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Quaternary Fault and Fold Database of the United States

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West Tahoe-Dollar Point fault zone (Class A) No. 216

Last Review Date: 2016-12-06

citation for this record: **Bryant, W.A., compiler, 2016, Fault number 216, West Tahoe-Dollar Point fault zone , in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 12/14/2020 03:01 PM.**

Synopsis	The West Tahoe-Dollar Point fault zone is the range bounding normal fault along the west side of the Lake Tahoe basin. This nearly 50-km-long normal fault zone extends north from the Christmas Valley area south of Lake Tahoe, bounds the west side of the steep bathymetric escarpment adjacent to the deepest part of Lake Tahoe and strikes northerly to the Truckee area. The Lake Tahoe basin is a north-trending graben containing more than 400 m of gently west-tilted sediment. Nearby faults include the Incline Village fault [1650], North Tahoe fault (also referred to as the Stateline fault or Stateline-North Tahoe fault) [1649], and the East Tahoe fault [1651]. The West Tahoe fault is delineated by a 10–15 m high scarp in upper Quaternary to Holocene sediments (Schweickert and others, 2004). Near Rubicon Point the West Tahoe fault forms a major 105 m high east-facing bedrock escarpment. The Dollar Point fault onshore offsets Pleistocene

	Bald Mountain olivine latite and Prosser Creek alluvium of Birkeland (1961) (Saucedo, 2005). Assuming a dip of 60° for the West Tahoe fault, Kent and others (2005) reported a slip rate of 0.6+0.4, -0.1 mm/yr. Onshore geologic mapping and a seismic reflection profile and recent detailed bathymetric mapping offshore are the sources of data.
Name comments	West Tahoe-Dollar Point fault zone named by Schweickert and others (1999) for the faults boarding the western side of Lake Tahoe. Saucedo (2005) shows the West Tahoe fault as extending from just north of Emerald Bay to the vicinity of McKinney Bay; the Dollar Point fault extends in a north-northeast direction to Dollar Point and extends north northwest onshore from Dollar Point to just south of Truckee. **Fault ID:** Refers to number 516 (West Tahoe-Dollar Point fault zone) of Jennings and Bryant (2010).
County(s) and State(s)	PLACER COUNTY, CALIFORNIA EL DORADO COUNTY, CALIFORNIA
Physiographic province(s)	CASCADE-SIERRA MOUNTAINS
Reliability of location	Compiled at 1:100,000 to 1:24,000 scale. *Comments:* Location of fault from Qt_flt_ver_3-0_Final_WGS84_polyline.shp (Bryant, W.A., written communication to K.Haller, August 15, 2017). Location of onshore West Tahoe fault is based on Seitz (2016); offshore West Tahoe fault is based on mapping by Saucedo (2005) and Schweickert and others (2000). Traces of the Dollar Point fault are based on mapping by Schweickert and others (2000), Wise and Sylvester (2004), and Franks (1980).
Geologic setting	The Lake Tahoe basin, located in the Jurassic-Cretaceous Sierra Nevada batholith, is the largest of several fault-controlled basins defining the western edge of the Walker Lane deformation belt (Oldrow and others, 2001; Unruh and others, 2003). The Lake Tahoe basin is a north-trending graben containing more than 400 m of gently west-tilted sediment (Hyne and others, 1972). The West Tahoe fault bounds the steep bathymetric escarpment adjacent to the deepest part of the west side of Lake Tahoe; The

	Dollar Point fault extends north from Lake Tahoe to the vicinity of the town of Truckee.
Length (km)	km.
Average strike	
Sense of movement	Normal *Comments:* Seitz (2016), Schweickert and others (2004); Kent and others (2005); Seitz (2016).
Dip Direction	E *Comments:* Schweickert and others (2004) state fault is steeply east-dipping; Kent and others (2005) assumed a 60° dip for estimating a dip slip rate. Seitz (2016) exposed east-dipping traces of the West Tahoe.
Paleoseismology studies	Osgood Swamp site (216-1) by Seitz (2015) excavated one fault normal trench across east-facing scarp on fine-grained alluvial sediments within a glacial moraine complex. Trench exposed faulted late Tioga-aged glacial deposits and overlying alluvial sediments and interbedded peat deposits.
Geomorphic expression	West Tahoe fault is characterized by east-facing scarps indicating predominantly down-to-east normal displacement. The offshore portion of the West Tahoe fault is delineated by 10- to 15-m-high scarps in late Pleistocene to Holocene deposits. Near Rubicon Point the West Tahoe fault forms a major 105 m high east-facing bedrock escarpment. Just east of Sugar Pine Point the West Tahoe fault is characterized by a prominent 37–40 m high east facing scarp in mid-Pleistocene lake deposits. Dollar Point fault offshore south of Dollar Point also has 10- to 15-m-high east-facing scarp on late Pleistocene deposits (Schweickert and others, 1999, 2004). At the northern extent of the Dollar Point fault west of Martis Valley traces of the Dollar Point fault strike more northwesterly and are delineated by saddles, linear ridges, and linear valleys suggestive of a component of dextral strike-slip displacement, based on inspection of 1:24,000-scale topographic maps by copmpiler.
Age of faulted surficial	Dollar Point fault onshore offsets Pleistocene Bald Mountain olivine latite and Prosser Creek alluvium of Birkeland (1961)

deposits	(Saucedo, 2005). Offshore, Schweickert and others (2004) report that the West Tahoe fault is delineated by a 10- to 15-m-high scarp on upper Quaternary to Holocene sediments. Offshore from Sugar Pine Point the West Tahoe fault is delineated by an 8- to 10-m-high scarp on Holocene deposits (Schweickert and others, 2004; Saucedo, 2005). Kent and others (2005) established a 19.2±1.8 ka age of a faulted erosional terrace, based on 14C and OSL dating. The on-land portion of the West Tahoe fault south of Emerald Bay offsets late Pleistocene Tioga-age glacial deposits. At the Osgood Swamp site, Seitz (2015) reported early to mid-Holocene alluvium is offset. Age of the faulted deposits is based on multiple 14C analysis (Seitz, 2015).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Seitz (2015) identified three events at the Osgood Swamp site. The most recent event occurred 5.5 ka and was characterized by 1.4 m vertical offset; the penultimate event occurred 7.2 ka with 0.8 m vertical displacement; and event 3 occurred 9.0 ka with 1.0 m vertical displacement.
Recurrence interval	 *Comments:* Seitz (2015, 2016) reported evidence for three events between 5.5 ka and 9 ka.
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Kent and others (2005) reported a vertical deformation rate of about 0.5 mm/yr for the West Tahoe fault. This rate is based on vertical displacement of 10 m of an approximately 20 ka terrace measured between Rubicon and Cave Rock along the south margin of Lake Tahoe. The age of this erosional terrace is 19.2±1.8 ka, based on 14C and OSL dating (Kent and others, 2005). The difference in elevations of this erosional terrace between Rubicon and Cave Rock is 10–15 m, which is assumed to indicate vertical displacement along the West Tahoe fault. Seitz (2015) reported a closed-interval (5.5–9.0 ka) vertical deformation rate of 0.62 mm/yr.
Date and Compiler(s)	2016 William A. Bryant, California Geological Survey
References	#8099 Franks, A.L., 1980, Environmental geology-land use

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