



DEPARTMENT OF CONSERVATION

Managing California's Working Lands

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CALIFORNIA GEOLOGICAL SURVEY RELEASES NEW MAP SHOWING LANDSLIDE SUSCEPTIBILITY IN CALIFORNIA

Link to map: <http://www.conservation.ca.gov/CGS/information/publications/ms/Documents/MS58.pdf>

SACRAMENTO – A new map showing the susceptibility of California to deep-seated landslides has been placed online by the California Geological Survey (CGS). Printed copies of the map should be available in a few weeks.

“What this map intends to do is provide an overview of where landslides are more likely to occur to emergency planners, those who own or operate infrastructure facilities, and the public at large,” said Dr. John Parrish, State Geologist of California and head of CGS. “There are other landslide susceptibility maps out there, but those are very general. This map has a very robust data set behind it. Although you cannot use it to determine the risk potential at a specific site, you can get a good sense of whether landslides are something you need to be aware of in a given area.”

The map was created in support of the recent ARkStorm Scenario, which described a storm that could result in more than \$300 billion in property damage in California. The map, now available to the public, is the first step in estimating potential landslide losses from a major winter storm.

“One glance at this map tells you the relative risk for the entire state,” said CGS Supervising Geologist Chris Wills, the lead in compiling the map. “You don’t need to be a scientist to understand that the brighter colors indicate a generally higher potential for landslides. Some areas with higher landslide potential are densely populated and many are crossed by roadways, pipelines, rail lines and the like.”

About 57,000 deep landslides are shown on the map. However, the existing digital maps from which data was culled cover only a quarter to a third of the entire state.

“There are probably many thousands of additional landslides that are not yet mapped,” Wills said. “They may not all impact population centers, but even in remote areas infrastructure is a concern.”

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LANDSLIDE SUSCEPTIBILITY MAP RELEASED 2-2-2

On the new map, landslide susceptibility is ranked on a scale of zero to 10 based on a combination of two factors: the strength of the rock and the degree of slope. The combination of greater slope and weaker rock produces the highest susceptibility. The slopes shown on the map vary from nearly flat to greater than 40 degrees. The rock strength varies from strong crystalline rocks (such as granite and basalt) and well cemented sandstones to, at the weak end of the scale, pre-existing landslides, shale, claystones and loose material.

A series of inset maps shows the factors involved in preparing the susceptibility map; a generalized statewide geologic map; and maps showing the individual factors of rock strength and slope gradient.

“Recent events in Japan have made the public exceptionally aware of earthquakes and tsunamis, but landslides are a more common hazard in California,” said Derek Chernow, Acting Director of the California Department of Conservation, of which CGS is a part. “People associate landslides with rain – indeed, this map was created for a storm scenario -- but they can happen anytime. Fortunately, they often give some warning to those who familiarize themselves with the signs.”

The largest area of high landslide susceptibility is in coastal mountains between San Francisco and Los Angeles. Other high-likelihood areas include the Coast Ranges north of San Francisco to the Oregon border, and the western Transverse Ranges in Los Angeles, Ventura and Santa Barbara Counties. The Central Valley, the northwestern Mojave, and much of the Imperial Valley are in the lowest-risk areas.

A landslide is any mass of earth and rock that moves downhill by sliding, flowing or falling. Large, slow-moving landslides composed of bedrock can cause extensive property damage. Debris flows -- commonly called mudslides and not shown on this map -- move very quickly and are more likely to cause fatalities.

Landslides cause an estimated 25 to 50 deaths and more than \$2 billion in damage each year in the United States. California has a significant share of that risk. When the state’s rainfall exceeds normal levels by 150 percent or more, landslides cause property damage in excess of \$100 million on average, and as many as five deaths each year. More than 100 Californians have been killed by debris flows during the past 25 years.

Although the map does not include information on the events that trigger landslides, such as rainstorms or earthquake shaking, it does include small inset maps of average annual rainfall and earthquake shaking potential around the state in a “next steps” section. This section states: “Although we cannot currently combine these factors to produce a landslide potential map, the convergence of factors suggests higher landslide potential in the northern Coast Ranges than other regions of the state.”

“Ultimately, we need to create a landslide potential map that defines the risk in terms of both susceptibility and the frequency of events that trigger landslides, such as rainfall and earthquakes,” Wills said.

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LANDSLIDE SUSCEPTIBILITY MAP RELEASED 3-3-3

CGS has produced numerous maps that show landslide features and delineate potential slope-stability problem areas since the 1960s. Typically, these maps have been created in response to landslide disasters and subsequent legislative mandates. Many CGS landslide maps and related products have been produced for local or state agencies, such as Caltrans and Cal Fire, in response to specific needs. Funding to create the new map was provided by the USGS Multi-Hazard Demonstration Project.

The last fatal landslide in California occurred in the Marin County town of Mill Valley in 2006. In 2005, 10 people were killed, 14 injured and 31 homes destroyed or rendered uninhabitable by a 30-foot-deep slide in the Ventura County town of La Conchita. This year alone, there have been numerous landslide incidents that caused highway closures, destroyed houses and property, and disrupted water or power delivery.

More information about landslides in general and CGS related programs can be found at http://www.conservation.ca.gov/cgs/geologic_hazards/landslides/Pages/Index.aspx.

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