

Quaternary Fault and Fold Database of the United States

As of January 12, 2017, the USGS maintains a limited number of metadata fields that characterize the Quaternary faults and folds of the United States. For the most up-to-date information, please refer to the [interactive fault map](#).

Fish Lake Valley fault zone, Wildhorse Creek section (Class A) No. 49b

Last Review Date: 1994-06-01

Compiled in cooperation with the California Geological Survey

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Synopsis

General: Major structure consisting of a long zone of right-oblique and normal faults and subsidiary left-lateral faults and thrust faults that extend mainly north from the Northern Death Valley fault zone [114] from California into western Nevada. Most of the fault has been mapped at 1:24,000 scale and trenching has been conducted on the Leidy Creek [49a] and Oasis [49c] sections of the fault zone, but not in the Wildhorse Creek [49b] and Cucomongo Canyon [49d] sections, which border Death Valley National Park. The entire fault zone has been active, repeatedly, in the latest Quaternary (<15 ka), with some sections

having evidence for late Holocene surface rupturing. Slip rates are typically 1–5 mm/yr, but exceed 5 mm/yr along the Oasis section. This fault zone is one of the most active in the western Basin and Range province.

Sections: This fault has 4 sections. The sections are modified from those defined by Brogan and others and by Sawyer who called them subzones, on the basis of distinct differences in fault strike and faulting style and possible differences in the timing of the most recent event along the fault zone. The Leidy Creek and Wildhorse Creek sections are the same as Brogan and others' Chiatovich Creek and Dyer sections and Sawyer's "northern" and "Dyer" subzones. The Oasis section includes the Oasis and Horsethief Canyon sections of Brogan and others, and combines the "eastern" and "western" subzones (parallel fault strands) of Sawyer into one section. The Cucomongo Canyon section is the same as that of Brogan and others.

**Name
comments**

General: Named by Sawyer (1990 #1633) and subsequently adopted in maps by Reheis and others (1993 #648; 1995 #3823). Previously referred to as the northern part of the Furnace Creek fault zone of the northern part of the Death Valley-Furnace Creek fault zone or fault system (*e.g.*, McKee, 1968 #1574; Stewart, 1988 #1654; Brogan and others, 1991 #298; Oldow, 1992 #3821). Extends from Chiatovich Creek in the north to about 12 km south of Last Chance Canyon in northern Death Valley (Machette, 2001 #4773). Joins Northern Death Valley fault zone [141] at Little Sand Springs within northern part of Death Valley National Park.

Section: Named for Wildhorse Creek as suggested by Reheis in a recent article by Machette and others (2001 #4773). Extends from Busher Creek in the north (4 km northwest of Dyer) south to Toler Creek, which is about 7.3 km south of Dyer. Same as the Dyer section of Brogan and others (1991 #298) and "Dyer subzone" of Sawyer (1990 #1633; 1991 #2384). Mainly north-striking faults that occur at the White Mountain range front in a zone 1 km wide or less. Bounded at the north and the south ends by west-striking faults in bedrock (Reheis and others, 1995 #3823).

Fault ID: Refers to fault 211 of Jennings (1994 #2878) and faults DV-1a, -1b, and -1c of dePolo (1998 #2845).

