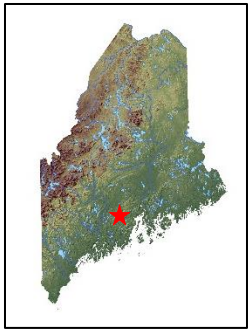
Maine Geologic Facts and Localities

June 2022

Haystack Mountain, Liberty, Maine



44° 23’ 52.3” N, 69° 18’ 29.4” W

Text by
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Introduction

Haystack Mountain trail in Liberty, Maine, is a lovely, short (~1 mile roundtrip) hike through the woods with some beautiful rocks to look at along the way. If the short trail to the summit is open to the public (the summit hosts an active blueberry field that may close for harvest), the hiker is rewarded with spectacular views of central Maine.

Figure 1. Views at the summit of Haystack Mountain, Liberty, Maine.

Getting There

From Route 3 in Liberty, just east of Lake St. George State Park, drive south on Route 220 for 0.8 miles. The trailhead for the Haystack Mountain trail is in the Vena M. Roberts Memorial Ball Field behind Walker School in Liberty; the road to the ball field is next to the Walker Health Center on the left/northeast side of the road. Park in the gravel parking lot and make your way along the left side/west side of the ballfield to the far corner of the field, behind the backstop.

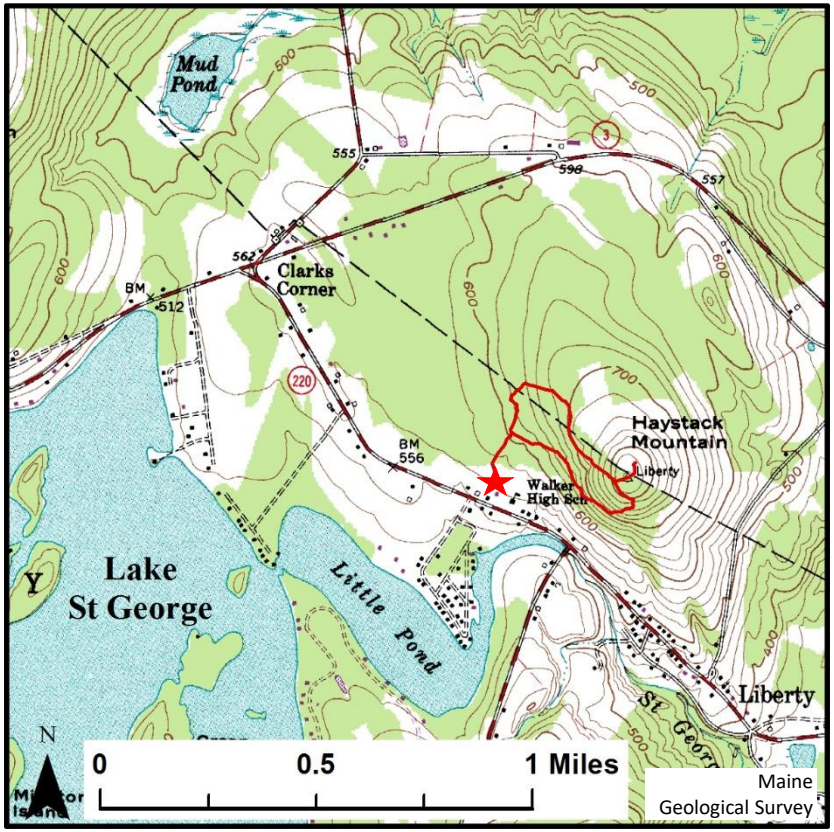


Photo by A.T.H. Whittaker June 2021

Figure 2. Left: topographic map of the area. Right: Trail sign off gravel parking area, red arrow to trailhead.

