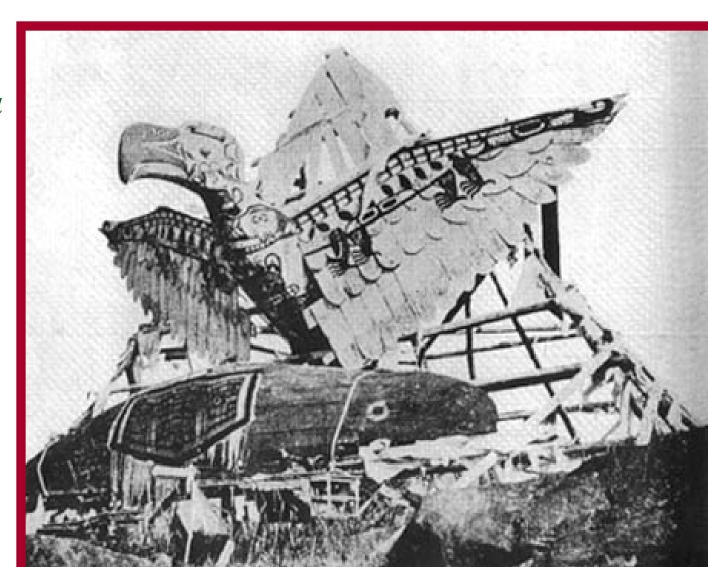
ABSTRACT

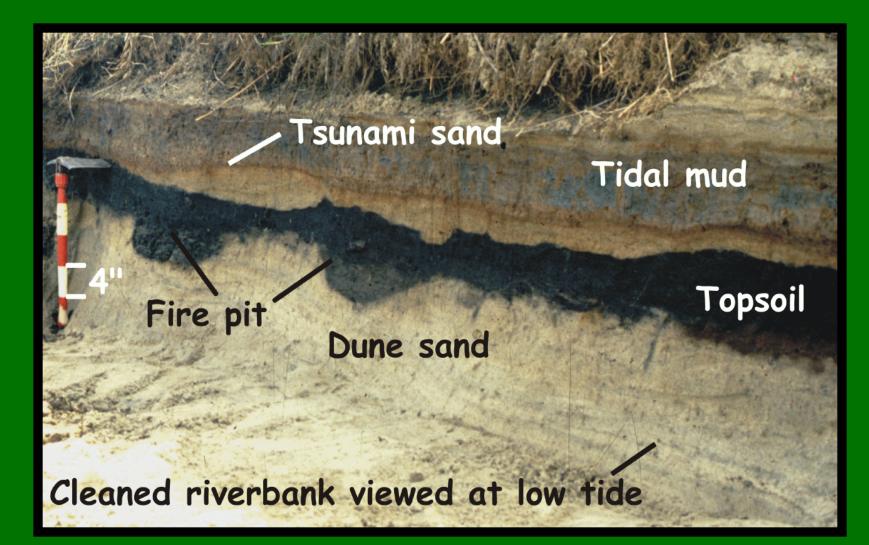
Great earthquakes along the Cascadia Subduction Zone (CSZ) have been taking place for thousands of years. The most recent CSZ earthquake (estimated magnitude 9) occurred on January 26, 1700. The exact date was determined from historic records of a tsunami that struck Japan, and confirmed by tree-ring studies of coastal trees killed when land level changes plunged their roots into tidal water.

A search of Native American myths, stories, and traditions has revealed an abundance of accounts from Washington and Oregon that may be connected to Cascadia Subduction Zone earthquakes.

