

Geologic Site of the Month
January, 2013

Marlboro Beach, Lamoine, Maine



44° 28' 16.29" N, 68° 16' 54.84" W

Text by
Thomas K. Weddle



Introduction

Marlboro Beach in the town of Lamoine has an interesting sequence of exposures of glacial and glacial marine deposits, as well as bedrock outcrops, best seen along the shoreline at low tide.



Photo by Thomas K. Weddle

Figure 1. Winter view of Mount Desert Island taken from Marlboro Beach, Lamoine, Maine.



Location

To get there, follow Route 1 east from Ellsworth, bear right on Route 184, turn left onto Route 204 and right on Raccoon Cove Road to the boat launch. A stroll along the beach from the Town Boat Launch site to Old Point at the eastern end of the beach provides an opportunity to view several different geological features (Figure 2).

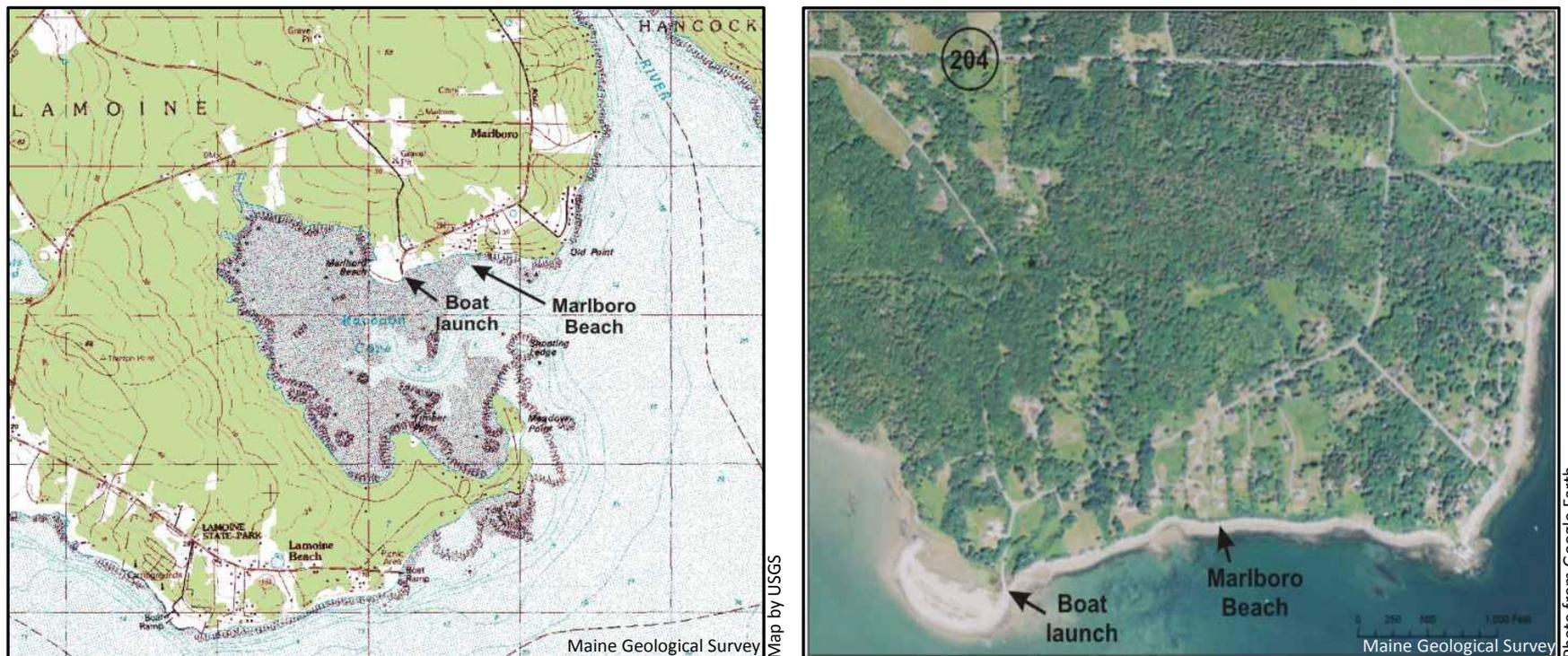


Figure 2. Topographic map of the area and a zoomed in aerial photo.

Marlboro Beach

One can access the western end of the beach from the boat launch area. There, one can see an erosional bluff exposure (Figure 3); photos also show change of summer and winter seasonal beach composition.



Photos by Thomas K. Weddle



Figure 3. Summer view from boat launch area toward the east showing eroded bluffs and sandy beach (Right).
Winter view from boat launch showing rocky beach (Left).

Erosion

Erosion and slumping of the bluff brings vegetation down (Figure 4).



