

Prepared in cooperation with the Northeast States Emergency Consortium

Earthquakes In and Near the Northeastern United States, 1638–1998

Map inside this Fact Sheet shows the regional pattern of earthquake distribution in and near the northeastern U.S.

A large-format version of the map (same title and date) contains additional information about northeastern earthquakes. To order, call 1-888 ASK USGS and inquire about Geologic Investigations Series I-2737.

Earthquakes occur on geologic faults. However, in nearly all parts of the northeastern U.S., we do not yet know how to tell which fault caused an individual earthquake. Geologic maps show faults that are exposed at the Earth's surface, and maps like this one show the locations of earthquakes, but there is no reliable map of "earthquake faults" for the northeastern U.S.

The most common way to measure an earthquake's size is its magnitude. There are many different magnitude scales, or ways to measure magnitude. Use of different scales can give slightly different values for the magnitude of the same earthquake. Therefore, your favorite earthquake might be shown here with a magnitude slightly different from what you have seen reported elsewhere.

The location of the earthquake's focus is uncertain, typically by several kilometers (miles) or more. Uncertainties are larger where seismo-

graphs (instruments that record earthquake shaking) are far apart, and for earthquakes that occurred before the development of seismographs. In fact, the latitudes and longitudes of some older earthquakes were so uncertain that they were rounded off to the nearest tenth or half a degree of longitude and latitude, or even to the nearest whole degree. Nonetheless, despite the uncertain earthquake locations, the map inside shows that most areas shown on the map have had earthquakes since European settlers arrived there. All areas shown on the map have been shaken by earthquakes.

Different areas were settled at different times, and these differences also affect the geographic distribution of known earthquakes. This is particularly true of earthquakes that occurred before the establishment of a network of seismographs throughout the northeastern U.S. during the 1970's. If an earthquake was too old, too small, or too remote to be recorded by a seismograph,

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1744



Old woodcut illustration showing contemporary account of damage to towns northeast of Boston, Massachusetts, during a magnitude 4.7 earthquake that occurred in 1744. Shaking was strongest about 20 kilometers (12 miles) northeast of the center of present-day Boston. (Reproduction of woodcut courtesy of the Rare Books Division, New York Public Library, Astor, Lenox, and Tilden Foundations.)

ABOUT THIS MAP

The map in this Fact Sheet and in USGS Geologic Investigations Series I-2737 was prepared for a general, nontechnical audience. Accordingly, it should not be used to assess earthquake hazard in small areas or at individual locations. The map does not show known explosions, mine collapses, sonic booms, or violent bursts caused by the expansion of frozen ground, all of which can be mistaken for earthquakes.

Magnitude 6.5

June 11, 1638, 2 p.m.

Central New Hampshire: The location and damage levels are very uncertain because settlements were sparse and reports were few. Shaking was felt strongly along the St. Lawrence River in Canada and in Boston, widely but less strongly across southern New England, and on ships near the coast. Aftershocks were felt for 20 days in eastern Massachusetts.

Magnitude 7.0

Feb. 5, 1663, 5:30 p.m.

Charlevoix, Québec: The largest earthquake known in the northeastern U.S. and nearby parts of Canada occurred in a seismically active area, about 100 km (60 mi) northwest of northern Maine. Shaking was reported to have lasted about 3 minutes and caused large landslides and sand blows. Six hundred km (375 mi) away in eastern Massachusetts, chimneys fell, pewter fell from shelves, and many people ran into the streets. The largest aftershocks of the next 3 days were felt in Boston. Aftershocks were felt in Québec for more than 7 months.