Whale in front of a snow-capped peak (Drucker, 1955)



Tsunami Sand overlying Archeological Site



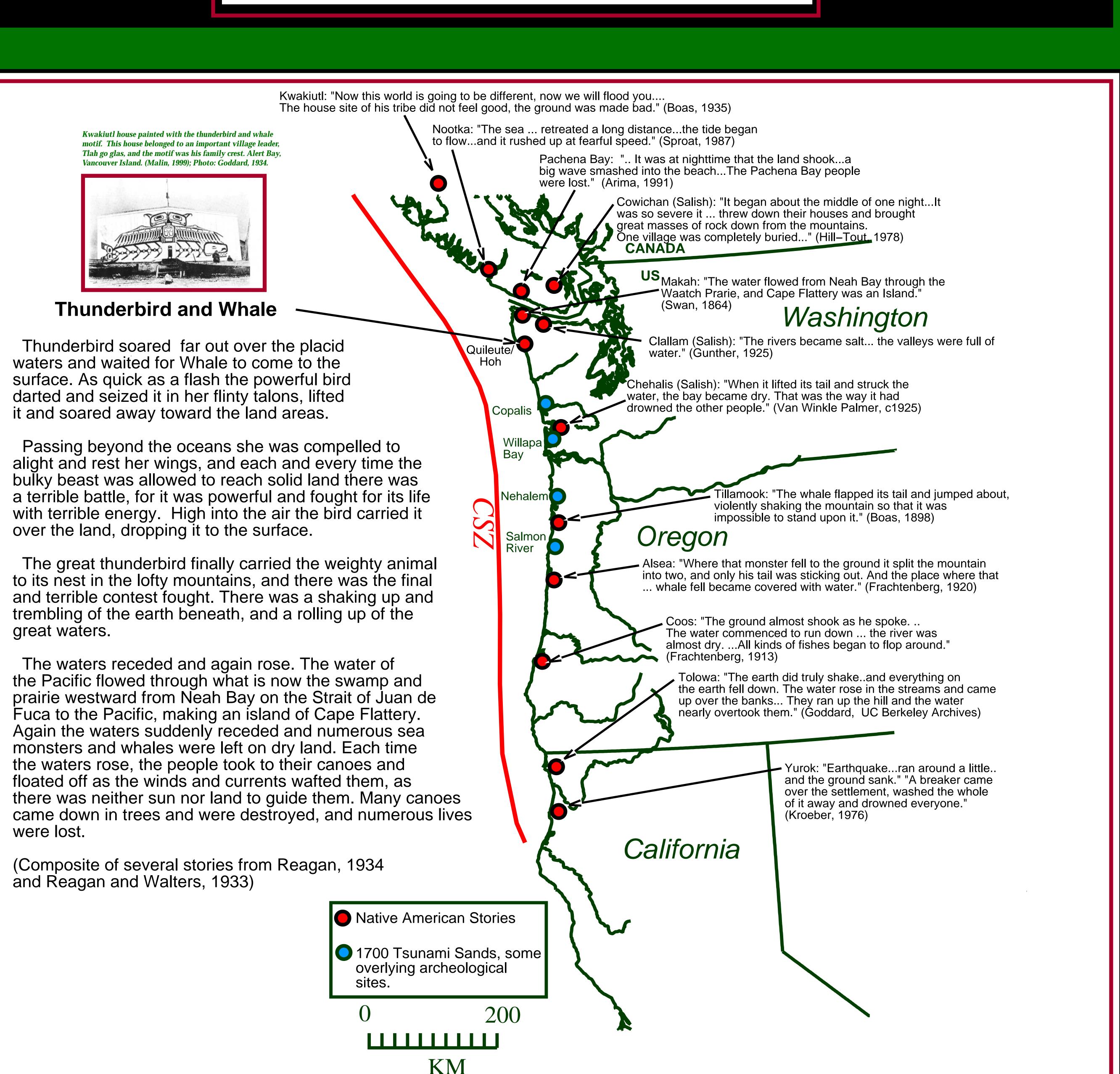
Tsunami sand associated with the 1700 earthquake covering a Native fire pit on the banks of the Salmon River. Fire cracked rocks, charcoal and ashes delineate the fire pit that was dug into the sandy beach. Minor, R. and W.C. Grant, 1996, American Antiquity, V. 761, No. 4, p. 772-781. Photo: Brian Atwater.



Searching for Native Stories about Cascadia Subduction Zone Earthquakes

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NONE OF THIS PROVES ANYTHING!

