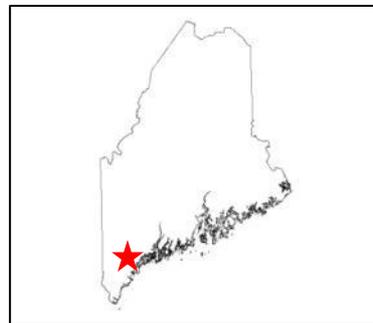


Geologic Site of the Month  
May, 2014

***The Great Landslide of 1868, Westbrook, Maine***



43° 41' 27.8" N, 70° 20' 51.4" W

Text by  
Stephen M. Dickson



## Introduction

The Town of Westbrook was incorporated in 1814 and the City of Westbrook was incorporated in 1891. During that period of population growth, electrical generation, and industrial expansion, the Town of Westbrook experienced the largest documented landslide in Maine history.

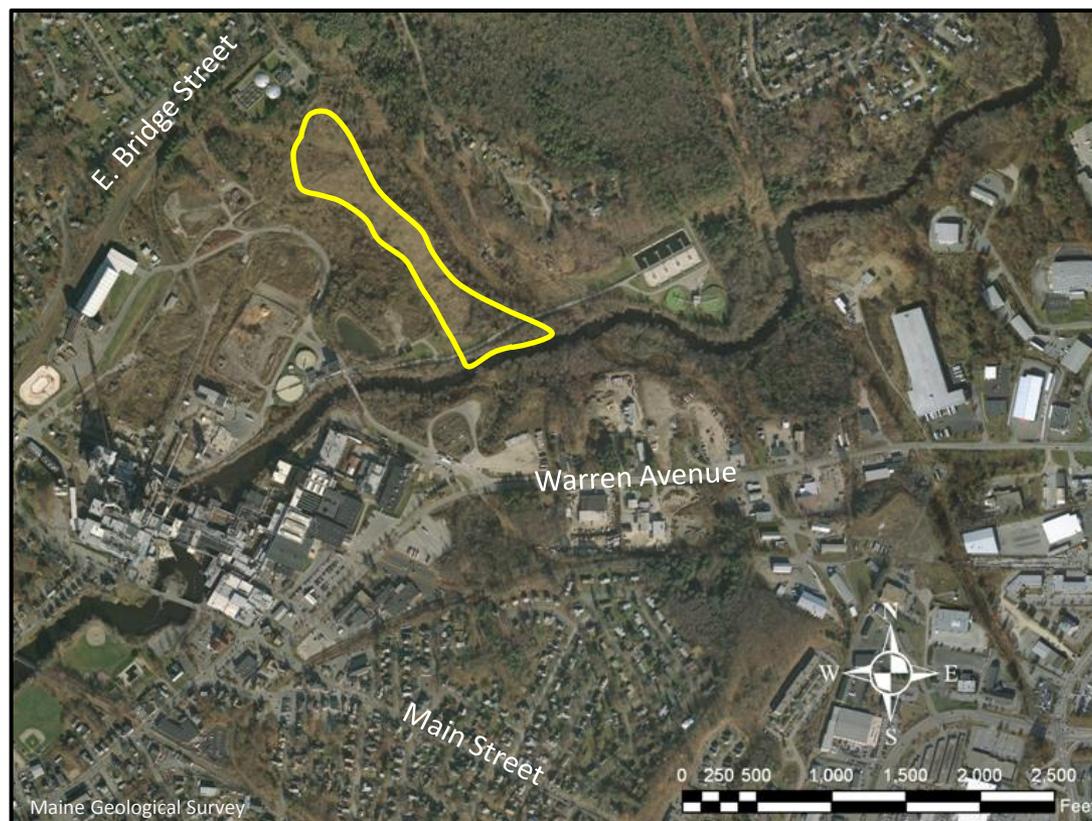


Image courtesy of MEGIS.

**Figure 1.** Map of Westbrook, Maine showing the general location of the 1868 landslide outlined in yellow on a 2009 air photo.



