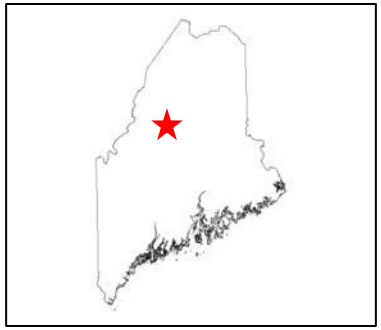
Geologic Site of the Month

October, 1998

Lobster Lake, Maine



45° 51‘ 7.91“ N, 69° 30‘ 53.88“ W

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Introduction

Along the shores of this beautiful lake northeast of Moosehead Lake is some of the most spectacular geology found anywhere in the state. In outcrop after outcrop, the shore of the lake reveals a complex geological story that begins with deep-sea sediments, is punctuated by several periods of igneous activity and folding, and ends with shallow marine sediment that is profusely fossilliferous.

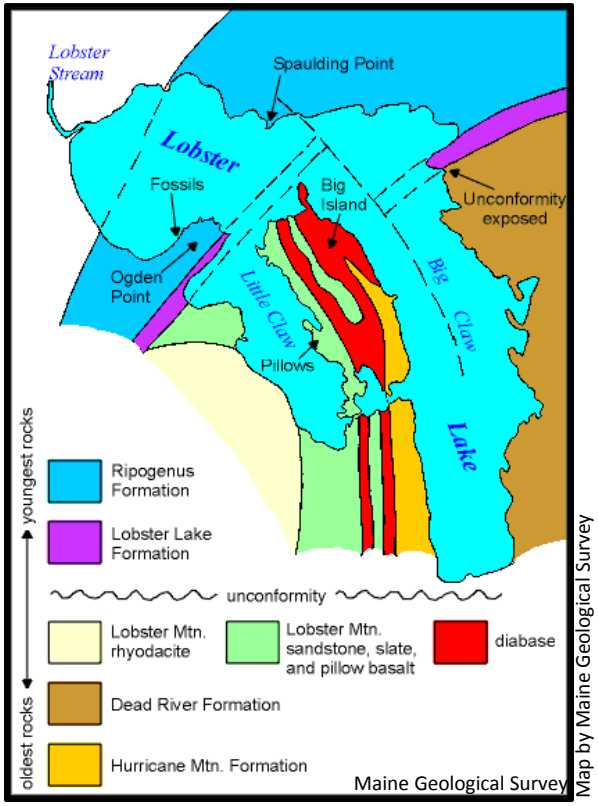

Figure 1. Bedrock geology map of Lobster Lake.

Hurricane Mountain Formation

Our brief tour begins with the Hurricane Mountain Formation which is Cambrian in age (~500 million years old). Dark gray, rusty weathering slate and phyllite make up most of the outcrops of this formation, best seen on the east side of Big Island (Figure 2). Weathering often accentuates fine layering in the slate, producing a distinct striped appearance. This unit formed as mud deposited in a deep-sea trench when part of an oceanic tectonic plate was plunging beneath another section of crust, a process geologists call subduction. (For more on this process, see Bedrock Geologic History of Maine).

Figure 2. Rusty slate and phyllite of the Hurricane Mountain Formation exposed on the eastern side of Big Island.

Lobster Mountain Volcanics

Much of Lobster Mountain (Figure 3) on the west side of the lake and Big Island is underlain by a variety of volcanic rocks collectively called the Lobster Mountain volcanics. These are all Ordovician in age and probably represent volcanic islands created when part of the oceanic crust was subducted. Lobster Mountain itself is underlain by a light greenish gray rhyodacite: an otherwise very fine-grained rock with large angular crystals of quartz. It weathers a distinctive light gray and is well exposed on the trail to the summit that begins at Jackson Cove.

Figure 3. View of Lobster Mountain from the southern end of Little Claw. Most of this part of the mountain consists of volcanic rhyodacite.

Big Island Geology

Big Island is underlain by a collection of volcanic rocks and volcanically related sedimentary rocks. These include pillow basalt (Figure 4), siltstone, and sandstone.

Figure 4. Pillow basalt from northern Maine similar to those found on the west side of Big Island. The blobby shapes in the basalt indicate that the basalt was extruded under the ocean with the magma cooling quickly in the seawater forming these characteristic "pillow" shapes.

Diabase Dikes

Some of the sandstone beds contain fossils. However, most of the prominent points and knobs on the island are underlain by diabase dikes (Figure 5) which are more resistant to erosion. These formed from molten magma which forced its way through cracks in the overlying sedimentary and volcanic material to solidify at relatively shallow depths. A most interesting aspect of these dikes is that they have features which indicate that they intruded soft, wet sediment, not hard rock; edges of dikes are unusually convoluted. All this speaks to a very dynamic geologic environment in which sand and mud were being deposited in a marine basin as magma was forcing its way up from depth.

