Landslides in Arizona
Just the facts

Land • slide noun *general term used to describe the downslope movements of soil, rock and organic material under the influence of gravity*.

Landslide,Echo Cliffs, near Page, AZ (2/2013). Toreva block landslide sliced through US Route 89. Repairs underway here will top more than $25 million.

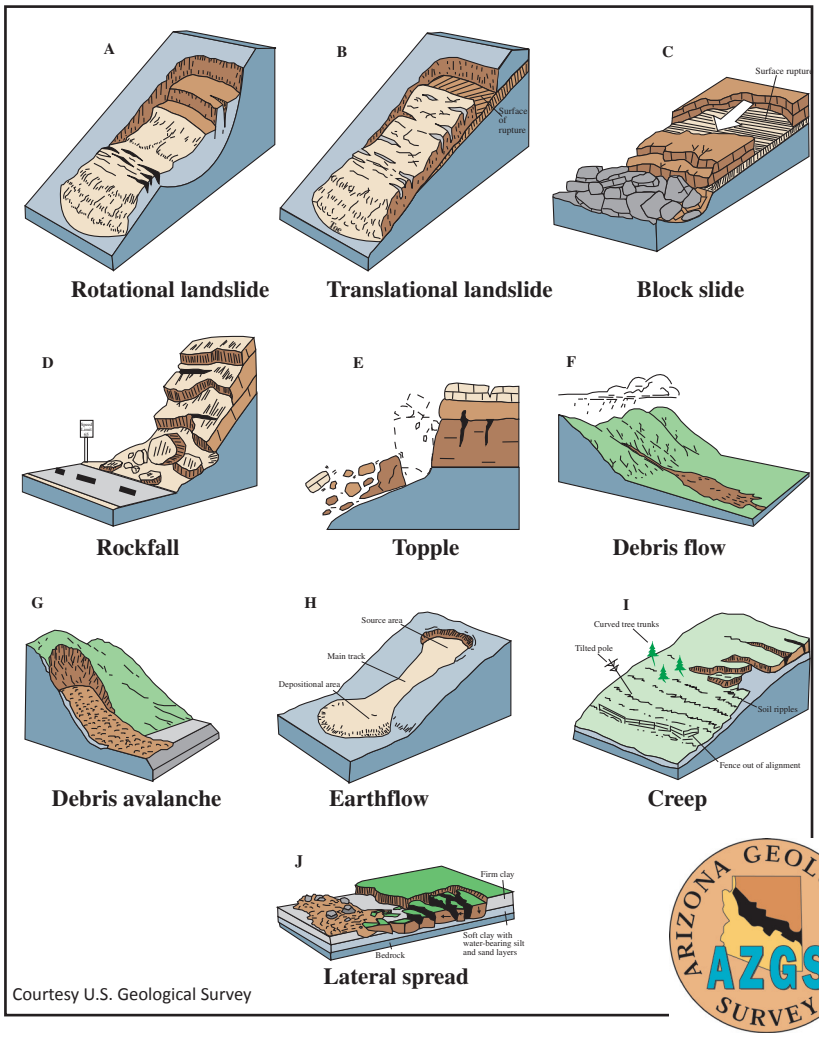
Landslides in the U.S. damage homes, buildings and roads, and are responsible for dozens of fatalities and billions of dollars in damages, rivaling annual flood losses (~$2–8 billion and 89 fatalities) (Source: NOAA National Weather Service Flood Loss Data, http://www.nws.noaa.gov/hic/).

Landslides hazards are common in mountainous areas of the Southwest and include fast-moving debris flows, large slow moving landslides, and other ground- failure related hazards.

In Arizona, historical landslides number in the hundreds and have caused tens of millions of dollars of damage to infrastructure and property. Evidence of past landslides exist in all 15 Arizona counties and in, or adjacent to, large metropolitan centers, such as Flagstaff, Phoenix, Tucson, Prescott, and elsewhere

Fast-moving debris-flows are particularly dangerous because they destroy objects in their path and can occur with little warning. Areas where wildfires or human modification have destroyed vegetation or altered slopes are particularly vulnerable to debris-flows during and after heavy rains.

Landslide types observed in Arizona



Courtesy U.S. Geological Survey

What causes landslides? Landslides result from disturbances in the natural stability of a slope. Frequently, they accompany heavy rains, earthquakes, or volcanic eruptions. Principally associatated with mountainous areas, landslides can occur in areas of low relief, as well.

Common landslide triggers include heavy rain, rapid snow melt, earthquakes, volcanic eruptions, and freeze and thaw cycle.

Debris-flows frequently occur during intense rainfall. Flows may occur hours after the period of the heaviest rain in a storm.

Signs of possible landslides problems, include, but are not limited to

- Structural deformation such as large foundation cracks, misaligned doors and windows, tilted floors, or sagging decks
- Large, open cracks in driveways, curbs, and roads
- Failing retaining walls
- Arc-shaped cracks in the ground
- New cracks or bulges in the ground
- Leaning telephone poles, trees, retaining walls, or fences

To reduce landslide risk, control road or driveway water so it flows away from steep slopes and into storm drains or natural drainages.

What is AZGS doing about landslides in Arizona?