### Accounts of a Flowslide in Westbrook

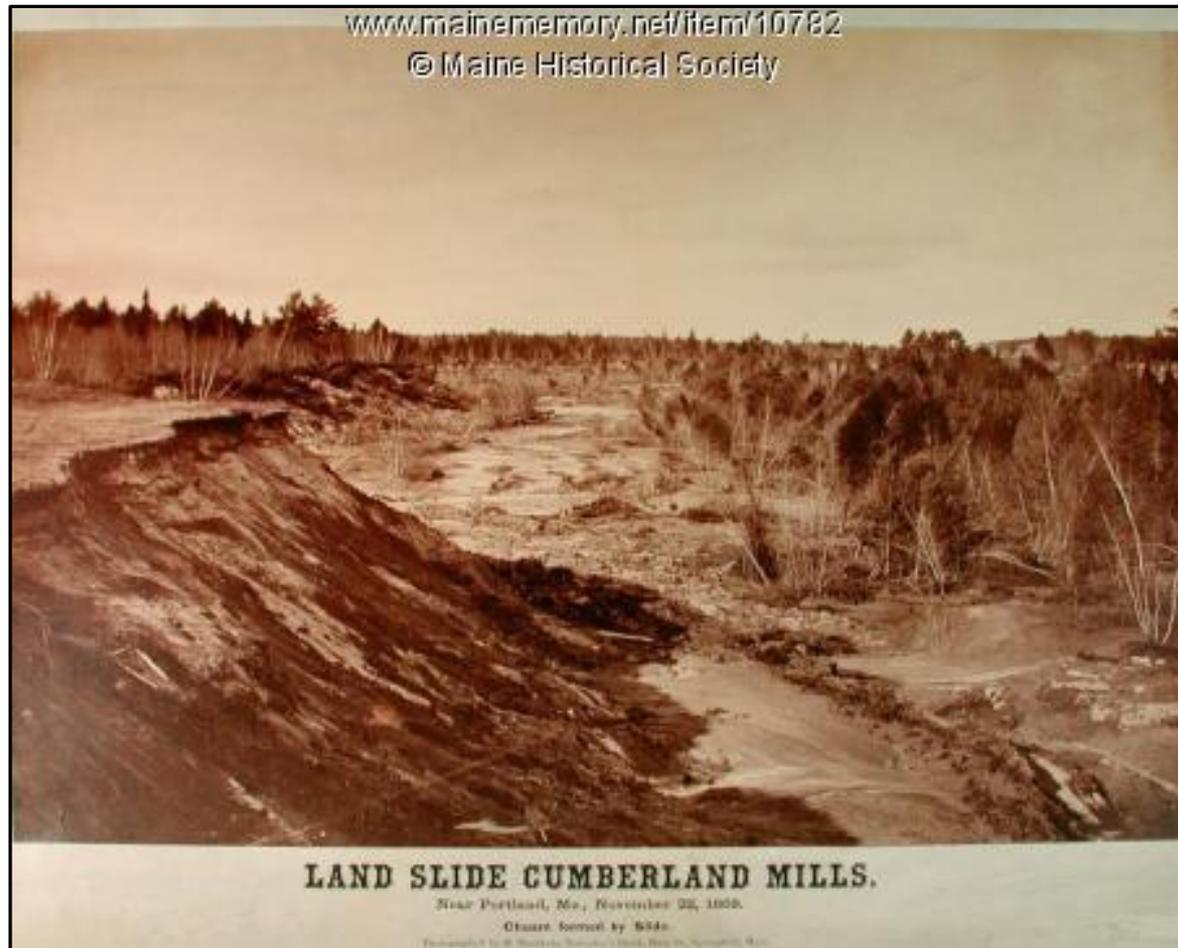
According to Edward S. Morse in the Proceedings of Boston Society of Natural History in 1869, the Town of Westbrook experienced a landslide on the night of November 22, 1868. The earth movement displaced the ground over approximately 20 acres and Morse estimated that it spread over about 34 acres. Sediment from the landslide moved into the Presumpscot River, filled the 200-foot wide cross-section and spread over a half a mile along the river's course. The plug of sediment acted as a dam across the river. Upstream water levels rose about 15 feet and caused flooding in the nearby paper mill and idled about 300 workers. A team of about 150 people manually excavated a new channel for the Presumpscot River to alleviate flooding.

