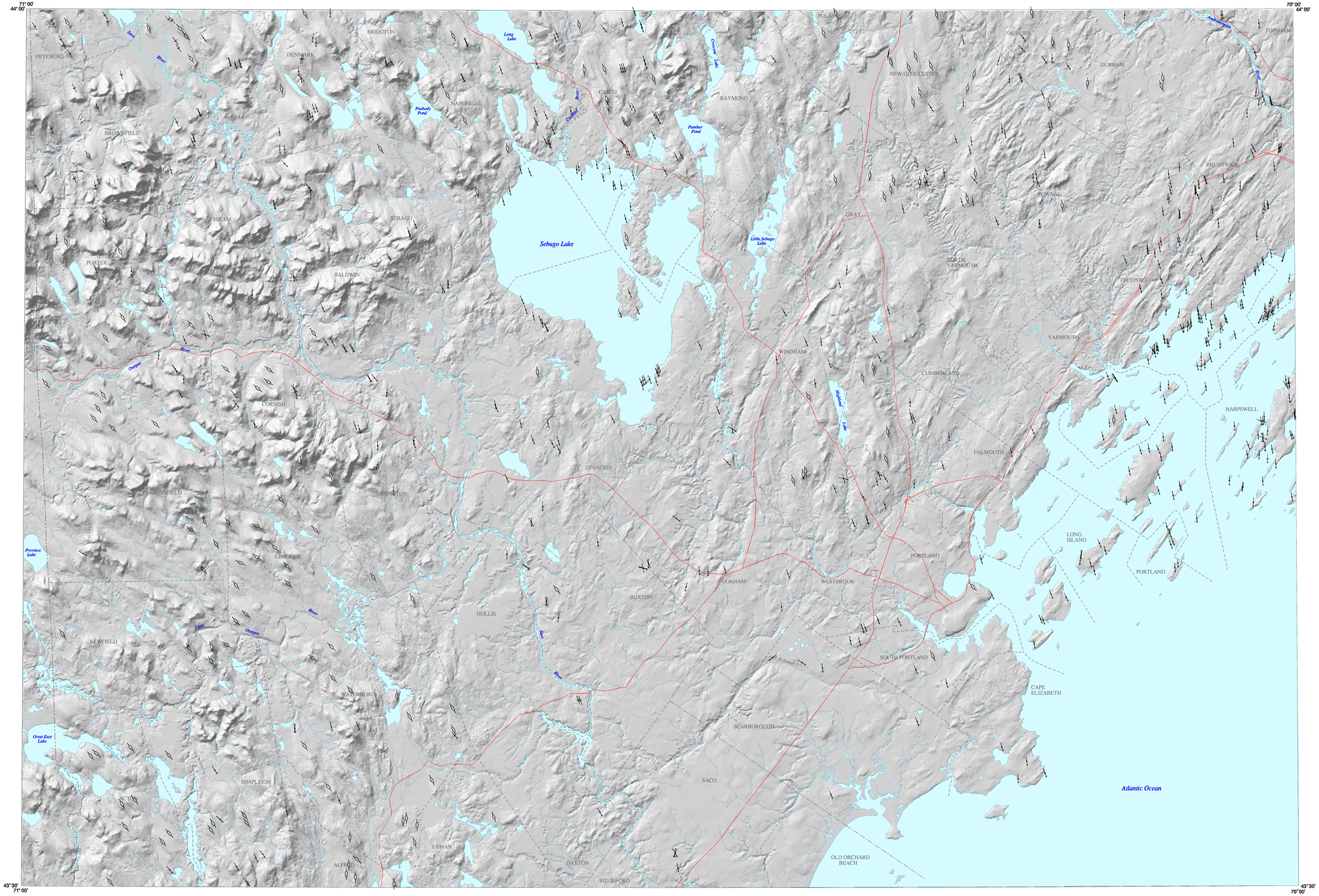
Glacial Ice-Flow Indicators in the Portland 1:100,000 Quadrangle, Maine



Shaded relief base by Marc C. Loiselle using a digital elevation model with a 10-meter grid, sun angle of 315°, and sun elevation of 45°.