With regards to natural hazards, AZGS's mission is to identify, characterize and inform the public regarding mitigation strategies for geologic hazards, landslides included.

The AZGS is building the first ever state-wide inventory of landslide deposits in Arizona. This involves compiling records of past landslides and scrutinizing satellite imagery and aerial photographs to identify and characterize the nature, timing and volume of recent landslide deposits.

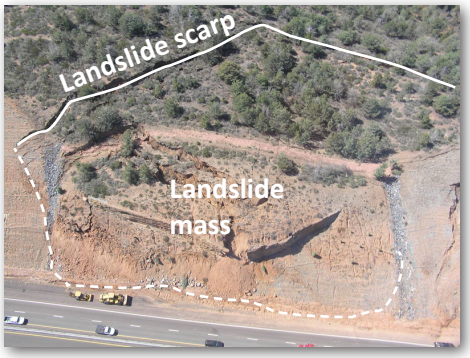
Results from this work will inform decision-making at the municipal, county, state and federal levels in a collective effort to classify and prioritize landslide hazard zones and mitigate death and destruction from landslides.

Who should I consult if I have questions about a specific site?

If you see evidence of a landslide on or adjacent to a roadway, please contact the Arizona Dept. of Transportation (https://wwwa.azdot.gov/contact_adot/)

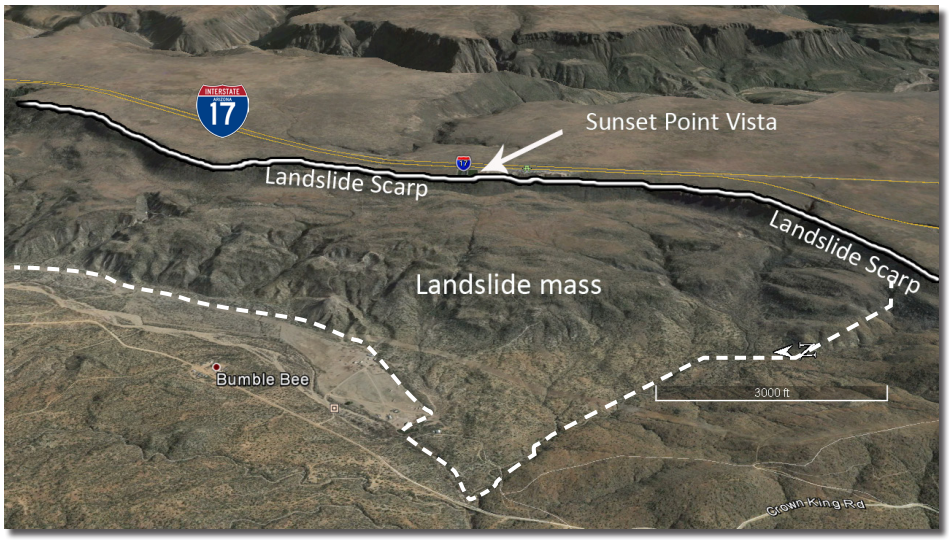
In the event of a landslide emergency, please call 911 for local authorities.

For questions about the nature, distribution or likelihood of landslides in Arizona, visit our Landslide in Arizona webpage at azgs.az.gov.



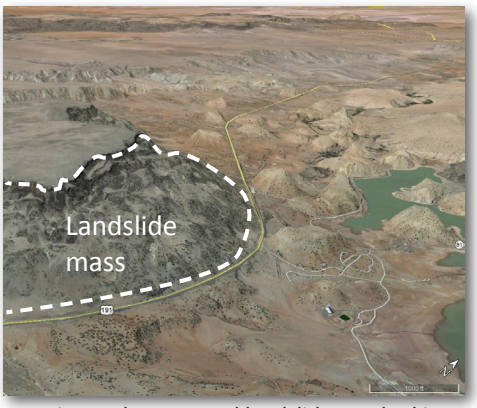
Rotational landslide SR 87, 3/2008

Debris-flow on Sabino Canyon tram road, 7/2006



Massive landslide adjacent to Interstate 17 near Sunset Point Vista. Age and level of recent activity unknown (Image from Google Earth Pro).

Rockfall damage Oak Creek Canyon, 6/2009



Massive undocumented landslide overlooking US 191 north of Eager, near Lyman Lake. Age, size and timing of recent activity are unknown.

Some recent landslides in Arizona

2/20/2013 | US Route 89 Landslide,Echo Cliffs south of Page, Arizona, a Toreva block landslide sliced through US Route 89. Cost ~ $25 million for highway repair.

2/2010|Mudslide covers State HY 87 near Sunflower, Arizona.

6/4/2009 | Rockfall Oak Creek Canyon, 5-foot basalt boulder damages property.

3/21/2008 | State Route 87 Landslide, near mile marker 224. Cost ~ $18 Million.

7/31/2006 |400+ debris-flows occur in mountain ranges of southeastern Arizona; damage in the Santa Catalina's Sabino Canyon top $1,000,000.

Select Resources

Bibliography of Arizona Landslide Maps and Reports http://repository.azgs.az.gov/uri_gin/azgs/dlio/886

USGS Landslides Hazard Program - http://landslides.usgs.gov/

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