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Native lore tells the tale: There's been a whole lotta shakin' goin' on

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Stories of two-headed serpents and epic battles between Thunderbird and Whale, common among Northwest native peoples, have their root in the region's seismic history. New research led by a University of Washington scientist has found stories that could relate to a large Seattle fault earthquake around A.D. 900 and specific eyewitness accounts linked to a mammoth 1700 earthquake and tsunami in the Cascadia subduction zone.

The stories come from people living in areas from northern California to the northern edge of Vancouver Island. They often differ depending on where they originated, said Ruth Ludwin, a UW research scientist in Earth and space sciences and lead author of two recent papers detailing evidence gleaned from native lore.

The same event might have been depicted differently in different places, depending on the local effects and cultural differences, Ludwin said. But references to Thunderbird and Whale, or similar figures related in lore to wind or thunder and water, are found in stories of shaking and flooding that were collected all along the coastline.

"There's a frightening amount of it," she said. "It appears that these stories have to do with earthquake-, tsunami- and landslide-like events. As you go around the region, there are very many of these stories and they are central to the native cultures, which suggests that these past earthquakes had profound effects on the local inhabitants. There's evidence for that in the geology as well, both on the coast and in the central Puget Sound area."

Thunderbird and Whale stories are part of a systematic native oral tradition that uses symbolism and memory devices such as rhyming to package information in a way that it can be remembered and retold for generations, Ludwin said. For instance, she and her colleagues reported in the March/April edition of *Seismological Research Letters* that ground shaking and ocean surges could be deduced from a story in which

Thunderbird drives its talons into Whale's back, then is dragged by Whale to the bottom of the ocean.

Archeological sites along the coast have yielded artifacts linked to the Thunderbird and Whale stories that imply seismic events earlier than the 1700 earthquake and tsunami. Geological evidence suggests the Cascadia subduction zone has produced at least seven major earthquakes in the last 3,500 years, the researchers said.

Ludwin noted that because white settlers reached the Northwest much later than other regions of the country, native languages and traditions remained intact far longer. By the mid-1800s when whites began showing up in larger numbers, there was a growing movement worldwide to record and preserve vanishing oral traditions.

Among the collected stories, the researchers found nine told between 1860 and 1964 that likely relate directly to a Cascadia subduction zone earthquake and tsunami in January 1700. Two of the stories tell of a grandparent who saw a survivor of the flood following the quake, and one story tells of a great-grandparent who survived the flood. Recent evidence has placed the earthquake at magnitude 9, so powerful that the resulting tsunami flooded fields in Japan.

Native stories deal with a variety of major natural events, including landslides and calving of glaciers. In a second paper, published this week in the July/August edition of *Seismological Research Letters*, Ludwin and colleagues discuss tales of "a'yahos," a term the Salish peoples gave to a shape-shifting supernatural spirit that often appears as a giant serpent, sometimes with two heads or blazing eyes and horns.

A'yahos comes from land and sea simultaneously and is associated with shaking and rushes of muddy water. The researchers found five native stories that associate a'yahos with places on or near the Seattle fault, and 13 others associated with central Puget Sound, Hood Canal and the Strait of Juan de Fuca.

One story mentions a spirit boulder just south of the Fauntleroy ferry terminal in West Seattle. The researchers were able to pinpoint the boulder, then examined lidar images of the area to find a giant prehistoric landslide, perhaps a mile in length, leading to the boulder at the edge of Puget Sound. Lidar is similar to radar but uses laser light beams rather than radio waves. Details of the landslide hidden by development and many years of vegetation growth are clearly visible with lidar, the same technology that in the 1990s helped to reveal parts of the Seattle fault, which was the source of a major earthquake and Puget Sound tsunami around A.D. 900. Other a'yahos stories associated with the fault come from Burien, Seattle's Lake Washington shoreline, Bainbridge Island and Bremerton.

Understanding the meaning of the native stories is not usually easy, Ludwin said, but once the symbolism becomes clear it is much simpler to relate the stories to the region's seismic history. That provides a key supplement to geologic evidence that has been gathered, she said.

"There were a lot of native people living here. Hearing the local story based on eyewitness accounts helps us to realize that the event occurred right here and that people saw it and remembered it for many generations," Ludwin said.

"Over time, so much has been lost but the stories still have a tremendous richness of detail. Things happened that left a very deep cultural impression."

The work reflected in the two papers was supported by grants from the U.S. Geological Survey and the Pacific Northwest Seismograph Network.

Co-authors for the paper published in the March/April edition are Robert Dennis of the Huu-ay-aht First Nation on Vancouver Island; Deborah Carver of Carver Geologic Inc.; Alan McMillan of Douglas College in British Columbia; Robert Losey of the University of Alberta; John Clague of Simon Fraser University in British Columbia; Christine Jonientz-Trisler of the Federal Emergency Management Agency; Janine Bowe chop of the Makah Museum and Cultural Center in Neah Bay, Wash.; Jacilee Wray of Olympic National Park; and Karen James, a cultural anthropologist from Bainbridge Island, Wash.

Co-authors for the July/August paper include Jonientz-Trisler and James, as well as Coll Thrush and Kathy Troost of the UW; Northwest historian David Buerge; James Rasmussen of the Duwamish Tribe; and Andy de los Angeles of the Snoqualmie Tribe.

*The journal is published by the Seismological Society of America.



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This illustration depicts a late 19th century interior ceremonial screen from Port Alberni, on British Columbia's Vancouver Island. It shows Thunderbird carrying Whale in its talons, a common native depiction of seismic activity. The original screen is in the American Museum of Natural History. The image is taken from "Northwest Coast Painting – House Fronts and Interior Screens" by Edward Malin, ©1999, Timber Press, Portland, Ore.