Redwood chips offer insights into 1838 San Andreas quake

David Perlman, San Francisco Chronicle, 1-28-14

A crew of unknown woodsmen, using their axes long ago to fell redwood trees near Santa Cruz, has helped scientists gather new evidence of the powerful earthquakes that have ruptured the ground in the restless mountains there.

The report in the Bulletin of the Seismological Society of America sheds new light on the seismic history of the San Andreas Fault that winds through the Santa Cruz Mountains.

In his report, Timothy Dawson of the California Geological Survey said that he and a graduate geology student dug more than a dozen shallow trenches near the foothill village of Corralitos, to find signs of at least four of the many powerful quakes that have struck the region since Spanish colonial days.

Dawson named the trenching site Hazel Dell, which is not far from Watsonville. In one trench he discovered hundreds of redwood chips, clearly made by sharp-edged ax blades that cut smoothly and at angles, together with long-buried stumps of redwoods that had obviously been felled by similar blades.

Combining tree-ring studies and radiocarbon dating of the chips and the stumps by scientists at the Lawrence Livermore National Laboratory, Dawson calculated that the chips were from trees felled by at least one woodsman working in what historical records show was territory owned by a California settler named Don Jose Amesti.

Amesti held a Spanish land grant for what was then Rancho Corralitos; it had been issued in 1827, and Amesti was making and selling redwood shingles there until 1836 or later, Dawson learned from historical records.

The chips and stumps were fresh evidence that the 1838 earthquake ruptured the ground during the history of Spanish settlement throughout the Santa Cruz Mountains and at the Hazel Dell foothill site, where workers had once felled redwoods, Dawson concluded. That quake is now estimated at magnitude 7.

"We rarely have an opportunity to find this kind of evidence, and it helps tell just where and when the ground actually ruptured in that earthquake," Dawson said. "It sometimes can happen with old archaeology records in the Middle East, but not around here."

Graduate student Ashley Streig, from the University of Oregon, worked with Dawson in the trenching venture. Their trenches also revealed many other signs of ground rupture in the Santa Cruz Mountains from the great 1906 earthquake.

The epicenter of that historic quake, currently estimated at magnitudes from 7.7 to 7.9, was on the San Andreas only 2 miles west of San Francisco, and it ruptured the ground for 296 miles from Shelter Cove (Humboldt County) to San Juan Bautista (San Benito County).

The San Andreas also triggered a major earthquake in 1890, and its epicenter was in Corralitos itself, right next to the Hazel Dell site, and the trenches showed the ground rupture there as well; other trenches at other sites in the Santa Cruz Mountains have also revealed ruptures from that quake.

Finally, layers in two of the trenches showed traces of one or more truly ancient fault ruptures in the

Santa Cruz Mountains, Dawson said. It would be impossible to determine their magnitudes, he said, but they probably struck at some time between the years 760 and 1300 AD.

"Our site is showing us in more beautiful detail than ever before how earthquakes have ruptured the ground in the historical times of human settlement," Streig said. "Now our goal is to extend our record much father far back in time. Two hundred years is too short."

Streig's faculty adviser at Oregon, Ray J. Weldon II, also joined the trenching venture. The team's report did not discuss ruptures from the 1989 Loma Prieta earthquake.