John E. Warren (c.a. 1954 and quoted in Devin and Sandford, 1990) described the adjacent embankments in the slide area as rising 45 feet high. He estimated about 800,000 cubic yards were displaced in an hour or two leaving a valley 1,500 feet long and 600 feet wide.

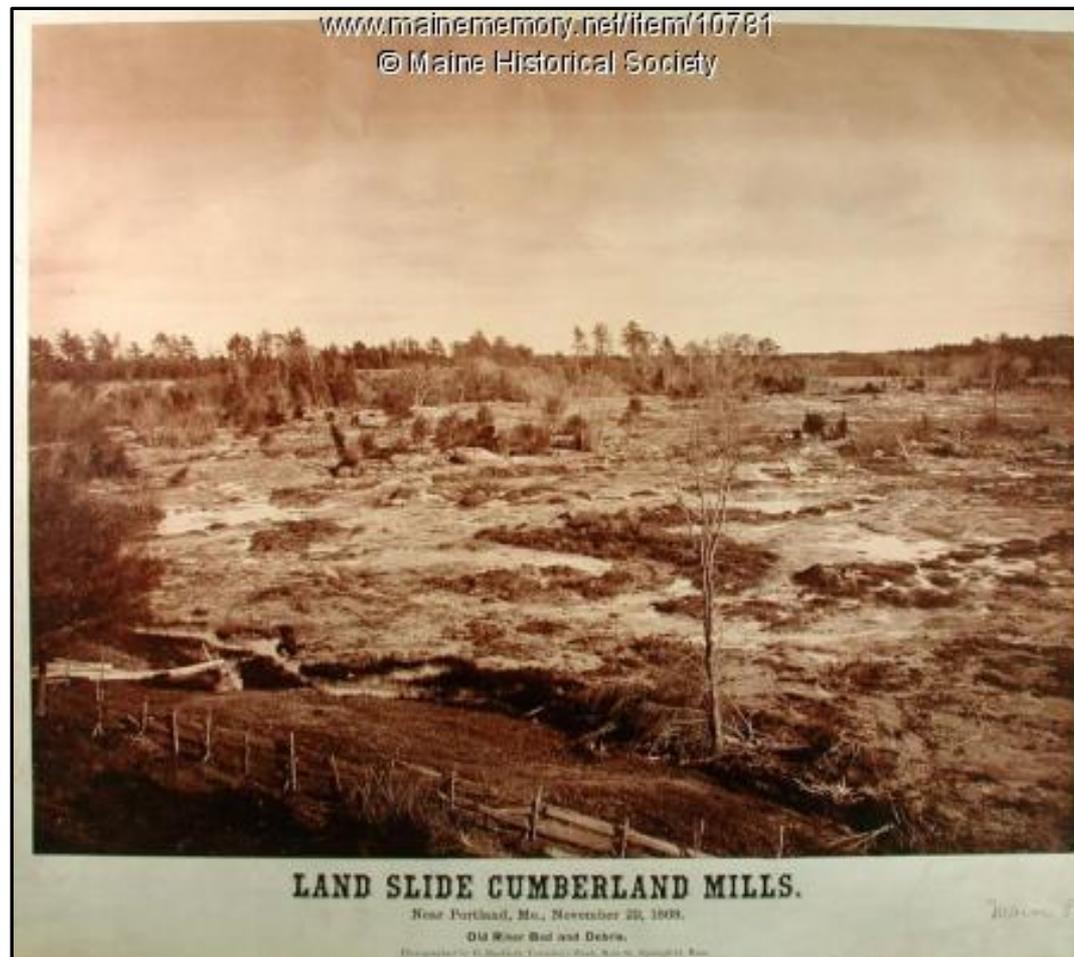
Geotechnical investigation by Steven C. Devin and Thomas C. Sandford (1990) examined the thickness and strength of the Presumpscot Formation clay in an adjacent area that did not experience the landslide. Their report (available from the Maine Geological Survey) found soft clay in places to a depth of over 100 feet. The softness of the clay may be representative of the "ponded" facies of the Presumpscot Formation (GM-P; Belknap and Shipp, 1991) and of such low strength that it becomes a viscous fluid that "flows" rather than fails as discrete blocks of the firmer "draped" facies (GM-D). Thompson (2008) mapped the extent of the Presumpscot Formation in Westbrook and Portland.

