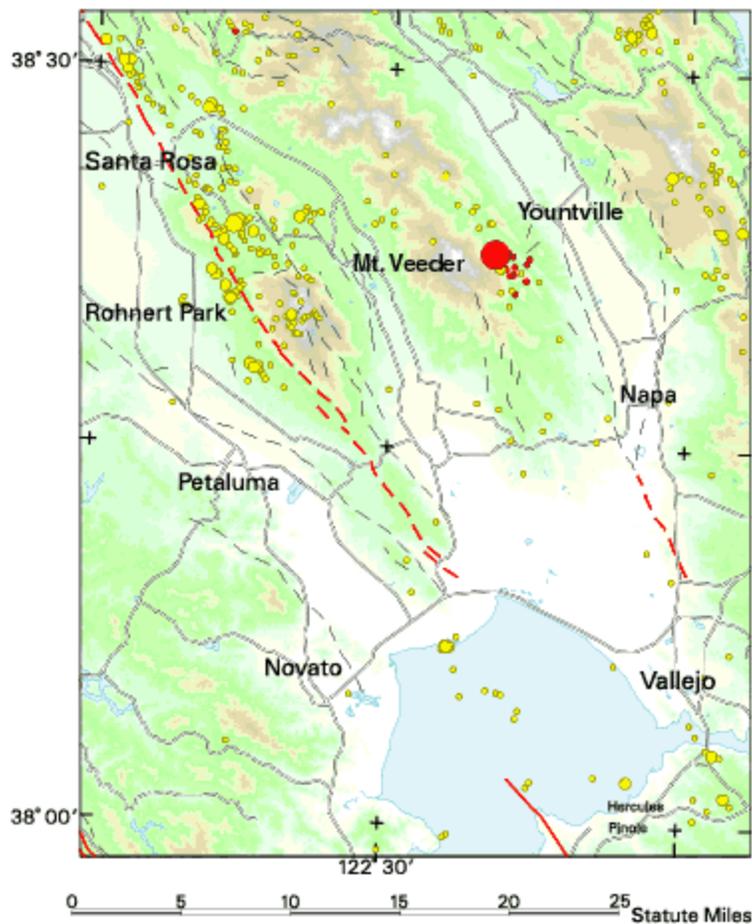


The September 3, 2000 Yountville Earthquake

A magnitude (M) 5.2 earthquake occurred at 1:36 AM on September 3, 2000 in the mountains 10 miles northwest of the town of Napa, near Yountville, CA. Although seismologists initially thought that the earthquake occurred on the West Napa fault, accurate locations now indicate that the earthquake occurred about 3 miles west of this fault.

Earthquakes of this size can occur anywhere throughout the Bay Area on deep faults that cannot be observed through geologic mapping of the Earth's surface. For example, a M 5.7 earthquake occurred on March 3, 1986 in the East Bay hills, about 10 miles northeast of San Jose, near Mt Lewis. This earthquake generated nearly 2000 aftershocks over a period of a year and a half, yet geologists have been unable to identify any fault at the surface that can be related to these earthquakes at depth.

The Yountville quake occurred on a northwest oriented fault, and rupture occurred through right-lateral strike-slip motion, typical of events in central California. As of 10AM 09/11/2000 PDT, there have been only 18 aftershocks within 5 miles (8 km) of the epicenter, ranging in magnitude from 1.2 to 2.6. It is unlikely that any of these aftershocks have been felt.



Yellow dots indicate historical seismicity, from 1970 - Aug. 31, 2000. Red dots indicate seismicity from Sept. 1 - Sept. 8, 2000, including the Sept. 3rd M 5.2 main shock.

Strong motion instruments recorded unusually high levels of shaking in the city of Napa as a result of the September 3rd Magnitude-5.2 earthquake near Yountville, California. Recordings of strong shaking by stations operated throughout the region by the U.S. Geological Survey (USGS), the California Department of Conservation's Division of Mines and Geology (CDMG), and UC Berkeley demonstrate that peak shaking levels in the city of Napa were amplified five to eight times relative to a station located in the mountains less than a mile from the earthquake epicenter. Both the high levels and local amplification help explain the surprising concentration of earthquake damage throughout the city, according to scientists from the three agencies.

The highest recorded level of shaking came from an instrument located in a fire station north of the city of Napa, approximately six miles from the epicenter. The shaking there was 50 percent of the force of gravity. This means that buildings at the site were subjected to a horizontal force that was 50 percent of the building's weight. A station located south of town, near Napa College, recorded a peak shaking level nearly as high. Both recordings are substantially higher than expected for a magnitude 5.2 earthquake and are consistent with the significant damage that the city suffered.

While earthquake shaking levels depend on the distance from the earthquake source, the high level of ground shaking in Napa also appears to be the result of two other factors: first, the amplification of shaking by young sediments along the Napa River, and second, the focusing of strong motion to the southeast, the direction the earthquake rupture propagated. A regional map of shaking levels can be viewed on the web. The offset of the strongest shaking to the southeast from the epicenter, and the amplification within the basin of sediments underlying Napa and along the northern shore of San Pablo Bay are also clear and can best be viewed in the web map of instrumental intensity.

The M5.2 event is the largest earthquake in this area since 1969 when two earthquakes, magnitude 5.6 and 5.7, struck Santa Rosa about 80 minutes apart. These earthquakes are associated with the Rodgers Creek fault system.

In fact, these 3 events are the only earthquakes with magnitude greater than 5.0 to hit the region 50-60 mi north of San Francisco Bay since 1906. However, in the past year there have been several magnitude 4 or greater events in this same region

- 1) A magnitude 4.7 event near Bolinas on 8/17/99.
- 2) A magnitude 4.3 event south of Santa Rosa on 9/22/99
- 3) A series of 3 earthquakes, magnitudes 4.0, 4.2, 4.0 near Cloverdale between January 10-18, 2000

It is not clear whether the increase in seismicity in this region reflects the end of a long period of seismic quiescence. If so, then this would indicate that the levels of stress are perhaps sufficiently high that larger quakes could be expected soon for the region. A similar seismicity pattern was observed in the 50-year period preceding the 1906 earthquake. However, there is too little data available on which to alter the formal probabilities for the seismic hazard in this region. Clearly, had such an argument been put forth after the two earthquakes that rocked Santa Rosa in 1969, the subsequent 30 years of earthquake activity in this region would have proven the argument to be flawed.

This earthquake injured 25 people, including 2 people critically. 70 people sought shelter at Red Cross facilities. Damage estimates are rising and range from \$10 to \$50M. On Wed, Sept 6, Governor Davis declared a state of emergency in the Napa Valley. A request has been made for federal funds. As of September 8, the City of Napa building inspectors have issued 168 "yellow tags" and 16 "red tags".