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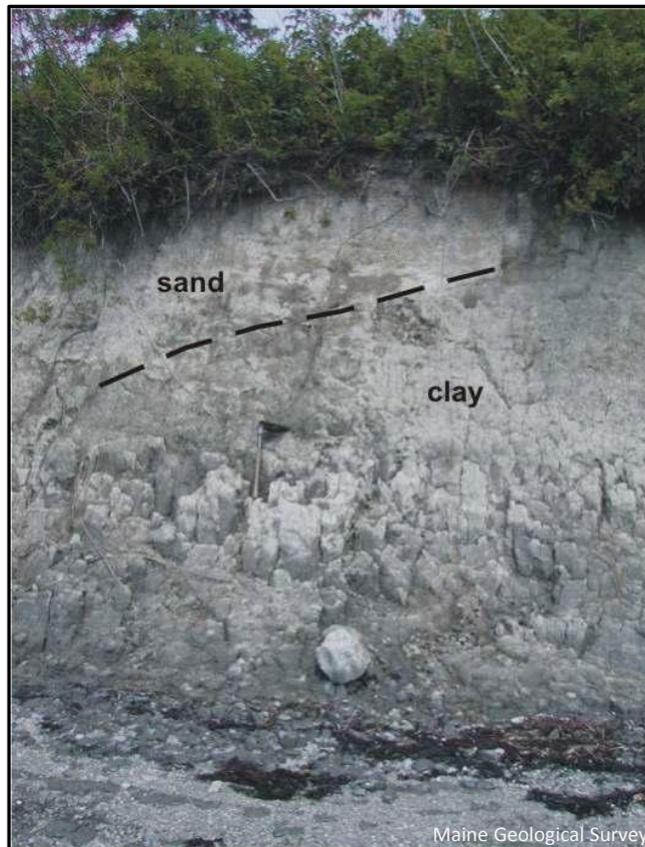


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Figure 4. Two views of erosional bluff exposure bringing vegetation down.

Glacial Marine Deposits

The eroded bluff records sandy stratified glacial marine deposits overlying glacial marine clay (Figure 5-Figure 6).



Photos by Thomas K. Weddle

Figure 5. Overview of exposure of sandy deposits overlying clay (Left). Shovel points to the contact between upper sand and lower clay (Right).

Glacial Marine Deposits

The clay was deposited into the ocean during the end of the last ice age. As the glacier melted away from the region, the land began to rise due to the loss of the ice mass. As the land rose, it eventually came through the ocean surface and currents there winnowed the glacial deposits leaving the sandy deposits as a relict shoreline.



Photo by Thomas K. Weddle

Figure 6. Close-up of stratified sandy deposits overlying the clay.



Ellsworth Schist

Continuing along the modern shore, you will encounter an outcrop of bedrock that has several interesting aspects. The outcrop is made up of two different rock types, where one rock type cuts across the other (Figure 7). Here in Lamoine, the most common local bedrock belongs to a unit called the Ellsworth Schist (or Ellsworth Formation). The darker rock cutting the Ellsworth Schist is an intrusive dike that formed later than the Ellsworth Schist.



Figure 7. The shovel handle in the photo is lying against the rock surface where the sculpted features can be seen.

Cusate Surfaces

There are other features found on this outcrop that are related to the last glacial period. When the great ice sheet was here, streams issued from drainage channels within and beneath the ice. These streams, especially those that flowed beneath the ice, may have been laden with sediment. A closer look from a different perspective (Figure 8) shows what appear to be a series of cusate surfaces. Some geologists interpret these cusate erosional surfaces to be the product of water charged with sediment flowing under great hydraulic pressure over the bedrock beneath the ice and carving into the rock surface.



Photo by Thomas K. Weddle

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Figure 8. A closer look shows what appear to be a series of cusate surfaces.



Ellsworth Schist

The final part of the walk along the beach brings us to a large outcrop of the Ellsworth Schist. The view in Figure 9 is toward Old Point taken from Meadow Point across Raccoon Cove; the island in the foreground is Shooting Ledge (see below for more information on this feature).



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Figure 9. View toward Old Point taken from Meadow Point across Raccoon Cove.



Evidence of Glaciers

From a distance, the author first thought the gray bluff was glacial marine clay. This rock exposure is quite steep and it should not be climbed, although exposure at the base of the outcrop may be examined (Figure 10).



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Figure 10. Steep rock exposure at Old Point.



Evidence of Glaciers

Beyond the large bedrock slope, flat bedrock surfaces that have glacial grooves and striations that range from 130 to 137 degrees may be seen (Figure 11, Figure 12).

