

EXPLANATION

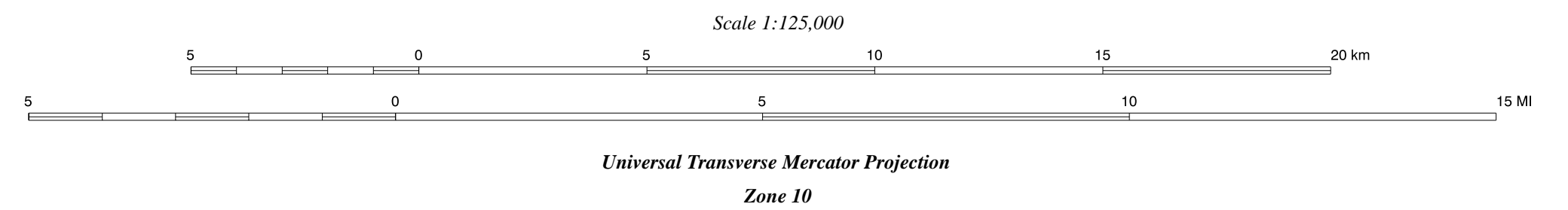
- Location of damaging landslide. The number identifies the landslide in the database. Data on file with authors, USGS, Menlo Park, California and Golden, Colorado.
- 60302 Five-digit number indicates a location identified by County of Santa Cruz Planning Department.

SUMMARY

Damage due to landslides was widespread in Santa Cruz County following a series of storms in January and February 1998. At least 165 landslides affected public and private property. Damage resulted from the following types of landslides: debris flows (51), earth and debris slides (40), rock fall (one), complex slides that included both earth or debris slides and debris flows (13), and 60 landslides of unknown type. Landslides damaged public roads in about 80 places, and temporarily blocked roads in many more. Debris flows caused significant damage that ranged from temporarily blocking roads to demolishing single-family homes. Earth slides and debris slides also caused significant damage to roads and structures. The two largest earth slides, at Heartwood Hill and Amesti Road, were preexisting landslides that the storms reactivated or accelerated. A rock fall partially blocked one road. County personnel documented 17 more landslides of unknown type that damaged or threatened structures and 43 that struck roads. Many more slides and debris flows left traces in the landscape but did not damage buildings or infrastructure. Our documentation of landslides in Santa Cruz County is incomplete; at least a few damaging landslides in remote areas probably went unreported by local residents, and in the time available we were not able to visit the sites of all reported slides to classify them and estimate their dimensions. Damage occurred throughout populated areas of the county, but was concentrated near Swanton, Boulder Creek, Eureka Canyon, Aptos, and Corralitos.

Landslides occurred throughout the county in January and February, the majority of them during major storms of early and mid February. Most landslides moved during or shortly after periods of heavy rainfall. The storm of January 11-12 triggered damaging landslides from Bonny Doon east to Scotts Valley. The storm of February 2-3 triggered landslides in the northern and western parts of the County, including Swanton, Big Basin State Park, Santa Cruz, Soquel, and Aptos. Another storm on February 6 and 7 caused more landslides in the same areas as well as in Boulder Creek, Felton, and San Lorenzo Park. A major storm February 19-21 triggered landslides in the central and western parts of the County, blocking California State Highways 9 and 17, but damaging landslides from that storm were concentrated in the south part of the County in Eureka Canyon and Corralitos.

Estimated direct costs of landslide-related damage totaled \$14.68 million, of which \$7.44 million (51 percent) was to public infrastructure (roads, bridges, etc.) and the remainder (\$7.24 million) to private property. Landslides caused 43 percent of the total storm damage, which was estimated at \$34 million. The estimated cost of repair to state highways in Santa Cruz County was \$3.06 million. The estimated cost to repair storm damage to county roads was \$9.87 million, landslide damage accounting for \$4.37 million (44 percent). Actual or imminent landslide damage made many private structures unsafe to occupy, with the result that 43 were red-tagged and three-yellow tagged. "Tagged" structures are those that have been either condemned (red) or in need of significant repair (yellow). Municipal and county building inspection departments are commonly responsible for such determinations. No storm-related fatalities were attributed to landslides. Information on damaging landslides was obtained from the Santa Cruz County Departments of Planning and Public Works, California Division of Mines and Geology, California Department of Transportation (Caltrans), newspaper accounts in the Santa Cruz County Sentinel, and our own field reconnaissance during the week of April 20-25, 1998. We thank Joe Hanna, Dave Hope, Bill Williamson, and Patrice Johnson (all Santa Cruz County personnel), Ron Richman (Caltrans), and Tom Spittler (California Division of Mines and Geology) for sharing information.

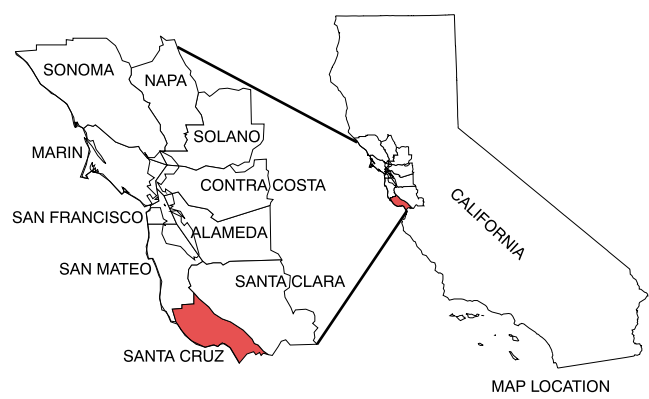


MAP SHOWING LOCATIONS OF DAMAGING LANDSLIDES IN SANTA CRUZ COUNTY, CALIFORNIA, RESULTING FROM 1997-98 EL NIÑO RAINSTORMS

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Digital data prepared using ARC/INFO 7.1.2 running under Solaris 2.6 on a UNIX workstation. Map formatted using Adobe Illustrator 8.0 running under Mac OS 8.6.

Shaded relief base derived from Graham, S.E., and Pike, R.J., 1997, Shaded Relief Map of the San Francisco Bay Region, California. U.S. Geological Survey Open-File Report 97-745-B.

Any use of trade, product or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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This map was produced on request, directly from digital files, on an electronic plotter. It is also available as a PDF file at <http://greenwood.cr.usgs.gov>

For sale by U.S. Geological Survey Information Services Box 25286, Federal center, Denver, CO 80225.