**County(s) and
State(s)**

ESMERALDA COUNTY, NEVADA
MONO COUNTY, CALIFORNIA

Physiographic province(s)	BASIN AND RANGE
Reliability of location	<p>Good Compiled at 1:100,000 scale.</p> <p><i>Comments:</i> Location of most faults on 1:24,000-scale maps (Reheis and others, 1993 #648; 1995 #3823) were compiled at 1:100,000 scale by Reheis and Noller (1991 #1195) and subsequently at 1:250,000 scale by Piety (1995 #915). Some faults were transferred by inspection from 1:24,000 to 1:250,000 scales by the compiler.</p>
Geologic setting	High-angle, right-oblique, down-to-east fault zone in Fish Lake Valley, bounding east side of White Mountains and the east side of the Horsethief Hills (informal name, Reheis, 1992 #1605) between Eureka and Fish Lake valleys.
Length (km)	This section is 10 km of a total fault length of 99 km.
Average strike	N22°W (for section) versus N15°W (for whole fault)
Sense of movement	<p>Normal</p> <p><i>Comments:</i> Nearly all faults appear to have simple normal offset. There are four exceptions: two small thrust faults that bound section on the north and south, one NW-striking right-lateral fault at the mouth of McAfee Creek (inactive since the middle Pleistocene), and one W-striking, apparently left-lateral fault in bedrock north of Perry Aiken Creek (Reheis and others, 1995 #3823). Although this last fault is not known to have Pleistocene offset, it appears to have affected the configuration of the north-striking active faults at the mouth of Perry Aiken Creek.</p>
Dip	<p>83° E</p> <p><i>Comments:</i> There is only one measured dip of 83° E. on the north-striking faults of this section.</p>
Paleoseismology studies	
Geomorphic expression	Very large fault scarps on both bedrock and alluvial-fan deposits characterize this section; the largest single scarp, just north of Perry Aiken Creek, is 85 m high (corrected for fan slope) on a late

	Pleistocene deposit (Reheis and others, 1995 #3823). The scarps show little or no evidence of facets that might represent offset due to a single event.
Age of faulted surficial deposits	Holocene (5 percent), late Pleistocene (65 percent), middle to early Pleistocene (15 percent), Mesozoic and Paleozoic (15 percent).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) <i>Comments:</i> The youngest faulted deposit, the middle alluvium of Marble Creek, is dated by radiocarbon ages on charcoal and buried logs and by tephrochronology at between 1.1 and 1.7 ka. Vertical displacement on this unit is a maximum of 0.9 m north of Perry Aiken Creek (Reheis and others, 1993 #648; 1995 #3823). Because the surface of this unit is continuously faulted through both the Dyer and the Chiatovich Creek sections, the last major event probably ruptured both sections.
Recurrence interval	 <i>Comments:</i> Assumed to be the same as the Leidy Creek section [49a], 500–1500 years.
Slip-rate category	Between 1.0 and 5.0 mm/yr <i>Comments:</i> At Perry Aiken and McAfee Creeks, vertical displacement rates are estimated to be a minimum of 0.7–1.8 mm/yr for the late Pleistocene and about 0.3–0.7 mm/yr since the eruption of the Bishop ash about 760 ka (Reheis and McKee, 1991 #1609; 1995 #3823). Lateral displacement rates are unknown, but certainly larger.
Date and Compiler(s)	1994 Marith C. Reheis, U.S. Geological Survey, Emeritus
References	#298 Brogan, G.E., Kellogg, K.S., Slemmons, D.B., and Terhune, C.L., 1991, Late Quaternary faulting along the Death Valley-Furnace Creek fault system, California and Nevada: U.S. Geological Survey Bulletin 1991, 23 p., 4 pls., scale 1:62,500. #2845 dePolo, C.M., 1998, A reconnaissance technique for estimating the slip rate of normal-slip faults in the Great Basin,

and application to faults in Nevada, U.S.A.: Reno, University of Nevada, unpublished Ph.D. dissertation, 199 p.

#2878 Jennings, C.W., 1994, Fault activity map of California and adjacent areas, with locations of recent volcanic eruptions: California Division of Mines and Geology Geologic Data Map 6, 92 p., 2 pls., scale 1:750,000.

#4773 Machette, M.N., Klinger, R.E., Knott, J.R., Wills, C.J., Bryant, W.A., and Reheis, M.C., 2001, A proposed nomenclature for the Death Valley fault system, *in* Machette, M.N., Johnson, M.L., and Slate, J.L., eds., eds., Quaternary and late Pliocene geology of the Death Valley region—Recent observations on tectonics, stratigraphy, and lake cycles (Guidebook for the 2001 Pacific Cell, Friends of the Pleistocene Fieldtrip): U.S. Geological Survey Open-File Report 01-51, p. J173-J183.