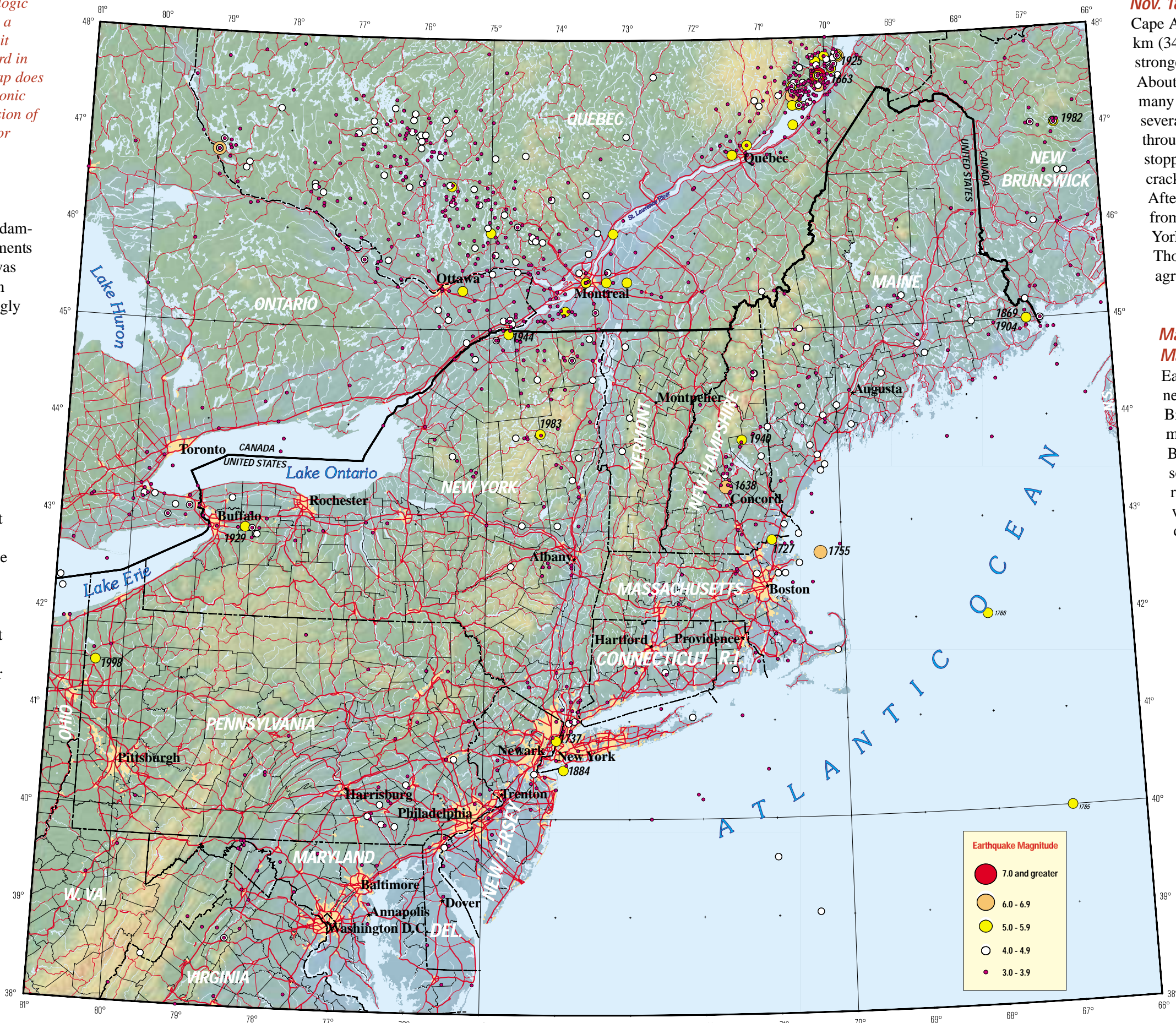
Magnitude 5.2

Dec. 18, 1737, 10:45 p.m.

New York City: Bells rang, and several chimneys fell. The earthquake was felt in Boston, Philadelphia, and northern Delaware.

Aug. 10, 1884, 2:07 p.m.

New York City: Chimneys and bricks fell and walls and plaster cracked in Connecticut, northern New Jersey, southern New York, and eastern Pennsylvania. The earthquake was felt from southern Maine to central Virginia, and westward to northeastern Ohio. Three strong shocks occurred; the second was the strongest. Slight aftershocks occurred on Aug. 11.



Magnitude 6.0

Nov. 18, 1755, 4:12 a.m.

Cape Ann, Massachusetts: At Boston, about 55 km (34 mi) southwest of Cape Ann, effects were strongest on infilled land near the wharves. About 100 chimneys were thrown down, and as many as 1,500 others were damaged. Walls of several brick buildings fell. Stone fences fell throughout the countryside. Springs formed or stopped. In eastern Massachusetts, ground cracks opened; some emitted sand and water. Aftershocks were reported. Shaking was felt from Nova Scotia to Maryland, and from New York State to a ship 320 km (200 mi) at sea. Those aboard the ship thought it had run aground.

Magnitude 5.9

Mar. 21, 1904, 1:04 a.m.

Easternmost Maine: Chimneys fell, in and near, two towns in Maine and one in New Brunswick. Shaking was felt throughout most of New England, Nova Scotia, New Brunswick, Prince Edward Island, and southeastern Québec. One foreshock was reported and more than 14 aftershocks were reported over the next two and a half days.

Magnitude 5.2

Sept. 25, 1998, 2:52 p.m.

Pymatuning Reservoir, Pennsylvania: The area in northwestern Pennsylvania where the earthquake was centered is mostly rural with many small towns. The shaking and an explosion-like noise drove many people outdoors. One person was thrown down and injured. A factory lost power when its transformer was damaged. Some chimneys cracked or lost bricks and a few fell. Some walls and windows cracked. Plaster fell. In an empty elementary school, ceiling tiles fell and windows broke. Many items fell from shelves in homes and stores. More than 100 residential water wells lost water and many of them had to be deepened. Shaking was felt in western New York State and Pennsylvania, northeastern Ohio, eastern Michigan, and southwestern Ontario. Several small aftershocks occurred.