Miles (mi)
0 1 2 3 4 5 6 7 8 9 10 11 12

Map Scale
1:100,000

Quadrangle Location

Kilometers (km)
0 2 4 6 8 10 12 14 16 18 20

National geodetic vertical datum of 1929.

Portland Quadrangle, Maine

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Figure 1. This bedrock outcrop in a Saco gravel pit records three successive flow directions of glacial ice. The shallow trough in the background preserves the oldest set of striations, indicating ice flow to the southeast. A later flow moved toward the south (recorded by striations in lower-right part of photo), followed by the youngest flow to the south-southwest (lower left). The arrows mark these sets of striations and directions of ice flow.

Figure 2. Rubbing a pencil across a glacially polished bedrock surface often reveals glacial striations that are otherwise hard to see. This photo is a view looking down on a granite ledge in Norway, Maine. The striations seen here could indicate ice flow in either of two possible directions, but from other geological evidence in the region we can infer the flow direction shown by the arrow.

Figure 3. This glacially streamlined till ridge is seen from Route 156 in Jay, Maine. It is oriented parallel to the former ice flow, which was toward the south-southeast. Many such till ridges that slope in the same direction that the ice flowed were built out from the south ("down-glacier") sides of bedrock hills. Their smooth terrain, favorable soils, good drainage, and southern exposures make them well suited for fields and orchards.

Figure 4. Large-scale glacial striations (grooves) are readily apparent on the wet surface of this ledge next to Route 27 in Kingfield. The direction of ice flow was from right to left (southward along the Carrabassett River valley).

Figure 5. Most glacial striations do not provide a definitive ice-flow direction. They yield two possibilities and geologists rely on other evidence, such as the glacial transport direction of rocks from a known source, to infer the true ice-flow direction. In central and southern Maine it is usually safe to assume that if striations have a NW-SE orientation, for example, the ice flowed toward the southeast. Occasionally we find a type of glacial erosion feature called "crag and tail," as seen on this basalt ledge on Roque Island. Here we can be sure that the ice flowed from right to left, as shown by the tapering "tails" of rock on the protected down glacier sides of hard knobs on the ledge surface.

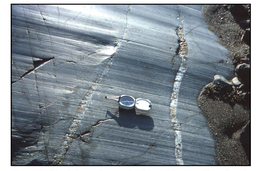

Figure 6. This ledge surface on the shore of Carrying Place Cove in Lubec was very well striated and polished by glacial abrasion. The orientation of the small concavity with a steeper side and striations streaming out from it (upper left) indicates ice flow from right to left.

Figure 7. View northeast across McWain Pond to McWain Hill in Waterford, Maine. The long cleared area on the hill is a good example of a till "ramp." Glacial ice flowed south-southeast and plastered till against the bedrock summit of the hill. This process also streamlined the till ridge and elongated it in the direction of flow.

EXPLANATION OF SYMBOLS

Glacially streamlined hill. Symbol shows trend of long axis of hill, which is parallel to former ice flow direction.

Fluted till surface. Symbol shows axis of narrow till ridge oriented parallel to glacial ice flow. Arrowhead indicates flow direction.

Striation locality. Arrow shows direction of glacial flow inferred from striations or grooves on bedrock, which locally may be associated with crescentic fractures or other types of glacial erosion features. Dot marks point of observation. Flagged direction is older. In rare cases where three flow directions are recorded, oldest trend is marked by two flags.

Road — State boundary
Town boundary — PORTLAND Township name
County boundary

RELATED MAPS

Tolman, S. S. (compiler), 2006, Deglaciation features in the Portland 1:100,000 quadrangle, Maine: Maine Geological Survey, Open-File Map 06-5.

Tolman, S. S. (compiler), 2006, Surficial geology of the Portland 1:100,000 quadrangle, Maine: Maine Geological Survey, Open-File Map 06-1.

INDEX TO SOURCES OF GEOLOGIC MAP DATA

1:24,000 Surficial geologic quadrangle maps, authors, and Maine Geological Survey Open-File numbers. In some areas the original map data have been supplemented with more recent observations.

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