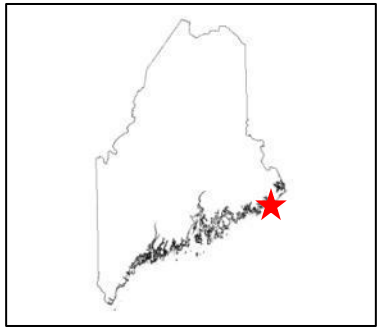
Geologic Site of the Month

June, 2010

Hiking the Bold Coast, Cutler, Maine



44° 39‘ 36.34“ N, 67° 12‘ 46.99“ W

Text by
Robert A. Johnston

Introduction

The Bold Coast is a scenic natural area of spruce-fir forest, peat bogs, dynamic rocky cliffs, and cobble beaches fronting the Bay of Fundy in eastern Washington County, Maine

Map from USGS

Figure 1. A section of the U. S. Geological Survey Cutler 7.5' topographic map, showing the Cutler Coast area.

The Bold Coast

Located in the town of Cutler, approximately 10 miles east of Machias along Route 191, the area is part of the Cutler Coast Public Reserved Land. The reserved lands are owned by the State of Maine and were purchased in 1989 through a grant from the Land for Maine's Future Program. Additional acreage was added in 1997, bringing the total acreage to over 12,000 acres.

On the property are hiking and ATV trails and a small camping area along the coast. Hunting is allowed in season. There are just over eight miles of hiking trails on the coastal side of Maine Route 191 (see Maine Bureau of Parks and Lands trail map). The coastal section is the topic of this web site of the month.

Charles T. Jackson, Maine's first state geologist, visited the Cutler area during his survey of the State of Maine in 1837 and reported "enormous cliffs of greenstone trap." These "trap rocks" were also noted by geologist Charles Hitchcock (1861) in his survey of the area. Later studies by both American and Canadian geologists identified these rocks as diabase (a dark-colored intrusive rock) and also examined the older shales, argillites, siltstones, and feldspar-rich tuff breccias in the area. Detailed mapping of the Cutler area was undertaken in the late 1950's by Olcott Gates.

His research resulted in a Maine Geological Survey publication entitled *The Geology of the Cutler and Moose River Quadrangles, Washington County, Maine* (1961) and has provided us with the best description of the rock types in the region.

Cutler Diabase

The Cutler diabase, the most common rock type along the Cutler Coast hiking trails, strongly influences the local landscape. During the last Ice Age, glaciers covered the land surface. Glacial erosion smoothed the diabase hills on the northwestern, up-ice, side and plucked rock away from the southeastern side. This resulted in a gentle slope on one side and a steep cliff on the other. Note the rounded hills on the U. S. Geological Survey topographic map (Figure 1) and in the field (Figure 2).

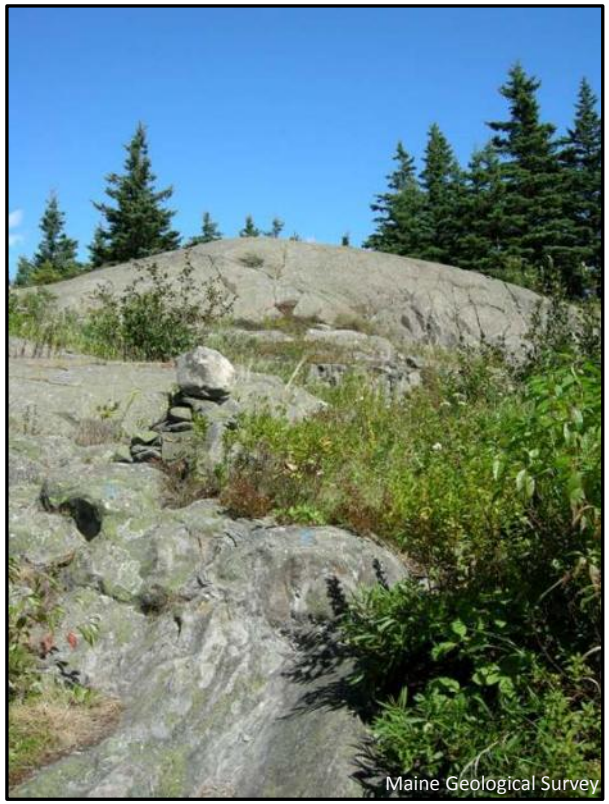


Photo by Robert A. Johnston

Figure 2. Outcrop of Cutler diabase smoothed by glacial erosion in the woods by the Coastal Trail at Cutler Coast.