Figure 5. Green rocks of the prominent diabase dikes that underlie most of the knobs and points on Big Island.

Unconformities

The Dead River Formation, exposed on the east side of the lake, is mostly a green phyllite although there are some siltstone beds and maroon phyllites. In other areas this unit is known to overlie the Hurricane, but its age is no more precisely known than late Cambrian or early Ordovician (~475-500 million years). Erupting volcanoes related to subduction provided most of the sedimentary material.

Younger rocks exposed along the northern shores of Lobster Lake include sandstone and limestone, but before describing them, it is important to note their relationship to the older rocks. Exposed on a prominent point on the eastern shore of Big Claw is a major unconformity between the older and younger rocks. An unconformity is a boundary between rock units that usually indicates to the geologist that there has been a period of major mountain building in the time interval between when the older and younger rocks were deposited. Rather than a regular progression of units in which bedding and other layering in the rocks are consistent from one unit to the next, at an unconformity the orientations of bedding and layering are often strikingly different from one unit to the next. To the geologist, such a difference indicates that the older rocks were folded, faulted, uplifted and eroded before the younger rocks were deposited - a period of mountain building. The unconformity at Lobster Lake is dramatically defined by layering in the Dead River Formation, which runs nearly north-south, being cut off by layering in the younger units which run nearly east-west. Such features are rarely exposed in Maine and are important to defining the geologic history of the state.

The Lobster Lake Formation is the first unit exposed above the unconformity. It was deposited sometime during the Silurian period ~420 million years ago. Well exposed on the north side of Jackson Cove, this unit consists of thickly bedded sandstones and conglomerates with a distinctive maroon color.

Ripogenus Formation

Interbedded limestones and mudstones of the Ripogenus Formation are younger than the Lobster Lake Formation and well exposed on Ogden and Spaulding points. Because limestone and mudstone weather and erode differently, the thin interbedding of this formation produces a distinct ribbed appearance to outcrops (Figure 6).

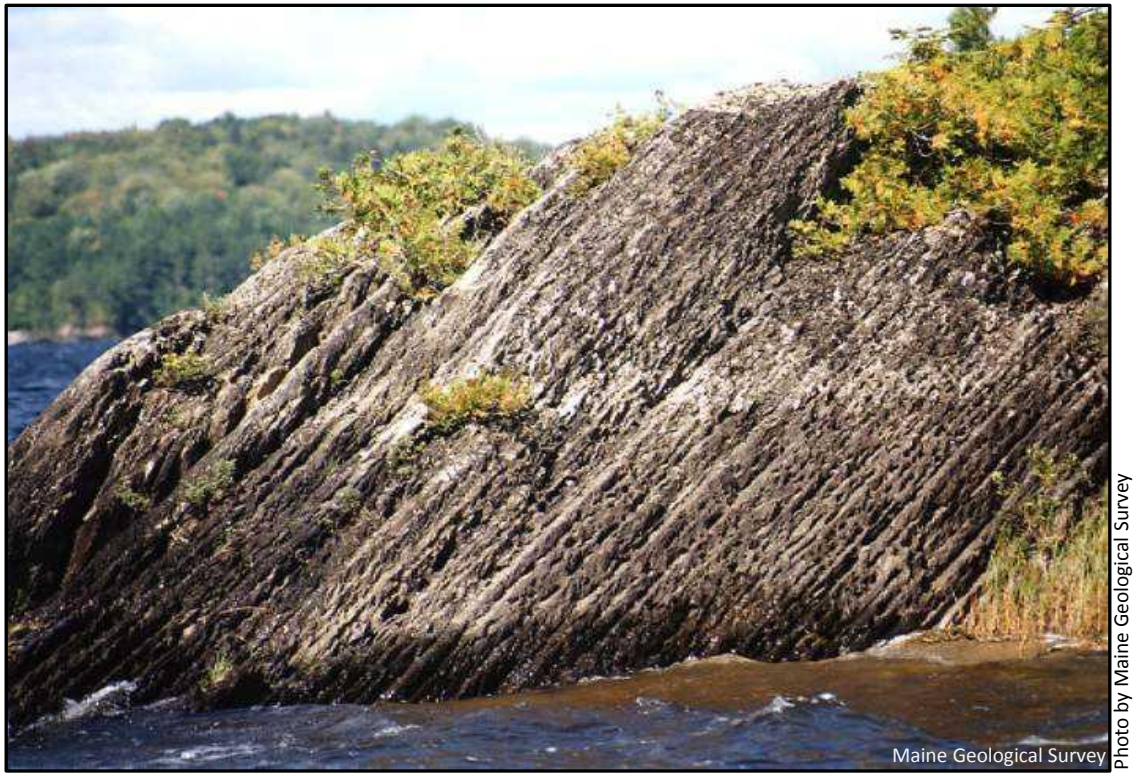

Figure 6. An outcrop of the Ripogenus Formation at Ogden Point showing the typical ribbed appearance of the interbedded limestone and mudstone. Limestone erodes more easily and forms the pits.

