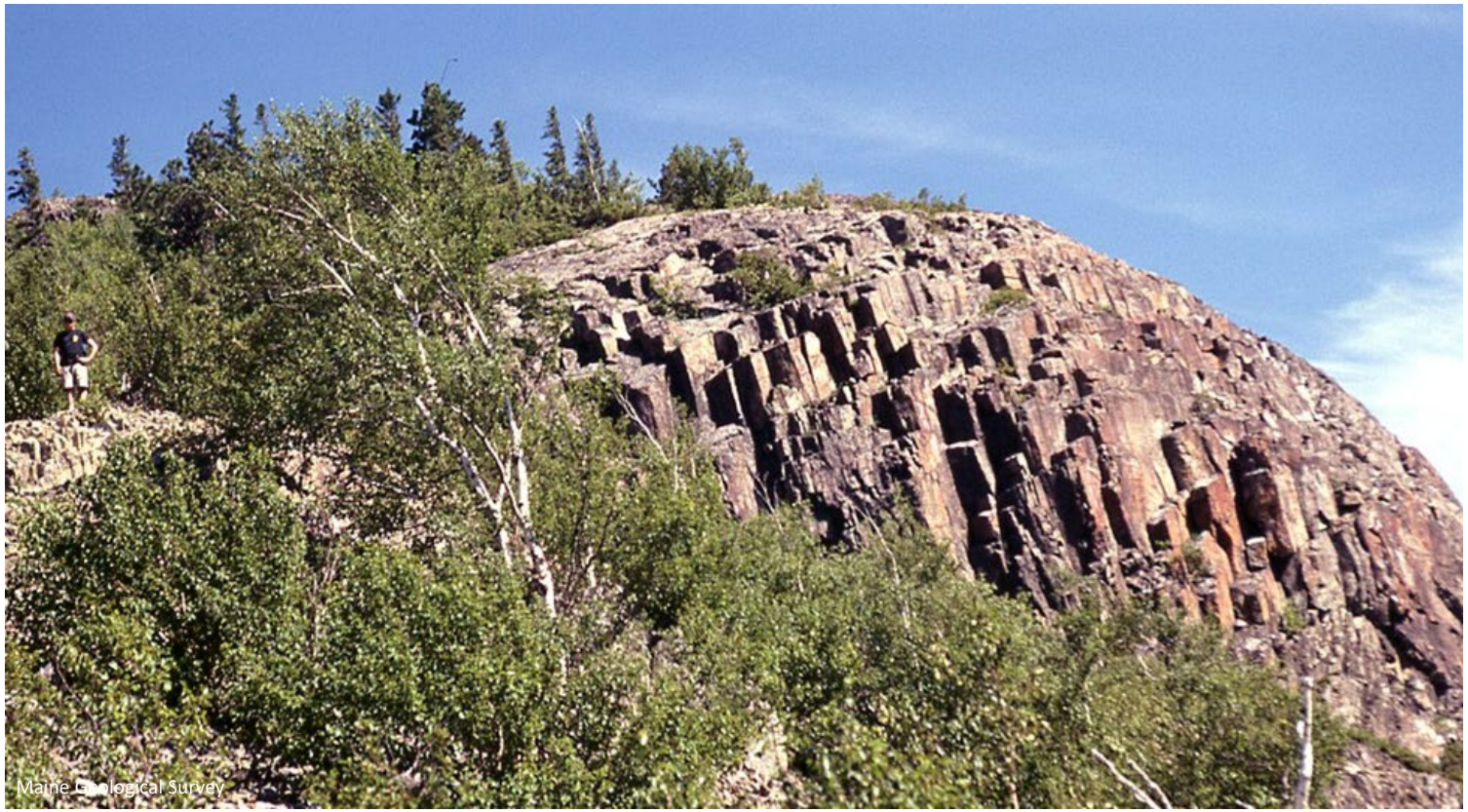

Figure 4. An example of columnar jointing in Traveler Rhyolite on North Traveler Mountain.

Introduction: Surficial Geology

The massive Laurentide ice sheet flowed from the northwest across this area several times during the last Ice Age, covering even the highest peaks in the park such as The Traveler and Katahdin. The glacier scoured and sculpted the landscape, carving out the U-shaped valley now occupied by the South Branch Ponds (Fig. 5). Glacial activity left many different types of deposits in the park, but the Ledges area is covered by a thin layer of glacial till which is a chaotic mix of sediments from clay to boulders that were transported and deposited by the glacier.

Figure 5. View of the glacially carved valley from South Branch Pond Campground.

