Susceptibility to Deep-Seated Landslides in California

This map shows the relative likelihood of deep landsliding based on regional estimates of rock strength and steepness of slopes. On the most basic level, weak rocks and steep slopes are more likely to generate landslides. The result shows the distribution of one very important component of landslide hazard. It is intended to provide information to owners, emergency planners and the public with a general overview of where landslides are more likely. The map does not include information on landslide triggering events, such as rainstorms or earthquake shaking, nor does it address susceptibility to shallow landslides such as debris flows. This map is not appropriate for evaluation of landslide potential at any specific site.

How this map was prepared

Landslide inventory: A priori mapped deep seated landslide hazard was used to create this map. Landslides were identified in this map by the state’s landslides. The map is based on the National Elevation Dataset and is augmented with regional geologic maps. The landslides that are shown are only displayed for specific counties. These data is classified and may cover only part of those counties.

The slope gradient was computed from the 10-m grid of elevation values from the 2009 National Elevation Dataset (NED). Slope values were then combined according to the methodology of Wilson and Keefer (1985) and Wieczorek, G.F., R.C. Wilson, R.C., and E.L. Harp, 1985. Map Showing Slope Instability during Earthquakes in San Mateo County, California, U.S. Geological Survey Open-File Report 85–17, 16 p.

Regional estimates of rock strength and slope were combined according to the methodology of Wilson and Keefer (1985) to produce landslide susceptibility maps which are only available for specific counties. These data is classified and may cover only part of those counties.

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Next steps, from landslide susceptibility to landslide potential: Landslides can be triggered by rainfall, by earthquake shaking, or other factors. Additionally, this map does not include susceptibility to debris flows, a very fluid, fast-moving form of landslide which typically is triggered by intense rainfall. A complete map of landslide potential would consider the increase in landslide hazard, including debris flow hazard, with higher potential rainfall and with higher potential earthquake shaking. Average annual rainfall is higher in the northern Coast Ranges than in other regions of the state. 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 in other regions of the state.