Glacial Erosion

Additional evidence of glacial erosion is present as glacial grooves on the rock, such as those seen just north of Black Point (Figure 3).

Photo by Robert A. Johnston

Figure 3. Cutler diabase along the shore near Black Point showing glacial grooves (parallel to the arrow), and smoothing of the rock surface due to glacial erosion.

Cutler Diabase Joints

Fractures in the rock, called joints, are visible in many outcrops (Figure 4).

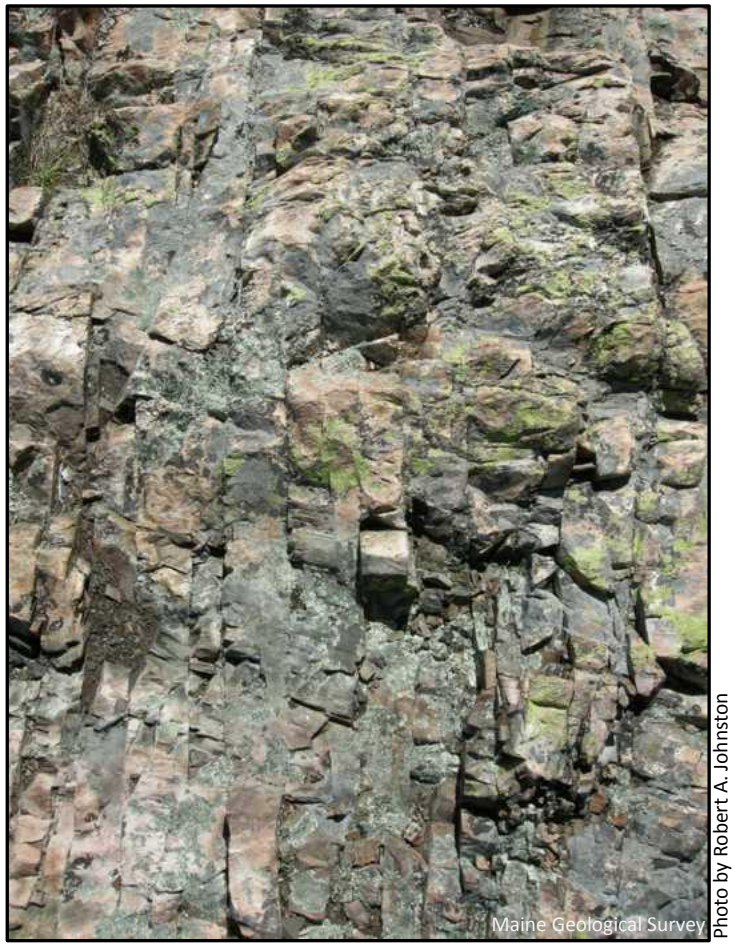


Photo by Robert A. Johnston

Figure 4. Vertical joints can be seen in this close-up of the Cutler diabase.

Cutler Diabase Joints

The joint pattern in the rock, when exposed to water, frost action, and waves at the ocean edge, controls the style of modern erosion, resulting in steep cliffs (Figure 5, Figure 11).