Introduction: Surficial Geology

The ice sheet retreated to the northwest of the South Branch Ponds Valley by at least 13,000 years ago (Anderson and others, 1986; Davis and others, 2015). Modern stream networks began to establish in what was likely a cold and somewhat barren landscape. Stream channels incised the steep hillsides, eroding and transporting sediment downstream. When high energy mountain streams reach the valley floor, they lose energy and their ability to transport sediment. Over time, a fan-shaped deposit of sand and gravel called an *alluvial fan* can form where a mountain stream meets the valley floor. These landforms extend from both valley sides at South Brand Pond Campground, creating a natural dam that impounded the South Branch Ponds and the dry, gently sloping surface now occupied by the campground (Fig. 2). Another large alluvial fan extending from Howe Brook on the east side of the valley separates Upper and Lower Sound Branch Ponds (Fig. 5).

Figure 5. View from the North Traveler Trail of the alluvial fan (extending from left valley wall in photo center) that separates Lower and Upper South Branch Ponds.

Stop 1: Alluvial Fan

As you walk to the Ledges trailhead from the parking area, you will cross the unnamed stream that built the alluvial fan on which the campground is located (Fig. 2 and Fig. 6). It is likely that it has little flow during most of the year, but the large cobbles in the channel provide evidence of its power during higher flow events. The Ledges Trail begins with a pleasant ascent of the alluvial fan – the trail is gentle with easy walking across this sand and gravel deposit (Fig. 2 and Fig. 7).

Figure 6: The stream that built the alluvial fan, dry in late summer.

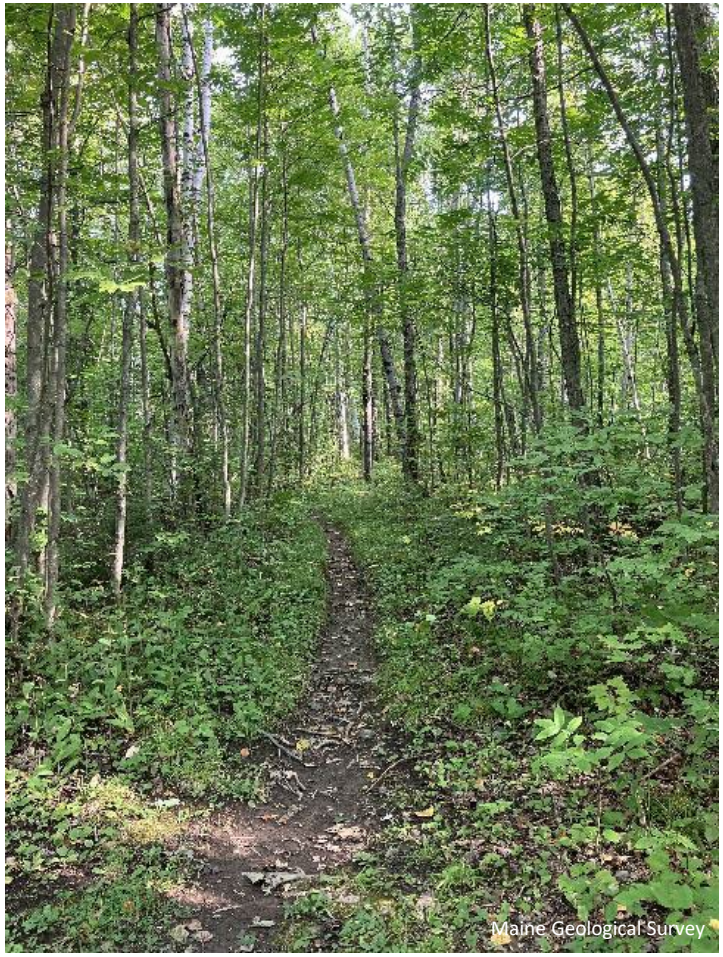

Figure 7: The Ledges Trail starts with a smooth and gentle ascent of the alluvial fan.

Stop 2: Alluvial Fan Boundary

The boundary between the alluvial fan and the till-covered valley wall is very clear when walking the Ledges Trail (Fig. 2 and Fig. 8). Hikers are met with a somewhat abrupt change in gradient and will notice that that trail is stonier under foot as they begin to traverse glacial till deposits on the hillside.

Figure 8. Boundary between the alluvial fan and valley wall, marked with a red backpack.

Stop 3: Traveler Rhyolite

After leaving the alluvial fan, the trail turns northwest and ascends to several ledges where outcrops of Traveler Rhyolite are common. In many areas, erosion and weathering along the steep southwestern side of the ledges make it easy to recognize the ash flow layers that comprise the rock as well as their tilt to the northeast (Fig. 9).

Figure 9. Weathered steps along the valley wall (photo left) make it easy to pick out layers in the Traveler Rhyolite that are tilted northeast (left to right in photo).