Fossils

A diligent searcher can find many different types of fossils in the limestone, including trilobites (Figure 7), brachiopods (Figure 8), cephalopods (Figure 9), and several different types of corals. The limestone layers are also littered with unidentifiable dark colored fossil fragments.

Figure 7. Trilobite tail (pygidium) in center of photo. These are fairly common in the Ripogenus Formation.

Fossils

Figure 8. A typical brachiopod of the Ripogenus Formation

Fossils

Figure 9. A rare straight cephalopod (below arrow). These are the ancient relatives of the modern-day nautilus.

Visiting Lobster Lake

Most visitors to Lobster Lake arrive by boat, having traveled the lumber roads to the boat ramp at Lobster Stream near its confluence with the West Branch of the Penobscot River. It is a short boat ride or paddle upstream to Lobster Lake and many fine campsites (Figure 10) managed as part of the Penobscot River Corridor by the Maine Bureau of Parks and Lands.

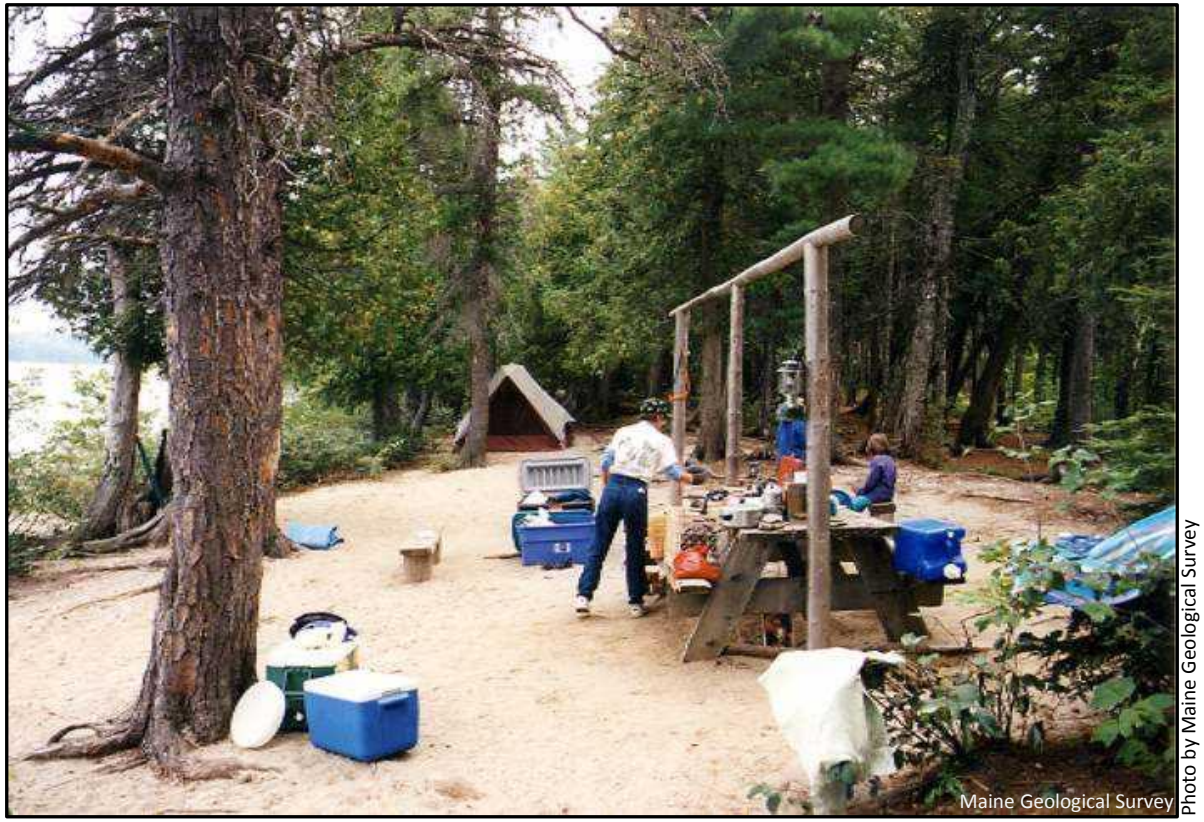

Photo by Maine Geological Survey

Figure 10. A typical canoe-accessible campsite on Lobster Lake.

Visiting Lobster Lake

More adventuresome travelers may arrange for drop of passengers, baggage, and canoes via float plane (Figure 11) from any of several services in Greenville.

Figure 11. DeHavilland Beaver DHC-2 with canoes strapped to the struts.

References and Additional Information

Simmons, R.H., 1987, Bedrock geology of portions of the North East Carry and Moosehead Lake quadrangles, Maine: Maine Geological Survey Open-File Report 87-22.

Boucot, A.J. and Heath, E. W., 1969, Geology of the Moose River and Roach River synclinoria, northwestern Maine: Maine Geological Survey Bulletin 21.