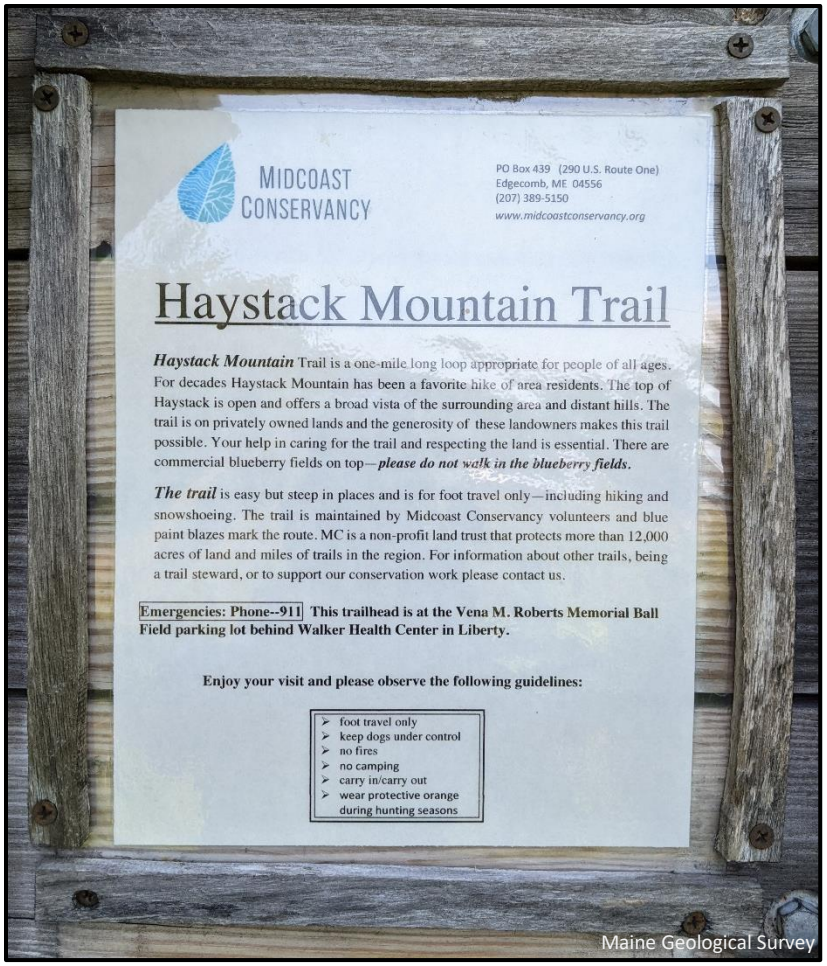


Photo by A.T.H. Whittaker June 2021

Figure 3. Trail information at the trailhead.

Trail Information

The trail is managed by the Midcoast Conservancy and is on private land; do not walk in the blueberry fields at the top. Please respect any trail closures, which may mean you cannot reach the summit and the anticipated views. The loop is approximately 1 mile and marked with blue blazes. Elevation change is about 200 feet to the summit (840 ft elevation). The trail is somewhat narrow with some uneven terrain and exposed tree roots (but the author's 7-year-old kid navigated this path with no problems). During the wet season the northwest side of the loop will be quite muddy, but the southeast side of the loop, the side with the bedrock outcrop, is usually accessible year-round (trail conditions are related to the underlying geology!). The trail is open to foot traffic only.

Surficial geology

The landscape around Haystack Mountain, like most of Maine, has been shaped by the large ice sheet that covered Maine during the last Ice Age, about 25,000 to 12,000 years ago. The ice moved slowly from the northwest to the southeast over this area, scooping up sand, gravel, and rocks, which froze into the base of the ice sheet and acted like sandpaper, grinding down mountains and sculpting hills.

This mixture of material (clay, silt, sand, and stones of various sizes) is also continuously left under the glacier in a deposit known as till (Qt on Figure 4), which blankets much of the landscape in Maine. The long lines with central arrowheads in Figure 4 represent areas where this till was deposited and then shaped by the moving ice into ridges and grooves. Where the deposit of till was thicker, the ice streamlined the pile into an elongated hill known as a drumlin, which is represented by the ovals with lines aligned to the long axis of the hill. Both of these features are oriented northwest-to-southeast, parallel to the direction of ice movement. Other areas of till deposit are much thinner (striped areas), and the bedrock may poke through in places or be completely exposed, like at the tops of mountains such as Haystack.