Stop 3: Traveler Rhyolite

Weathering has broken up the rock quite a bit along the Ledges Trail but keep your eye out for this spot where some of the characteristic columns formed by columnar jointing can still be observed (Fig. 10). Columns can also be easily viewed on the side of The Traveler Mountain area from a canoe on the South Branch Ponds.

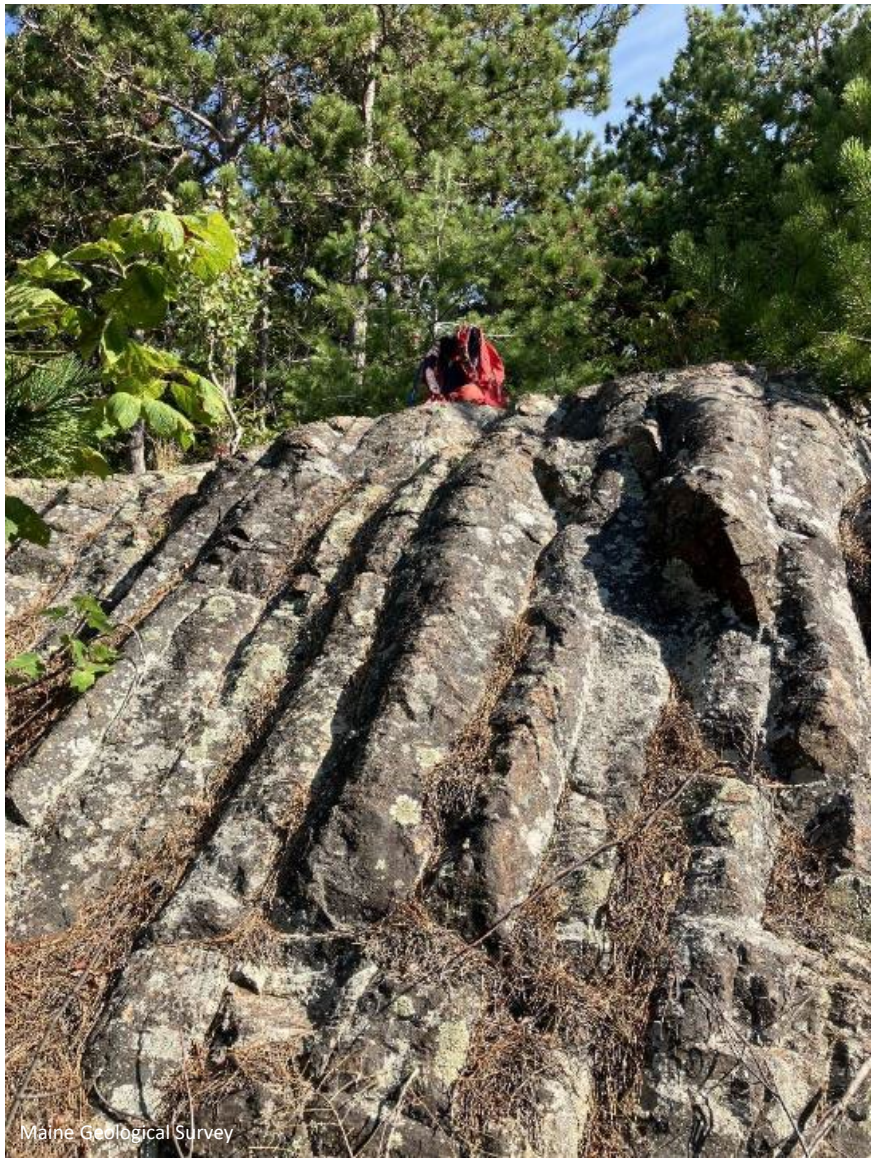

Figure 10. Columns in Traveler Rhyolite along the Ledges Trail. The trail traverses the top of this area (where backpack sits in photo), so these columns would actually be observed from above.

Stop 3: Traveler Rhyolite

If you take a close look at the rock in some areas, you will notice very fine layers which are a product of compact foliation brought out by differential weathering of the various rock components (Fig. 11). The tiny holes have been created by faster weathering of weaker rock "ingredients" – possibly ash balls or feldspar phenocrysts.

Figure 11. Fine layers in an exposure of Traveler Rhyolite.

Stop 4: South Branch Valley View

An overlook towards the western edge of the ledges provides an excellent view of the glacially carved South Branch Ponds Valley (Fig. 12). Lower South Branch Pond and the alluvial fan that separates it from Upper South Branch Pond are clearly visible.

Figure 12. View of the South Branch Ponds Valley from the Ledges Trail. Glacial erosion created the U-shaped valley – the sloping left side of the "U" is visible in photo center as well as the alluvial fan that separates the South Branch Ponds.

References

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