Oral history is made up of stories that serve as mnemonic keys to a much larger body of information, and Pacific Northwest Native stories contain highly condensed and deeply layered information. This makes them enigmatic and difficult to interpret.

Knowing that Native Americans living along Cascadia must have experienced earlier subduction zone earthquakes on the CSZ, tsunamis from distant sources, and crustal and Benioff Zone quakes, we re-read Native stories to learn how these events are expressed in the oral liter-

Because earthquakes and tsunamis are repeating events, is nearly impossible to unequivocally link any specific story to the 1700 earthquake, although it is still worth examining the stories to see which pieces fit what we know about the event, and whether the stories contain new information that might be confirmed through paleoseismic studies. The story of Thunderbird and whale clearly predates the 1700 earthquake (McMillan, 1999).

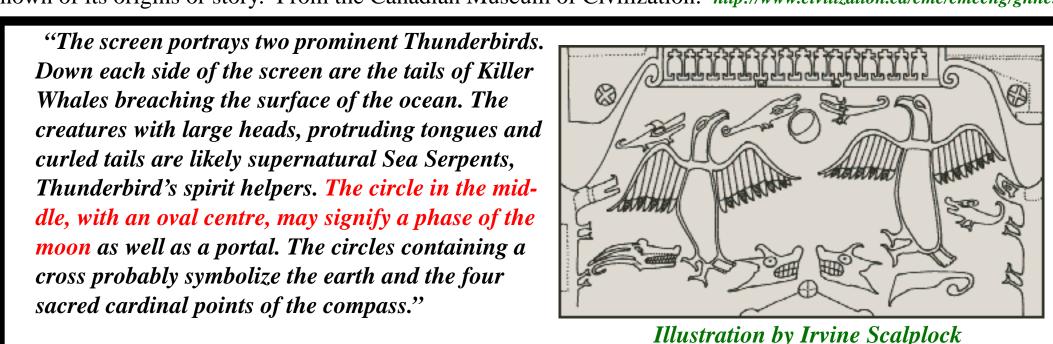
PHASE OF THE MOON.

- According to the U.S. Naval Observatory Astronomical Applications Department (URL: aa.usno.navy.mil/AA/) On the evening of Jan. 26, 1700, sunset along the Washington was at 5:10 PM PST, and the moon rose at 5:21 PM. The Moon was a waxing crescent with 36% of the Moon's disk illumi-
- nated. The moon would have had pronounced "horns" pointing upward and to the left (Hal Mofield, NOAA, Personal Communication).

Various representations of the moon and sun are shown with the Thunderbird. Some may refer to family crests. Two representations that correspond to the phase of the moon during the 1700 event have been found:

1. Inside The Nuu-Chah-Nulth House: This interior screen was carved in the late 19th century, but little is known of its origins or story. From the Canadian Museum of Civilization: http://www.civilization.ca/cmc/cmceng/ghhe5eng.html

Whales breaching the surface of the ocean. The creatures with large heads, protruding tongues and curled tails are likely supernatural Sea Serpents, Thunderbird's spirit helpers. The circle in the middle, with an oval centre, may signify a phase of the moon as well as a portal. The circles containing a cross probably symbolize the earth and the four



2.~``A lightning serpent painted on each side of her robe shows that her ancestor saw the lightning serpent at the time of the flood. A quarter moon painted in shiny black on her forehead ..." - Nootka (Roberts and Swadesh. 1955)

TIME OF YEAR: WINTER - January 26, 1700

Some stories are consistent with winter: 1. "It became so cold that the children died." -Clallam (Gunther, 1925)

sacred cardinal points of the compass."