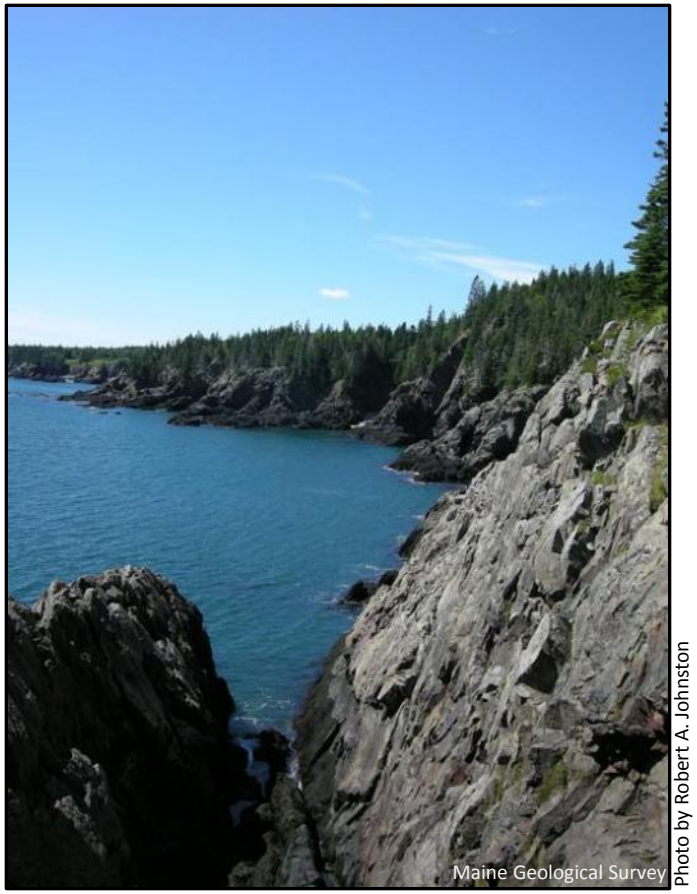


Photo by Robert A. Johnston

Figure 5. View south from the first ocean viewpoint at the Cutler Coast Public Reserved Land.

The Fundian Fault

A number of regional structural features influence the coastline shape in the Cutler area. Perhaps the most prominent, just offshore of the Cutler Coast, is the Fundian fault which parallels the coastline from Machias to Lubec (Gates, 1982). It passes between West Quoddy Head and Grand Manan Island in Canada (Figure 6). Johnson (1925) and Koons (1941) noted that the Fundian fault may be the border fault between the Triassic rocks of the Bay of Fundy and the Silurian-aged rocks of the Cutler coastline.

Photo by Robert A. Johnston

Figure 6. Looking northeast across the Bay of Fundy to Grand Manan Island (Canada).

Pocket Cobble Beaches

Pocket cobble beaches form from modern erosion of both the bedrock and exposed glacial deposits (Figure 7). The Cutler Coast shoreline, facing the open ocean, is a high energy environment, as reflected by the large size of the cobbles and boulders on the beaches.

Photo by Robert A. Johnston

Figure 7. The view south along the Coastal Trail showing two pocket beaches.

Pocket Cobble Beaches

Only very large waves crashing on the shore could have moved some of the large rounded cobbles and boulders up the beach at Black Point Cove (Figure 8).

Photo by Robert A. Johnston

Figure 8. Cobble beach at Black Point Cove (note the size of the cobbles).

Pocket Cobble Beaches

The waves move the cobbles and pebbles, grinding them together, polishing their surfaces, and rounding their edges (Figure 9).

Photo by Robert A. Johnston

Figure 9. Polish on the pebbles and cobbles found on one of the pocket beaches at Cutler Coast.

The Coastal Trail

Hiking trails begin on the right side of Maine Route 191, about three miles northeast of Cutler. Refer to the trail map produced by the Maine Bureau of Parks and Lands for detailed hiking distances. It is a 1.4 mile walk along on the Coastal Trail to reach the first viewpoint, overlooking the Grand Manan Channel and Bay of Fundy (Figure 5, Figure 10 and Figure 11).

Photo by Robert A. Johnston

Figure 10. View north across Holmes Bay from the first ocean viewpoint at the Cutler Coast Public Reserved Land.

