U.S. Department of the Interior
U.S. Geological Survey

Open-File Report 2022–1002
Pamphlet accompanies sheet

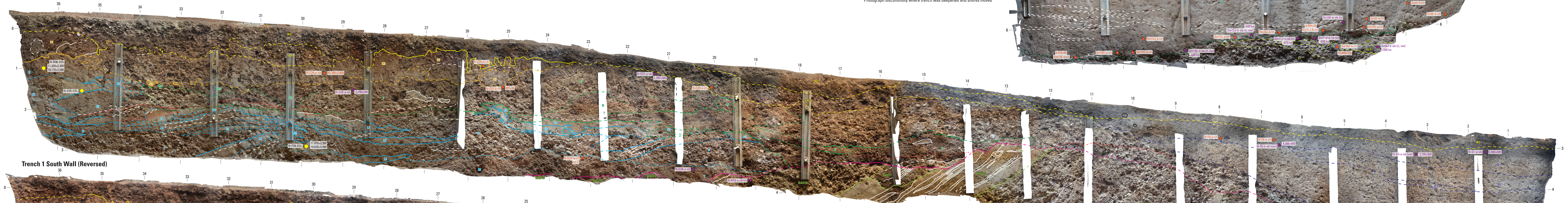
Trench 2 North Wall

Photograph discontinuity where trench was deepened and shores moved

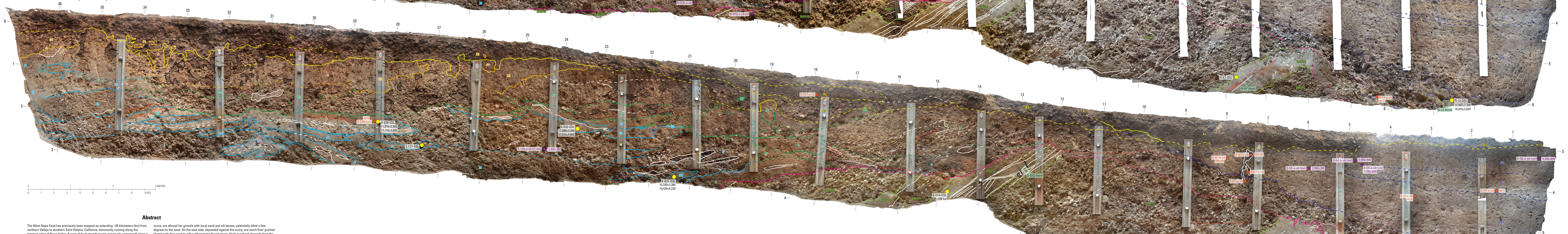
Trench 2 South Wall (Reversed)

Photograph discontinuity where trench was deepened and shores moved

Trench 1 North Wall

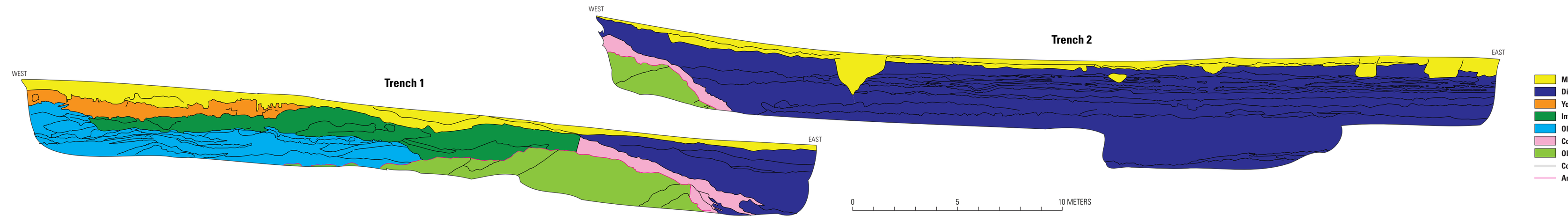


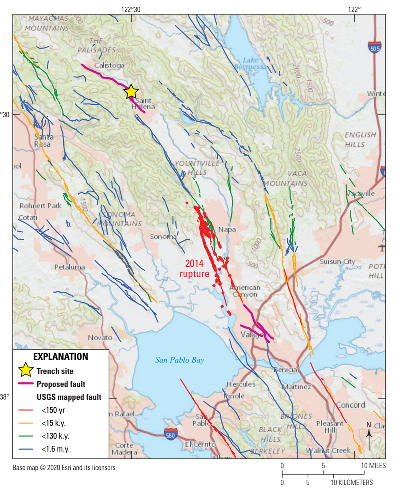
Trench 1 South Wall (Reversed)