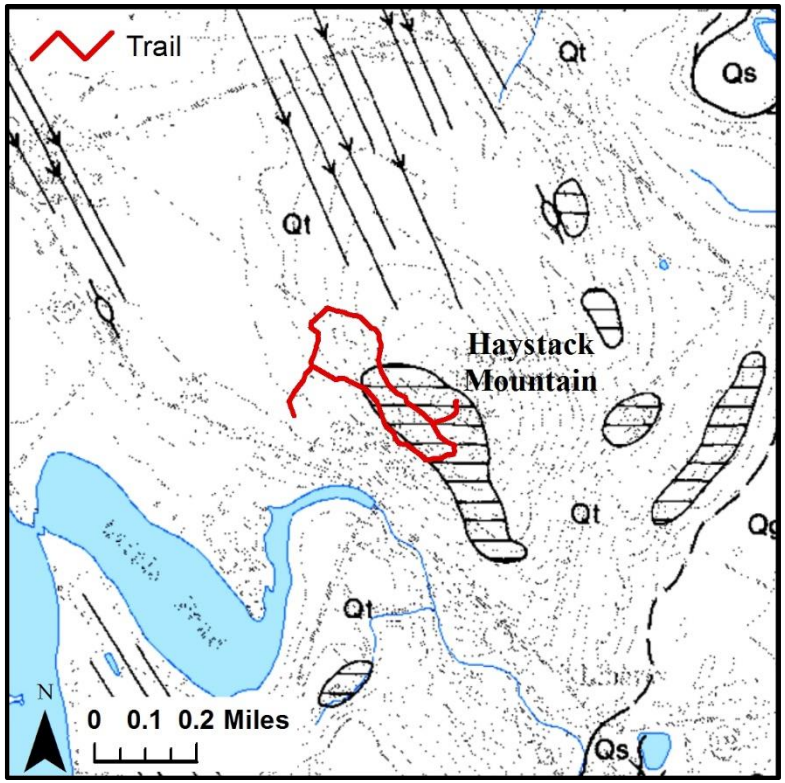


Figure 4. A portion of the surficial map of the area (Smith, 1986) showing the distribution of streamlined till (lines with arrows), drumlins (ovals with lines), and thin deposits of till (striped areas).

Mountain morphology and surficial geology

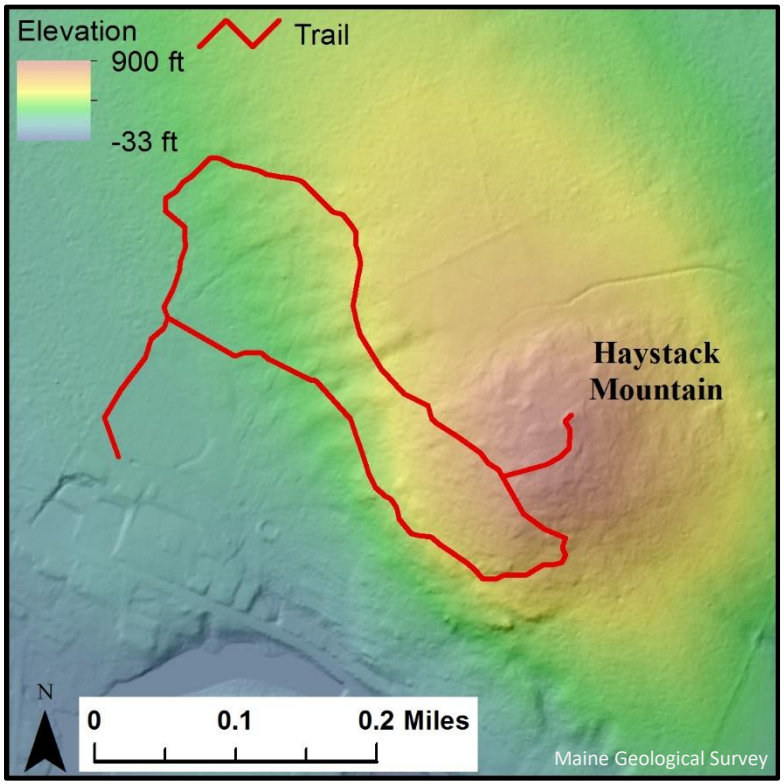
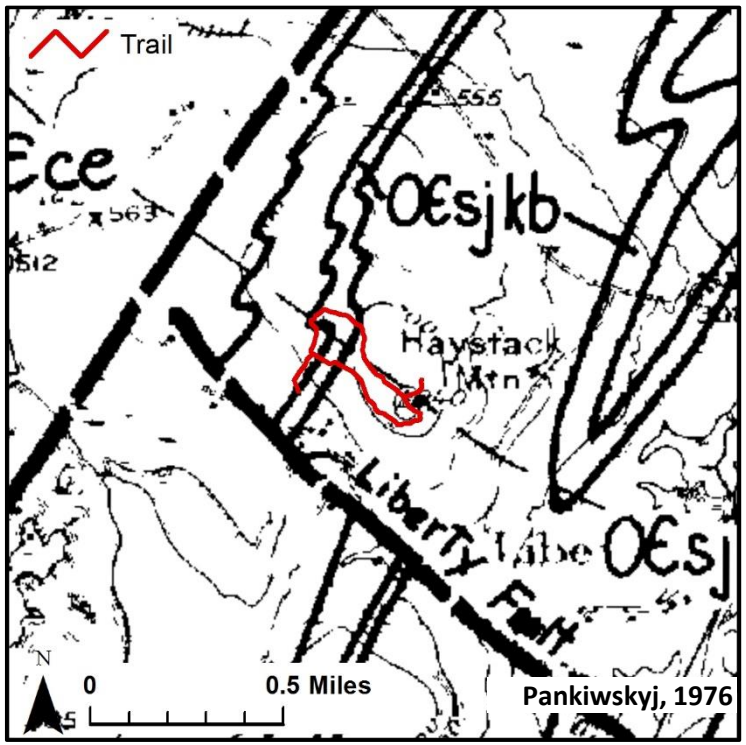


Figure 5. Elevation map of Haystack Mountain, showing the form elongated to the northwest-southeast, with a gentle slope on the northwest side, and a steeper slope on the southeast side.