The Coastal Trail

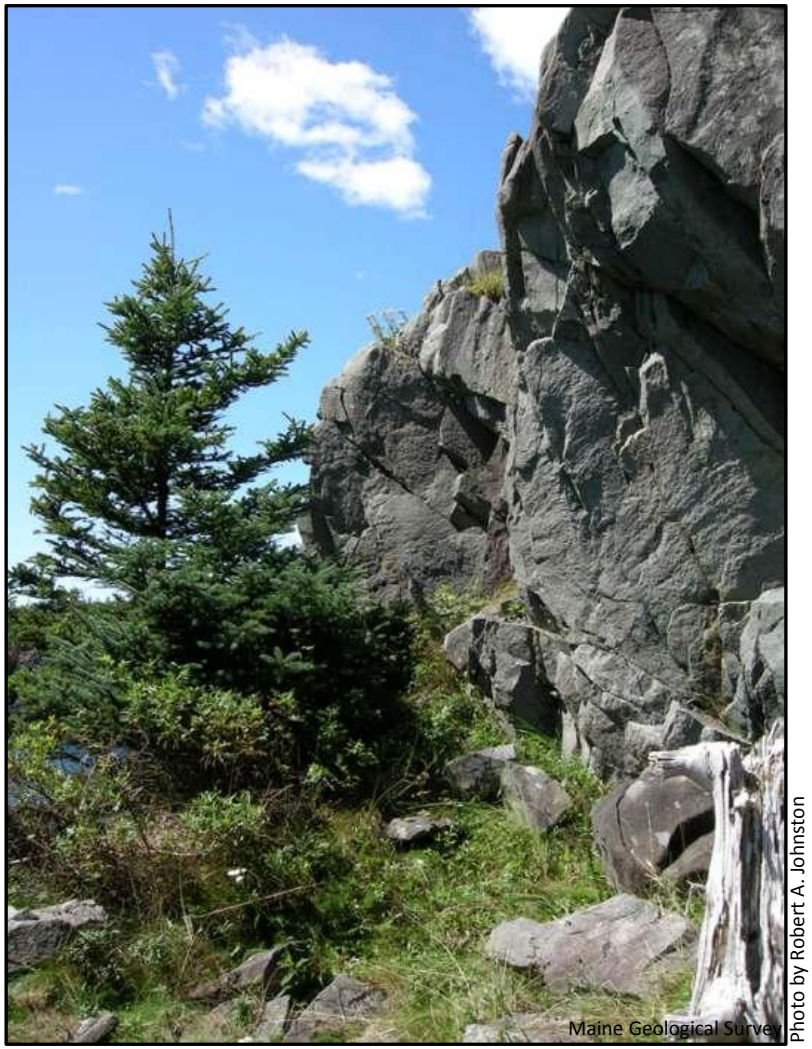


Photo by Robert A. Johnston

Figure 11. Steep cliff with visible jointing in the Cutler diabase.

The Coastal Trail

This walk is through a maritime spruce-fir forest (Figure 12; Gawler and Cutko, 2010).

Photo by Robert A. Johnston

Figure 12. A walk along the Coastal Trail leading to the ocean through the maritime spruce-fir forest.

The Coastal Trail

From this first viewpoint the Coastal Trail heads southwest 1.4 miles to Black Point Cove and its cobble and boulder beach(Figure 8). Most hikers will return to the parking lot from Black Point by way of the Black Point Brook Cutoff and Inland Trail (2.7 miles from Black Point) (Figure 13).

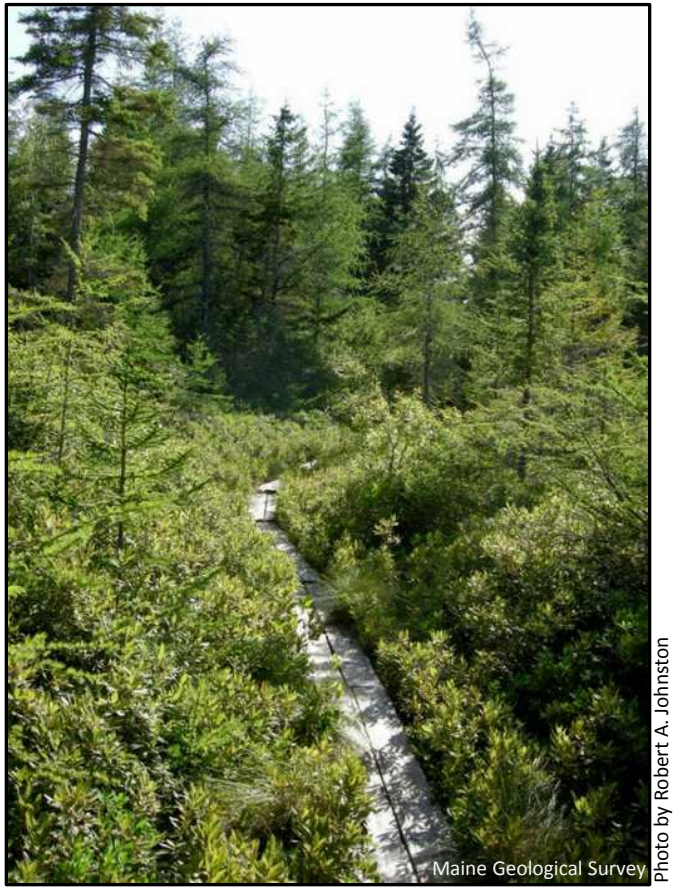


Photo by Robert A. Johnston

Figure 13. Boardwalk through a peat bog on the Inland Trail at Cutler Coast Public Reserved Land.