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then we are likely to know about it only if it was felt or caused damage, and if it was reported in newspapers, diaries, or other written records. This may be the reason why earthquakes that are known from 1638 to 1937 are most numerous in long-settled coastal areas, whereas earthquakes since 1975 are more evenly distributed across the northeastern U.S., including in inland areas.

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1940

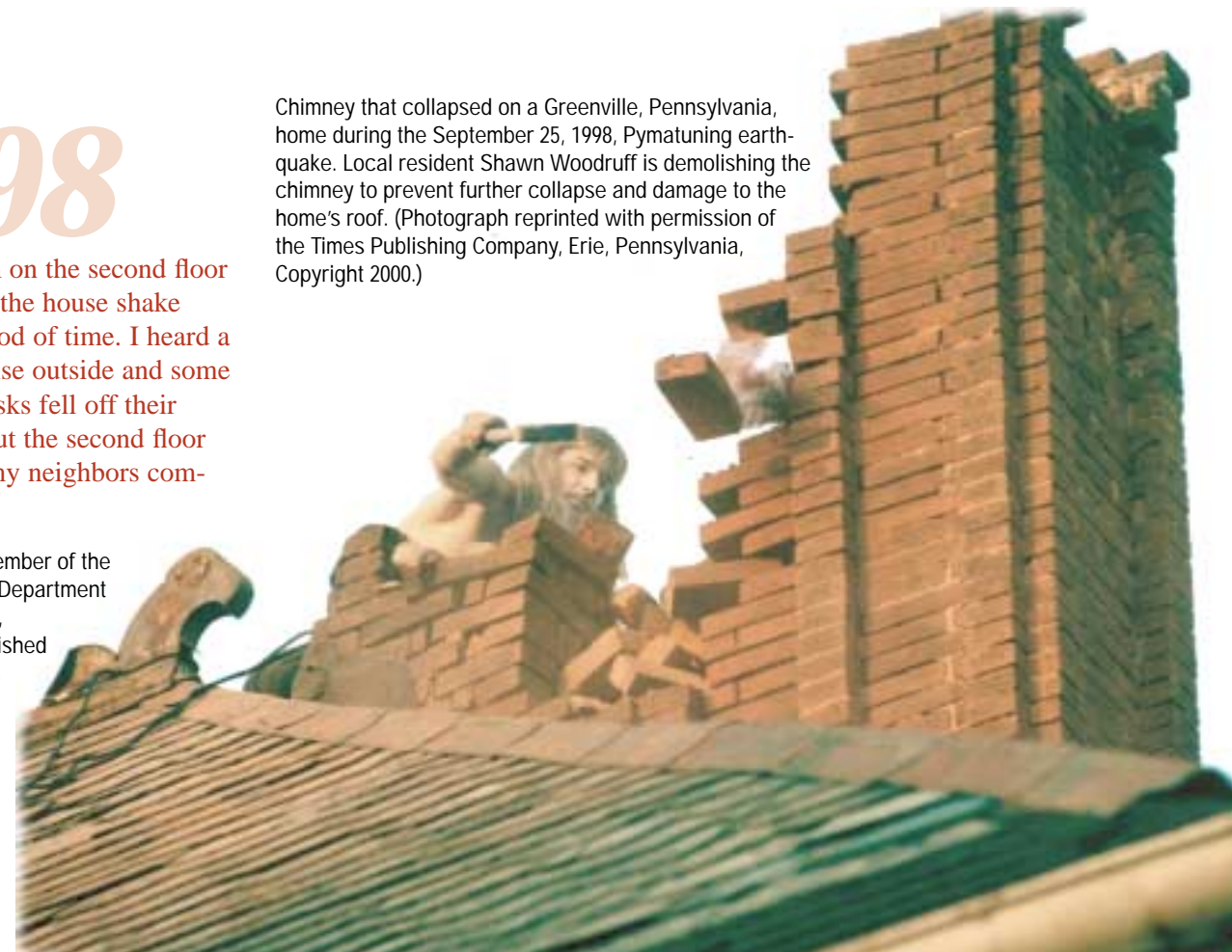


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1998

“I was standing in a room on the second floor of my house when I felt the house shake violently for a short period of time. I heard a loud ‘explosion-like’ noise outside and some of my compact music disks fell off their storage shelf. I looked out the second floor window and saw all of my neighbors coming out of their homes.”

Chimney that collapsed on a Greenville, Pennsylvania, home during the September 25, 1998, Pymatuning earthquake. Local resident Shawn Woodruff is demolishing the chimney to prevent further collapse and damage to the home's roof. (Photograph reprinted with permission of the Times Publishing Company, Erie, Pennsylvania, Copyright 2000.)



Eyewitness account from a member of the Greenville, Pennsylvania, Fire Department during the September 25, 1998, Pymatuning earthquake. (Published in *Pennsylvania Geology*, 1998, vol. 29, no. 4.)