- 2. "Chief Wakas held a winter ceremonial. When he gave a winter ceremonial long ago the deluge came." Kwakiutl (Boas,
- TIME OF DAY: NIGHT About 9 PM local time (after dark)
- 1. "I think it was at nighttime that the land shook ... I think a big wave smashed into the beach." Nootka (Arima et al, 1989). 2. Stories about earthquake lights (see below) also suggest a nighttime event.
- 3. "This is not a myth, ... for my tale is seven generations old....it was nearly midnight. Then there was a great earthquake and
- the houses of the Kwakiutl collapsed" Boas, 1935, p. 122 4. "In the days before the white man, there was a great earthquake. It began about the middle of one night." Cowichan (Hill-Tout, 1978)

EARTHQUAKE LIGHTS:

Earthquake lights are a poorly-understood, but well documented earthquake phenomena. The lightning serpents are the companion of the Thunderbird, as is consistent with the more ordinary interpretation as Thunderbird as bringer of thunder and lightning. Several of the Native stories contain elements that relate lightning to effects that could only result from a megathrust earthquake:

- 1. "her ancestor saw the lightning serpent at the time of the flood." Nootka (Roberts and Swadesh, 1955) 2. "there was a great storm and hail and flashes of lightning in the darkened, blackened sky and a great and crashing "thunder-noise" everywhere. He further stated that there were also a shaking, jumping up and trembling of the earth beneath, and a roll-
- ing up of the great waters." Quileute/Hoh (Reagan, 1934) 3. Earthquake said. "Well, I shall tear up the earth." Thunder said, "That's why I say we will be companions, because I shall go over the whole world and scare them ... for I bought something to be seen at night. ... Always they traveled at night. - Yurok, (Kroeber, 1976 B5).

SUBSIDENCE: WHERE ARE THE STORIES?

In addition to several minutes of strong shaking and rapidly arriving Tsunami waves, permanent land level changes accompany great Subduction Zone earthquakes. In 1700, estuaries near the coast sank and were flooded with salt water. Atwater), on the Bone River near Willapa Bay, and along Highway 4 between Long Beach and Longview. Other ghost forests were logged circa 1900, and remain only as stumps. Tree ring dates from Red Cedars at four sites show that these trees died in the winter of 1699-1700. (Yamaguchi, D.K., B.F. Atwater, D.E. Bunker, B.E. Benson, and M.S. Reid, 1997, Nature, V. 39, p. 922).

No stories about the ghost forests are known to me.

Are there other stories about subsidence? - Headlands that were once easy to walk around, but suddenly became impassable, or the submergence of near-shore village sites? We're still looking.

HEIGHT OF TIDE:

A RECURRING EVENT.

Kwakiutl Stories include a description of the Thunderbird sending his feather costume back to the sky, admonishing it:

"You will not keep on thundering. Only sometimes you will sound when my later generations will die. You will speak once at a time when those who will change places with me will die." (Boas, 1935, p. 65)

AFTERSHOCKS:

Native stories often refer to several Thunderbird brothers or to the Whale and his

Nootka (Sproat, 1987, p. 121) Ouileute/Hoh (Reagan, 1934, various) Salish (Curtis, 1913, p. 162) Tillamook (Boas, 1898, p. 33) Yurok (Spott and Kroeber, 1942, p. 227)



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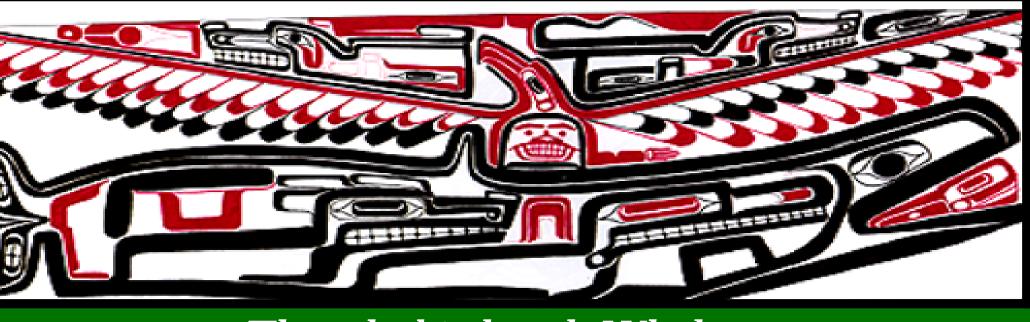
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