Firmer clays produce a retrogressive failure such as those along the north shore of Rockland Harbor in 1973 and 1996 (Berry et al., 1996). For a variety of landslide examples, please see the Maine Geological Survey (2010) web site.



Historical Record

**Figure 2.** A photograph from November 22, 1868 looking north into the Westbrook landslide from above a steep embankment. This shows the sidewall relief of the landslide. The lower slide zone has blocks of land with trees that tilt away from the camera. The flow direction was toward the bottom of the picture. (See Buccholz, 1968.)

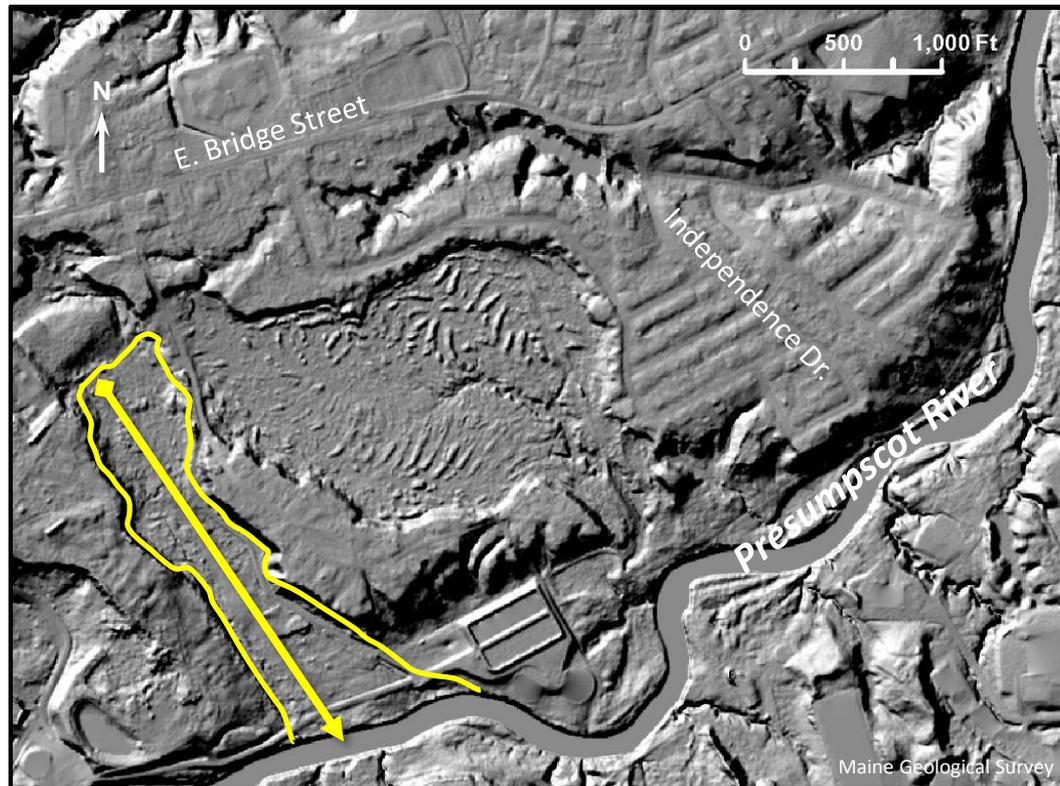
Historical Record (continued)

**Figure 3.** A November 22, 1868 photograph presumably looking south toward the Presumpscot River in the distance. This shows a view down into the landslide. The slide zone has hummocky topography and discrete blocks of intact vegetation. The flow direction is thought to have been toward the top right corner of the picture. (Buccholz, 1968.)



