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## Landslide Types and Processes

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Landslides in the United States occur in all 50 States. The primary regions of landslide occurrence and potential are the coastal and mountainous areas of California, Oregon, and Washington, the States comprising the intermountain west, and the mountainous and hilly regions of the Eastern United States. Alaska and Hawaii also experience all types of landslides.

Landslides in the United States cause approximately \$3.5 billion (year 2001 dollars) in damage, and kill between 25 and 50 people annually. Casualties in the United States are primarily caused by rockfalls, rock slides, and debris flows. Worldwide, landslides occur and cause thousands of casualties and billions in monetary losses annually.

The information in this publication provides an introductory primer on understanding basic scientific facts about landslides—the different types of landslides, how they are initiated, and some basic information about how they can begin to be managed as a hazard.

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### TYPES OF LANDSLIDES

The term "landslide" describes a wide variety of processes that result in the downward and outward movement of slope-forming materials including rock, soil, artificial fill, or a combination of these. The materials may move by falling, toppling, sliding, spreading, or flowing. Figure 1 shows a graphic illustration of a landslide, with the commonly accepted terminology describing its features.

The various types of landslides can be differentiated by the kinds of material involved and the mode of movement. A classification system based on these parameters is shown in figure 2. Other classification systems incor-

porate additional variables, such as the rate of movement and the water, air, or ice content of the landslide material.

Although landslides are primarily associated with mountainous regions, they can also occur in areas of generally low relief. In low-relief areas, landslides occur as cut-and-fill failures (roadway and building excavations), river bluff failures, lateral spreading landslides, collapse of mine-waste piles (especially coal), and a wide variety of slope failures associated with quarries and open-pit mines. The most common types of landslides are described as follows and are illustrated in figure 3.



La Conchita, coastal area of southern California. This landslide and earthflow occurred in the spring of 1995. People were evacuated and the houses nearest the slide were completely destroyed. This is a typical type of landslide. Photo by R.L. Schuster, U.S. Geological Survey.

Photograph and diagram present information visually.

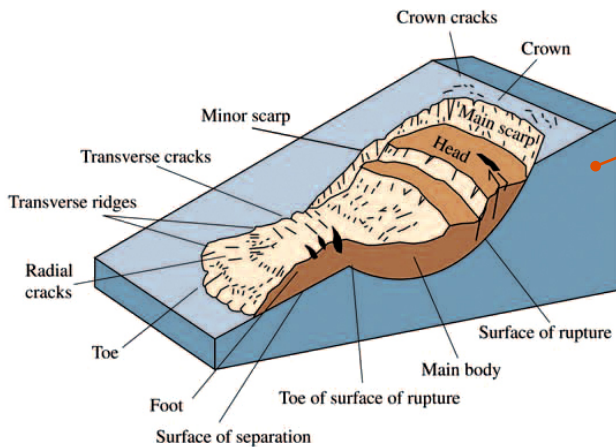


Figure 1. An idealized slump-earth flow showing commonly used nomenclature for labeling the parts of a landslide.

**SLIDES:** Although many types of mass movements are included in the general term "landslide," the more restrictive use of the term refers only to mass movements, where there is a distinct zone of weakness that separates the slide material from more stable underlying material. The two major types of slides are rotational slides and translational slides.

**Rotational slide:** This is a slide in which the surface of rupture is curved concavely upward and the slide movement is roughly rotational about an axis that is parallel to the ground surface and transverse across the slide (fig. 3A). **Translational slide:** In this type of slide, the landslide mass moves along a roughly planar surface with little rotation or backward tilting (fig. 3B). A **block slide** is a translational slide in which the moving mass consists of a single unit or a few closely related units that move downslope as a relatively coherent mass (fig. 3C).

**FALLS:** Falls are abrupt movements of masses of geologic materials, such as rocks and boulders, that become detached from steep slopes or cliffs (fig. 3D).

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