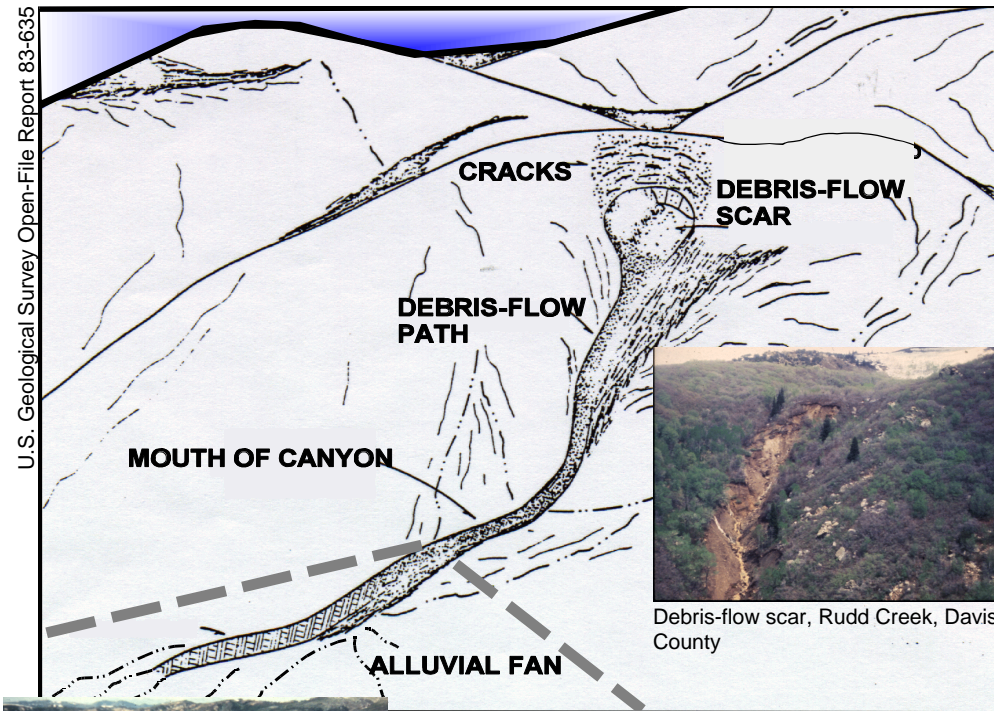


# Debris-Flow Hazards

William F. Case, Utah Geological Survey

Debris flows are often called mudslides, mudflows, or debris avalanches. They consist of debris mixed with water. Debris is mainly soil and anything else, such as trees and



rock fragments that are picked up as the flow moves down a slope or channel.

Debris flows may be generated when hillside colluvium or landslide material becomes rapidly saturated with water and flows into a channel.



Debris-flow scar, Rudd Creek, Davis County



Flow onto alluvial fan, Birch Creek, Sanpete County

Intense rainfall, rapid snowmelt, or high levels of ground water flowing through fractured bedrock triggers the movement. Debris flows and floods also occur when heavy rains on slopes cause extensive hillside erosion and channel scour.

Repeated debris flows and/or floods deposit sediment at the mouth of a canyon, forming an alluvial fan. The fan shape is a result of periodic diversion of the main channel back and forth across the fan. Flows may travel farther down the fan from the mouth of the canyon if the channel becomes entrenched and the flow is confined. Alluvial fans are risky places for homes because it is difficult to predict where flooding or debris flows will occur.

Debris flows can be as thick as wet concrete and can transport boulders as large as a car; debris flows may eventually become muddy flood waters as they deposit their debris.



Rudd Creek debris flow, May 1983, Davis County, showing boulders and muddy flood waters.

Debris flows tend to move in pulses. Early pulses or previous debris flows form levees that channel the flow until the levees are breached. The presence of older levees indicates the recurrence and characteristics of debris flows in a particular canyon. This is valuable information for developing land on the alluvial fan.



Levee of the Rudd Creek debris flow, May 1983, Farmington, Davis County.

## Reduction Of Debris-Flow Risk



Sediment fence reduces erosion on a wet slope denuded by a wild fire, Freeze Creek, Salt Lake County.

Debris-flow risk can be reduced by: (1) preventing debris from entering a stream channel, (2) trapping debris on a hillside, in the channel or in a debris basin before it reaches developed property; or (3) distributing or diverting debris on the alluvial fan away from structures.

Most of the debris in a debris flow is picked up as the flow moves down a stream channel; the debris collects in the channel from slope erosion or from other debris flows that did not make it to the mouth of the canyon. Slope erosion can be reduced by terracing, reseeding after wild fires, and intelligent land use such as controlled grazing.



Gabion used to trap debris in Freeze Creek, Salt Lake County.

Debris can be trapped using sediment fences on slopes, gabion baskets or check dams in channels, and debris basins on alluvial fans.

With proper design and construction, debris and water can be diverted away from buildings by a "plow-shaped" deflection wall, or debris can be trapped with a chain-link fence strengthened to hold the debris.



Debris basin in Farmington, Davis County, to trap debris flows issuing from Rudd Creek.

The Utah Geological Survey documents and evaluates geologic hazards such as debris flows to protect citizens of Utah. If you wish to report a debris flow or other landslide, or want more information, please contact the Utah Geological Survey at:

Utah Geological Survey, PO Box 146100, Salt Lake City, UT 84114-6100, phone 801-537-3300. The office is located at 1594 West North Temple, Salt Lake City. The web site is [www.ugs.state.ut.us](http://www.ugs.state.ut.us)

The Southern Utah Regional Office, Electronic Learning Center, Room 103, Southern Utah University, Box 9053, Cedar City, UT 84720, phone 435-865-8126, cell phone 435-559-0876.