### The Westbrook Landscape

The 1868 landslide moved south southeast into the Presumpscot River. The river, seen at the bottom of the shaded-relief map, flows west to east (left to right). At the time of the landslide, sediment crossed the river and created a dam with water impounded upstream.



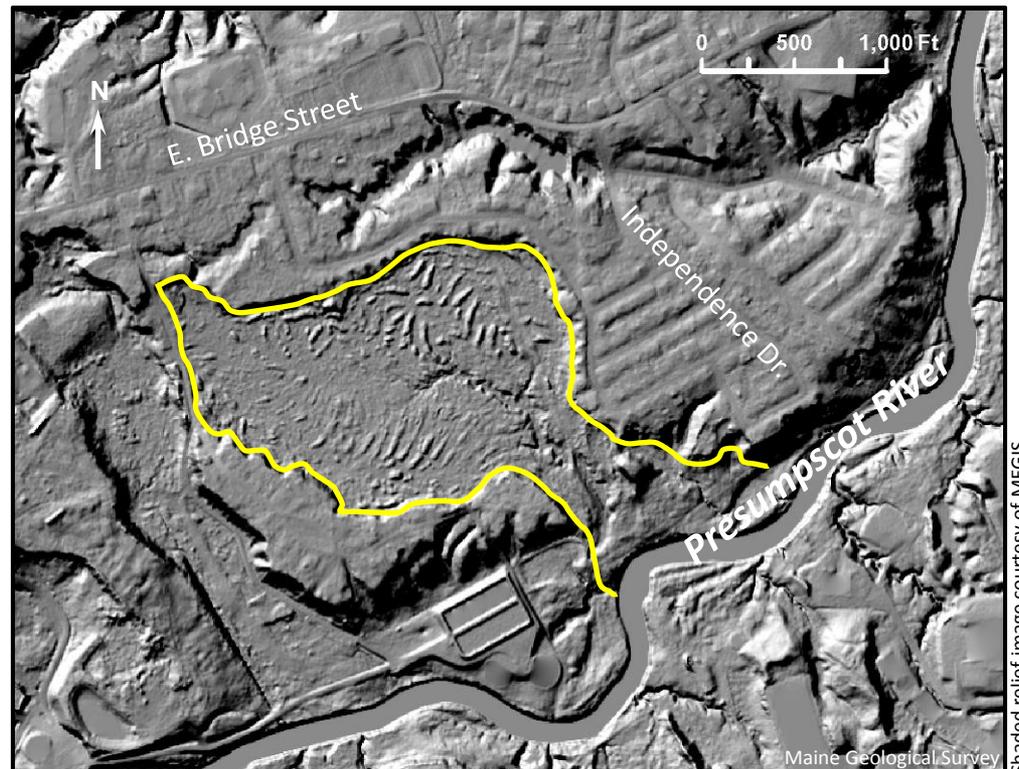
Shaded relief image courtesy of MEGIS

**Figure 4.** The location and flow direction of the 1868 landslide is shown by the yellow line and arrow. This image has exaggerated vertical relief and illumination from the northwest to illustrate the landscape without buildings and vegetation. Topographic relief was imaged by airborne laser (LiDAR) in 2010.



### Remnants of a Larger Landslide

East of the 1868 landslide there is a forested area with large expanse of hummocky lowlands. This area has raised, en echelon ridges and troughs and a central, small, incised drainage channel that leads to the Presumpscot River. It appears to be the site of a former flowslide. There is no age control on this landform at present. However, Mr. C. B. Fuller reported to Morse (1869, p. 240) that there was "...a gorge below [downstream of] the one of 1868, which was evidently an old slide." This "Fuller Flowslide" most likely predates the 1868 landslide and possibly the Colonial Period.



