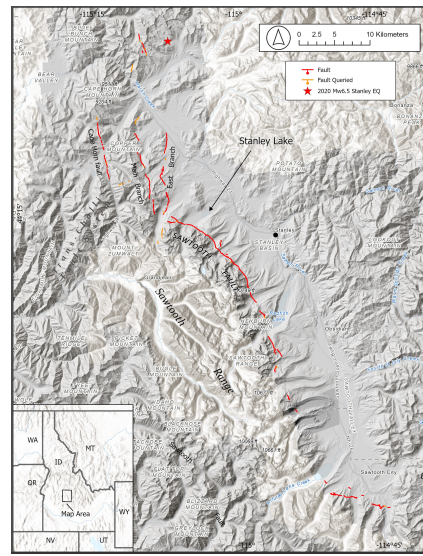


Sawtooth fault mapping

Shapefile



Tags

Sawtooth fault, Cape Horn fault, Shake Creek fault, Boulder Front fault, Stanley earthquake, Idaho, active fault, IGS, Idaho Geological Survey, map

Summary

Mapping of surficial fault scarps along the Sawtooth, Cape Horn, Shake Creek, and Boulder Front faults.

Description

Surface fault scarps were mapped at 1:10,000 scale or greater using Southern Idaho lidar data (FEMA, 2018).

We performed a desktop evaluation of lidar and mapped fault scarps in shapefile format at a scale of 1:10,000 using ESRI ArcGIS software. Active fault scarps were identified through desktop analysis of lidar based on geomorphic evidence described by Hansen et al. (1999) and McCalpin (2009). All mapped scarps were evaluated to exclude those formed by nontectonic processes such as erosion, gravitational slope failure, and those related to glaciation and older pre-Quaternary structures. In some locations, the Sawtooth fault scarps are intersected, adjacent to, or otherwise near features that fit the description of sackungen (McCalpin, 1999). These features can form due to nontectonic processes or as secondary features in response to an earthquake (McCalpin and Jones, 2021). Their surficial expression can be similar to that of a tectonic scarp, which makes them difficult to differentiate. Following the general geomorphic criteria defined by McCalpin (1999), we classified sackungen as scarps that dip opposite that of the main fault, are relatively short and arcuate, and restricted to a particular aspect of a slope. It is likely that some features are classified incorrectly, but this should have a minimal

impact on the hazard characterization of the Sawtooth fault since their extent is limited. In general, the Quaternary fault scarps mapped in this study have a consistent geomorphic expression along strike, they are visible across one or more Quaternary deposits (i.e., alluvium, colluvium, glacial) or landform (i.e., alluvial fan, terrace, deglacial surface, moraine), and often increase in size on older surfaces.

All scarps were digitized systematically to ensure the linework represents the base of the scarp and so that the down-dip direction will be correctly indicated when symbolized in mapping software. Scarps were only digitized where they have geomorphic expression. We did not map scarps as inferred or buried where they are not visible in landforms such as active channels, terraces, waterbodies, or other locations. The attribute scheme is based on the Idaho State Geological Survey attribute scheme for fault scarps and is a work in progress.

GIS Attribute Schema for the Idaho Geological Survey's Active Fault Database:

Field Name	Description	Data Type
OBJECTID	Automatic ESRI field	Object ID
Shape	Automatic ESRI field	Geometry
Id	Fault identification number	Long
FaultName	Fault name	Text
source	Source of mapping. Indicates if the mapping was adopted from another source, or what the basis is for new mapping.	Text
Shape_Leng	Length of line feature	Double
FaultAge	Age of fault. Based on historical ruptures, paleoseismic studies, or age of faulted deposits.	Text
SlipSense	Sense of slip. Normal, reverse, or strike-slip (right-lateral or left-lateral).	Text
DipDirecti	Fault dip direction	Text
SlipRate	Slip rate. Based on paleoseismic or neotectonic studies where available. Otherwise based on estimates of offset and age.	Text
Mapper	Name of mapper	Text
	Location confidence. Estimate of the accuracy of	

Loc_Con	the location of the mapped line based on the judgement of the mapper and the quality of the basemap. Assigned categories of Good, Moderate, or Poor.	Text
Interp_Con	Interpretation confidence. Estimate of the confidence of the geologic interpretation of mapped feature based on the judgement of the mapper. Assigned categories of Certain or Uncertain.	Text
FaultNum	Fault number used in U.S. Geological Survey's Quaternary Fault and Fold Database.	Text
SectionNam	Fault section name used in U.S. Geological Survey's Quaternary Fault and Fold Database.	Text
FaultZone	Fault zone name used in U.S. Geological Survey's Quaternary Fault and Fold Database.	Text
StrandName	Fault strand name used in U.S. Geological Survey's Quaternary Fault and Fold Database.	Text
Synopsis	Synopsis	Text
Location_Comment	Location comments	Text
Geologic_Setting	Description of the fault's geologic setting.	Text
Geomorph_Expression	Description of the fault's geomorphic expression.	Text
Age_Youngest_Faulted_Dep	Age of youngest deposit offset by the fault.	Text
Detailed_Studies	Description of detailed studies of the fault, including paleoseismic and neotectonic studies.	Text
IGS_Fault_Code	IGS fault code	Long
System_Code	Fault system code	Long
Structure_Code	Fault structure code	Long
System_Name	Fault system name used in U.S. Geological Survey's Quaternary Fault and Fold Database.	Text
Structure_Name	Structure name	Text
Compiler_and_Affil	Name and affiliation of the data compiler.	Text
Shape_Length	Length of line feature	Double

For more details on the mapping, see:

Lifton, Z.M., Zellman, M.S., and Thackray, G.D., 2023, Mapping and Neotectonic Investigation of the Sawtooth Fault, Central Idaho:

Collaborative Research with Idaho Geological Survey, Idaho State University, and BGC Engineering, Inc.: U.S. Geological Survey Earthquake Hazard Program Final Technical Report for External Grant Award Numbers G21AP10270, G21AP10271, and G21AP10272, https://earthquake.usgs.gov/cfusion/external_grants/reports/G21AP10271.pdf.

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Credits

Idaho Geological Survey, 2023
and

Lifton, Z.M., Zellman, M.S., and Thackray, G.D., 2023, Mapping and Neotectonic Investigation of the Sawtooth Fault, Central Idaho: Collaborative Research with Idaho Geological Survey, Idaho State University, and BGC Engineering, Inc.: U.S. Geological Survey Earthquake Hazard Program Final Technical Report for External Grant Award Numbers G21AP10270, G21AP10271, and G21AP10272,
https://earthquake.usgs.gov/cfusion/external_grants/reports/G21AP10271.pdf.

Use limitations

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Extent

West	-115.262483	East	-114.561723
North	44.475775	South	43.836187

Scale Range

Maximum (zoomed in)	1:5,000
Minimum (zoomed out)	1:150,000,000

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