#1574 McKee, E.H., 1968, Age and rate of movement of the northern part of the Death Valley-Furnace Creek fault zone, California: Geological Society of America Bulletin, v. 79, p. 509-512.

#3821 Oldow, J.S., 1992, Late Cenozoic displacement partitioning in the northwestern Great Basin, *in* Craig, S.D., ed., Structure, tectonics, and mineralization of the Walker Lane: Geological Society of Nevada, Proceedings of the Walker Lane symposium, p. 17-52.

#915 Piety, L.A., 1995, Compilation of known and suspected Quaternary faults within 100 km of Yucca Mountain, Nevada and California: U.S. Geological Survey Open-File Report 94-112, 404 p., 2 pls., scale 1:250,000.

#1605 Reheis, M.C., 1992, Geologic map of late Cenozoic deposits and faults in parts of the Soldier Pass and Magruder Mountain 15' quadrangles, Inyo and Mono Counties, California, and Esmeralda County, Nevada: U.S. Geological Survey Miscellaneous Investigations Map I-2268, 1 sheet, scale 1:24,000.

#1609 Reheis, M.C., and McKee, E.H., 1991, Late Cenozoic history of slip on the Fish Lake Valley fault zone, Nevada and California, *in* Late Cenozoic stratigraphy and tectonics of Fish Lake Valley, Nevada and California—Road log and contributions to the field trip guidebook, 1991 Pacific Cell, Friends of the

Pleistocene: U.S. Geological Survey Open-File Report 91-290, p. 26-45.

#1195 Reheis, M.C., and Noller, J.S., 1991, Aerial photographic interpretation of lineaments and faults in late Cenozoic deposits in the eastern part of the Benton Range 1:100,000 quadrangle and the Goldfield, Last Chance Range, Beatty, and Death Valley Junction 1:100,000 quadrangles, Nevada and California: U.S. Geological Survey Open-File Report 90-41, 9 p., 4 sheets, scale 1:100,000.

#648 Reheis, M.C., Sawyer, T.L., Slate, J.L., and Gillespie, A.R., 1993, Geologic map of late Cenozoic deposits and faults in the southern part of the Davis Mountain 15' quadrangle, Esmeralda County, Nevada: U.S. Geological Survey Miscellaneous Investigations Map I-2342, 1 sheet, scale 1:24,000.

#3823 Reheis, M.C., Slate, J.L., and Sawyer, T.L., 1995, Geologic map of late Cenozoic deposits and faults in parts of the Mt. Barcroft, Piper Peak, and Soldier Pass 15' quadrangles, Esmeralda County, Nevada, and Mono County, California: U.S. Geological Survey Miscellaneous Investigations Map I-2464, 2 sheets.

#1633 Sawyer, T.L., 1990, Quaternary geology and neotectonic activity along the Fish Lake Valley fault zone, Nevada and California: Reno, University of Nevada, unpublished M.S. thesis, 379 p., 6 pls.

#2384 Sawyer, T.L., 1991, Quaternary faulting and Holocene paleoseismicity of the northern Fish Lake Valley fault zone, Nevada and California, *in* Field trip to Fish Lake Valley, California-Nevada:, Friends of the Pleistocene, Pacific Cell, May 31-June 2, 1991, Guidebook, p. 114-138.

#1654 Stewart, J.H., 1988, Tectonics of the Walker Lane belt, western Great Basin—Mesozoic and Cenozoic deformation in a zone of shear, *in* Ernst, W.G., ed., Metamorphism and crustal evolution of the western United States, Ruby Volume VII: Englewood Cliffs, New Jersey, Prentice Hall, p. 683-713.

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