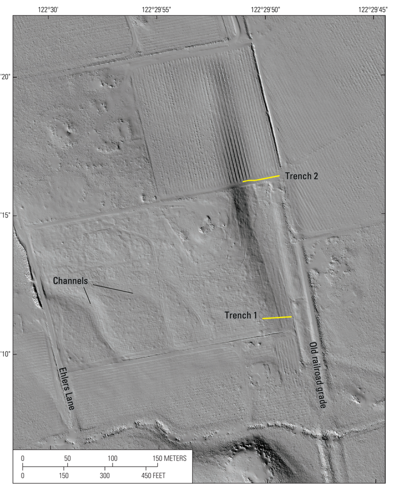
Summary Trench Logs

Simplified logs of trenches 1 and 2 aligned along strike of the scarp. Major sedimentary unit packages and contacts are shown.

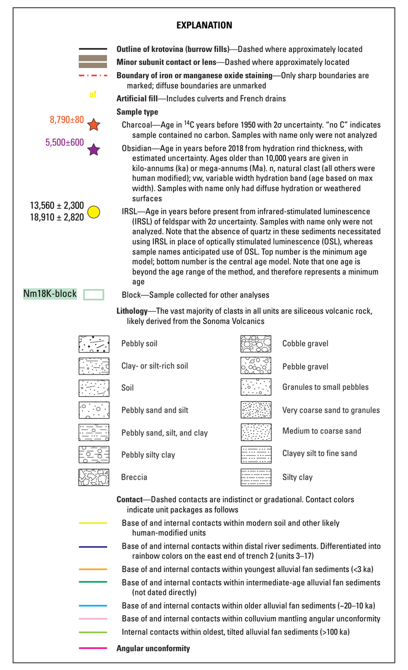




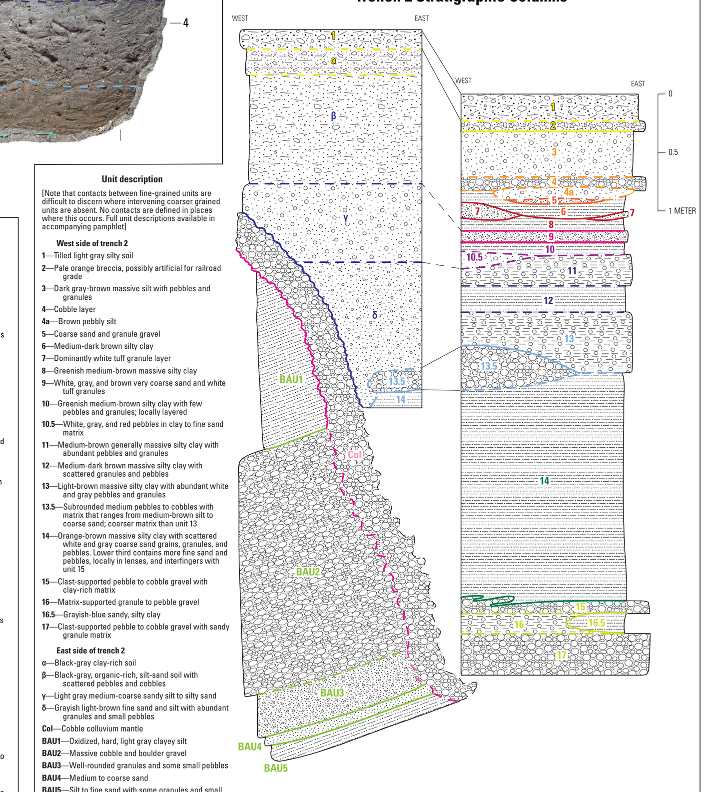
Map of Napa Valley and surrounding areas of California showing locations and estimated last activity of faults in the USGS Quaternary Fault and Fold Database (USGS and CGS, 2019). The 2014 rupture (thick red line; Ponti and others, 2019) and proposed extensions (thick pink line) of the West Napa Fault are also shown. The Ehlers Lane trench site is indicated by a yellow star. k.y., thousand years; m.y., million years.