The Coastal Trail

From Black Point one can continue southwest along the Coastal Trail to the Fairy Head campsites and then return back to the parking lot by way of the Inland Trail (6.3 miles). Just south of Black Point Cove is another pocket beach, this one a lower energy beach with smaller pebbles and cobbles (Figure 14).

Photo by Robert A. Johnston

Figure 14. Pocket beach south of Black Point along the Coastal Trail.

The Coastal Trail

Three small tentsites are located at Fairy Head, all offering beautiful views of the rocky Maine coast (Figure 15 and Figure 16).

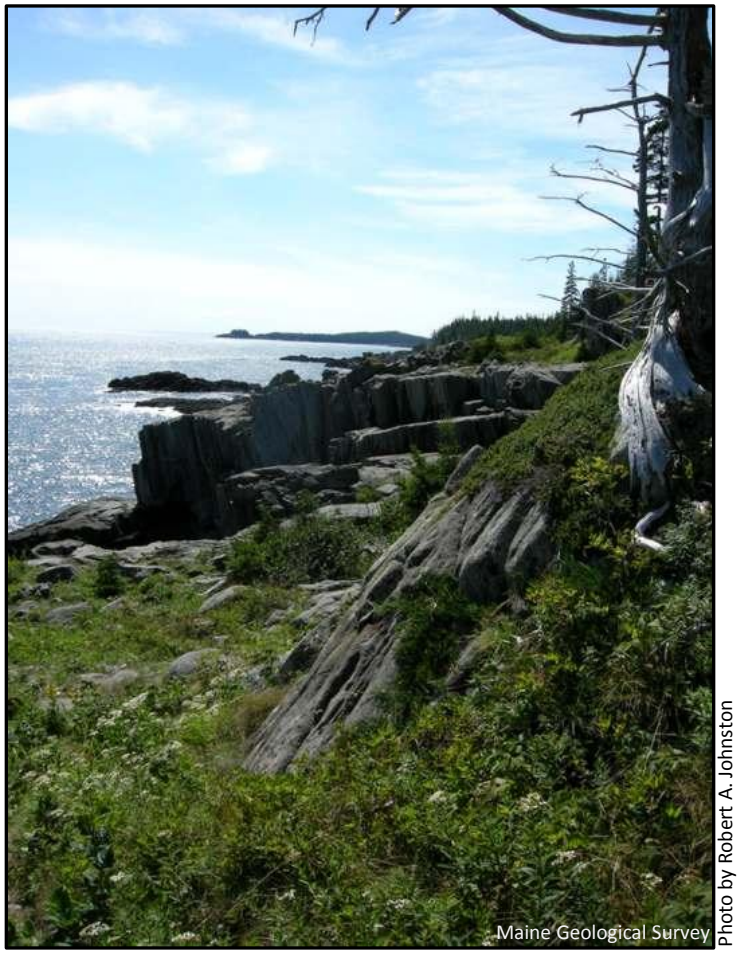


Photo by Robert A. Johnston

Figure 15. Looking south from near Fairy Head on the Coastal Trail. Little River Lighthouse is visible in the distance.

The Coastal Trail

Photo by Robert A. Johnston

Figure 16. Coastal Trail near Fairy Head. Grand Manan Island is on the horizon.

Cutler Coast Public Reserved Land

One of the most spectacular sections of the Maine coastline is found in the Cutler Coast Public Reserved Land. This unspoiled landscape can readily be experienced after some moderate hiking (Figure 17) and is a great place to enjoy some of Maine's interesting flora, fauna, and geology.

Photo by Robert A. Johnston

Figure 17. Rocky cliffs with a pocket beach on the Cutler Coast Public Reserved Land, Washington County, Maine.

References and Additional Information

Gates, O., 1961, The geology of the Cutler and Moose River quadrangles, Washington County, Maine: Maine Geological Survey, Quadrangle Mapping Series No. 1, 67 p., map.

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