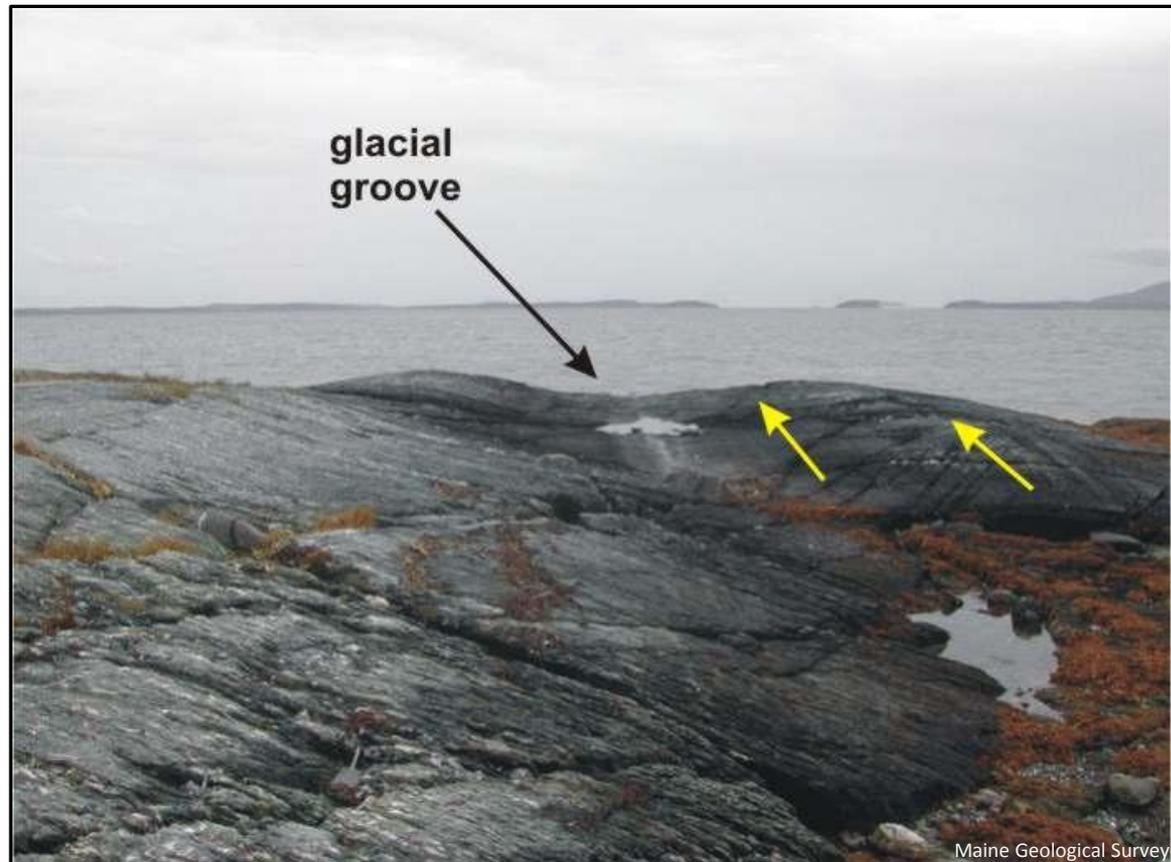


Figure 11. Broad groove formed by the glacier. Yellow lines are parallel to ice-flow direction as shown by striations within the groove.

Evidence of Glaciers

Photo by Thomas K. Weddle

Figure 12. Photo showing at least two ice-flow directions (shown by yellow lines). The water-filled feature is a crescentic gouge. It was formed where a boulder at the base of the glacier gouged the bedrock surface and indicates a unique ice flow direction toward the viewer (to the south-east). Chatter marks were formed in a similar way.

Shooting Ledge

The ledge exposure named Shooting Ledge at the entrance to Raccoon Cove piqued the interest of the author; why Shooting Ledge? The first thought offered by a colleague was that it might be a smaller feature like Thunder Hole in Acadia National Park, where incoming waves crash into a crevice in the bedrock coast and forces the air and water to shoot up into the air intermittently. Geological terms for these features include spouting horn, blow-hole, blowing cave, spouter, and puffing hole.

A second guess was whether it had been used for target practice by the military (MGS Field Locality: [Reid State Park](#)). A call to the Lamoine Town Office inquiring about the Shooting Ledge added to the mysterious name when the author was told that it is also known as Shooter's Ledge, so-called because it was where the duck hunters would set up blinds and shoot ducks as they flew in toward the cove. There was no knowledge of it ever having been an area for military target practice, or that there is a spouting horn there.



References and Additional Information

Reusch, Douglas N., 2003, Bedrock geology of the Salsbury Cove quadrangle, Maine : Maine Geological Survey, Open-File Map 03-91, scale 1:24,000 ([map - 1.5 Mb pdf format](#)).

Reusch, Douglas N., 2003, Bedrock geology of the mainland portion of the Newbury Neck and Salsbury Cove 7.5-minute quadrangles: Maine Geological Survey, Open-File Report 03-92, 14 p. report, 22 figs ([1.6 Mb pdf format](#)).

Weddle, Thomas K., 2012, Surficial geology of the Salsbury Cove quadrangle, Maine: Maine Geological Survey, Open-File Map 12-8, scale 1:24,000 ([2.0 Mb pdf format](#)).