**Figure 5.** The flowslide perimeter is outlined in yellow and estimated to be about 63 acres.

### Ground Views

This area is on private land and has very few distinctive features to see on the ground. Below are two ground-level images that are typical. They show very little relief or distinctive features that would indicate that a landslide had occurred in this area. Remote sensing imagery provides a much better view of the geology of this location and clues to its past.



Photo by D. B. Locke, 2014



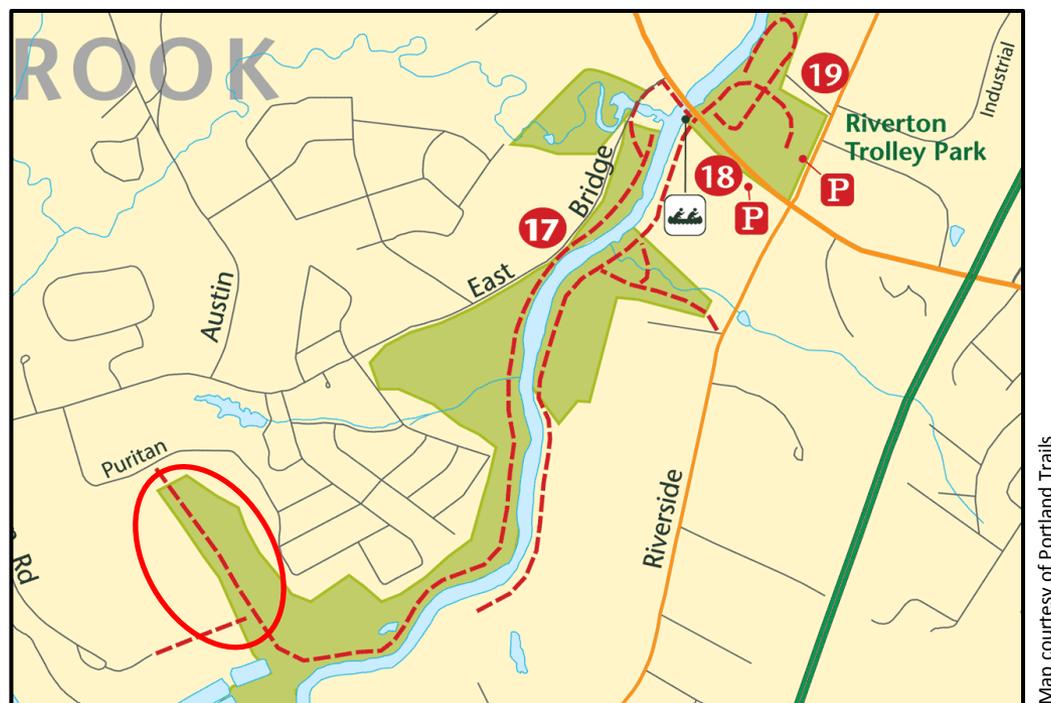
Photo by D. B. Locke, 2013

**Figure 6.** The left photo is looking toward the west bank of the 1868 landslide area from Hillside Road. The right photo is southwest of Independence Drive and north of the Presumpscot River, possibly over the remnants of the larger landslide and east of the 1868 landslide.



### Directions

The area of the former landslide site is accessible through the Portland Trails network. Use the Forest Avenue (Route 302) bridge to cross the Presumpscot River to East Bridge Street for access to the [Presumpscot Trail](#) about a tenth of a mile southwest of Forest Avenue. There is a Greater Portland Transit District METRO bus route along Forest Avenue and parking at Riverside Street. This area is populated by deer and a popular bow hunting area in the fall.



**Figure 7.** Trail 17 leads southwest along the north bank of the Presumpscot River and turns northwest into the former landslide site (Figure 5) just south of Puritan Drive. The red oval shows the approximate location of the large landslide site.



### References and Additional Information

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