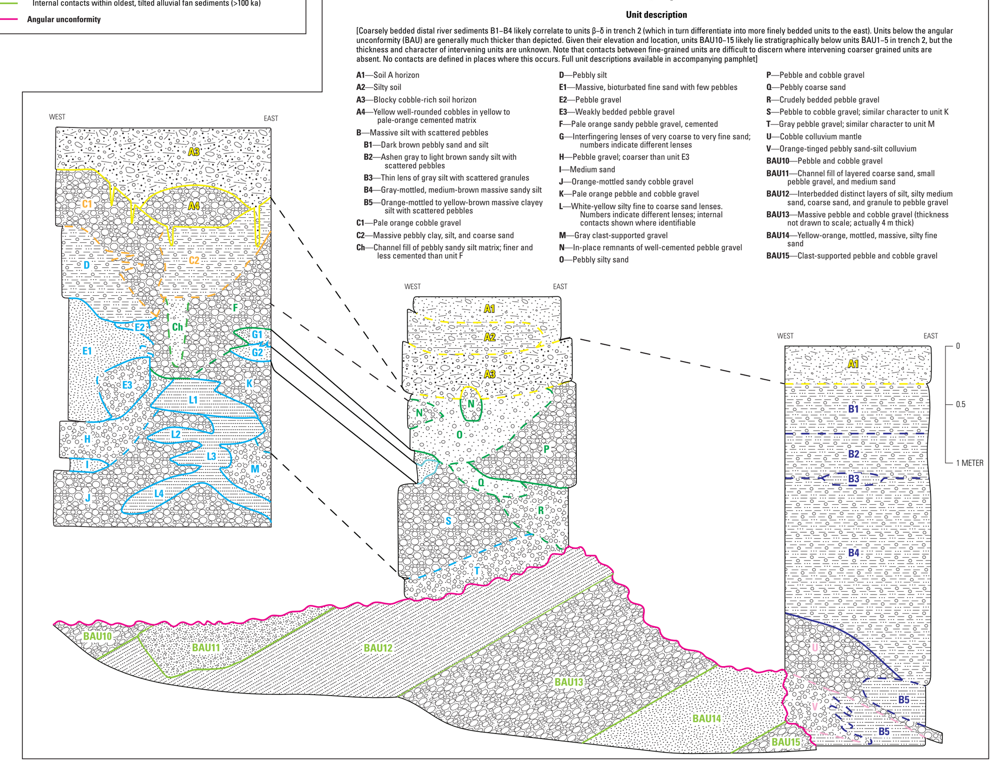
Southwest-illuminated shaded relief of merged airborne and terrestrial light detection and ranging (lidar) topography of the Ehlers Lane site showing trench locations and other features. Airborne lidar is from the 2003 National Center for Airborne Laser Mapping (NCALM) Napa Watershed dataset (NCALM, 2010) and terrestrial lidar was collected during our study in 2017 (Pickering and others, 2021).



Trench 2 Stratigraphic Columns



Trench 1 Stratigraphic Columns



Abstract

The West Napa Fault has previously been mapped as extending ~45 kilometers (km) from northern Vallejo to southern Saint Helena, California, dominantly running along the western edge of Napa Valley. A zone of fault strands (some previously unmapped) along a ~15-km section of the fault ruptured during the 2014 magnitude 6.0 South Napa earthquake, illustrating the need for further investigation of this little-studied structure. Based on light detection and ranging (lidar) topography and field examination, it is likely that the fault zone extends an additional 10 km or more northward past Saint Helena. In this vicinity, geomorphology suggests two fault strands, one along the range front and another associated with a line of rounded hills that rise 5–10 meters above the middle of the valley. In 2017, we excavated two trenches across an apparent fault scarp on the east side of one elongate hill near Ehlers Lane north of Saint Helena. Examination of the walls revealed three main sedimentary packages. The oldest package, weakly lithified alluvial fan gravels with local sand and silt layers, is tilted 25°–35° to the west. Overlying these tilted strata are two younger sets of strata. On the west side, underlying the crest of the scarp, are alluvial fan gravels with local sand and silt lenses, potentially tilted a few degrees to the west. On the east side, deposited against the scarp, are much finer grained (dominantly fine sand to silt) subhorizontal fluvial strata, likely overbank deposits from the Napa River. We obtained age control on the two younger units through a combination of radiocarbon, infrared-stimulated luminescence, and obsidian hydration dating, establishing that they are latest Pleistocene to modern in age. Although there are no prominent unconformities within the alluvial fan sediments, sample dating indicates there are two generations, one in the 10–20 thousand year (ka) age range and one in the <3 ka age range. Owing to a general lack of well-defined laterally continuous alluvial fan units, it is difficult to distinguish contacts between the two generations except in the immediate proximity of dated samples. The river sediments approximately span the Holocene in age. No faults were apparent in either trench, indicating that any fault related to the observed surface deformation has not ruptured to the surface at this site during the Holocene and is likely blind.

Photomosaics and Logs of Trenches Associated with Study of West Napa Fault at Ehlers Lane, North of Saint Helena, California

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