Haystack Mountain itself is a glacially streamlined and plucked hill, with a gentle slope of till on the northwest side and a steep, rocky side on the southeast. The ice sheet moved over this area and left the till on the northwest side of the rock that makes up the mountain, which must have stuck out some from the surrounding land. As the ice sheet moved over this rock, water froze in cracks, and when the glacier continued moving southeast, the ice plucked some of the rocks out of the mountain, leaving the steeper, rockier form on the southeast side.

Bedrock geology

The rocks on Haystack Mountain belong to the Scarboro Formation of the Casco Bay Group. This rock formation is named after the town of Scarboro (now spelled Scarborough), south of Portland, where it is also found. The rocks are now considered metamorphic, but they were formed from fine-grained sediment deposited about 460 million years ago at the bottom of an ancient ocean basin, known as the Iapetus, that existed well before the Atlantic Ocean that we know today.



Colliding tectonic plates destroyed the Iapetus Ocean, compressing the sediments in the ocean basin and pushing them onto the margin of North America, which at that time was farther to the northwest than it is today. In the process, the sediments were buried, heated, and subjected to great stresses that created the metamorphic rock that we see today.

The southeast side of the trail loop (the steep, plucked side of the mountain) has exposures of the bedrock along the trail.

Figure 6. The bedrock map showing the mountain mapped as combined Scarboro – Jewell Formation (O€sj) (Pankiwskyj, 1976).

Bedrock geology

The heat and pressure resulted in the formation of schist, a type of metamorphic rock that contains abundant plate-like minerals that all line up to give the rock a 'grain' or foliation. The Scarboro Formation is mostly gray-colored fine-grained schist that contains mica (both muscovite and biotite) and abundant milky white quartz segregations. The mica minerals give the rock a silvery sheen. If you look closely at the schist, you may also see small dark mineral grains of garnet or staurolite.

Photo by A.T.H. Whittaker June 2021

Figure 7. An exposure of Scarboro Formation along the trail.

Along the trail

The layers of mica and the quartz segregations are complexly folded in this rock due to the movements of the tectonic plates during a major Appalachian mountain building event known as the Acadian orogeny about 380 million years ago. In some places, pink andalusite is found with the white quartz. Andalusite is an index mineral that tells geologists roughly the pressure and temperature conditions of the rock, because it forms under a narrow range of pressures and temperatures – in this case, low pressures and moderate temperatures.

Figure 8. Left: folded silvery schist and folded white quartz segregation. Right: pink andalusite with white quartz.

View from the top

If you are able to reach the top, there are wide exposures of the Scarboro Formation. The wavy texture is due to preferential erosion of the folds in the softer schist, while the white quartz is harder and more resistant to weathering. The quartz segregations are smooth due to glacial polishing (go ahead, pet it!). On a clear day, you can see the windmills in nearby Freedom to the northeast, the Camden Hills to the southeast, and several local ponds.

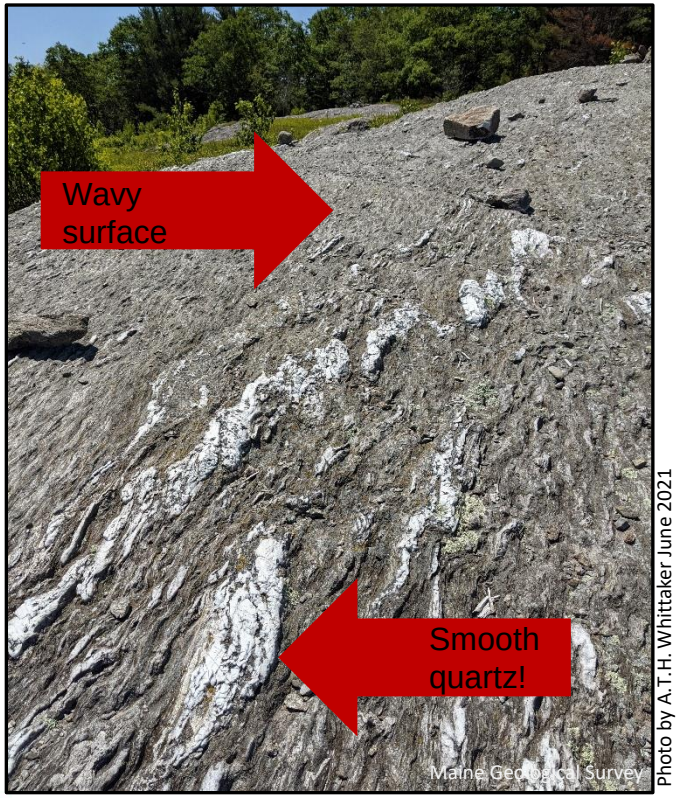


Figure 9. Left: interesting differential weathering textures at the top of the mountain, view to the southwest. Right: view of Camden Hills to the southeast.

References and Additional Information

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