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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.

Little Salmon fault zone (Class A) No. 15

Last Review Date: 1999-03-24

Compiled in cooperation with the California Geological Survey

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Synopsis	
Name comments	Initially named and mapped by Ogle (1953 #4929), who also named and mapped the connecting Yager fault. Kelsey and Allwardt (1984 #4928) applied the name Little Salmon to the southeast extension of both faults, and subsequent workers generally applied the name Little Salmon fault or fault zone to all of the closely related faults in the zone. Other names applied locally (e.g., Bay Entrance, Buhne Point faults). **Fault ID:** Refers to number 47 (Little Salmon fault) (onshore) of Jennings (1994 #2878); also includes his number 46 (east trace of

	Little Salmon), 41 (Bay Entrance), 45 (North Spit), 51 (Yager), and 52 (Goose Lake), as well as Buhne Point of Woodward-Clyde Consultants (1980 #4934). Does not include number 37 (Little Salmon offshore) of Jennings (1994 #2878) or the Table Bluff-Tompkins Hill faults of McCrory (1996 #1217).
County(s) and State(s)	HUMBOLDT COUNTY, CALIFORNIA
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:62,500 scale. *Comments:* Locations based on digital revisions to Jennings (1994 #2878) using original mapping by Ogle (1953 #4929) at 1:62,500 scale, Smith (1982 #4930; 1982 #4931) and Wills (1990 #4933) at 1:24,000 scale.
Geologic setting	The Little Salmon fault zone is part of a broad, compressional thrust/fold belt developed in the accretionary wedge above the Cascadia subduction zone [781] (Carver, 1992 #4919). The 40-km-long onshore fault zone may extend another 40 km into the offshore as discontinuous thrust faults and folds (Clarke, 1990 #4143; 1992 #4919; McCrory, 1996 #1217). The zone is a northeast-dipping imbricate thrust zone that offsets all late Cenozoic sedimentary units of the Eel River basin. Faulting is associated with folding, most of which occurred in Quaternary time and continues to the present. Estimates of total dip-slip displacement vary and may be as much as 7 km with a late Quaternary slip rate as much as 10 or 12 mm/yr (Carver, 1987 #4918; Clarke, 1992 #4092; 1992 #4919; McCrory, 1996 #1217).
Length (km)	91 km.
Average strike	N44°W
Sense of movement	Thrust *Comments:* Ogle (1953 #4929), Woodward-Clyde Consultants (1980 #4934), Carver and Burke (1988 #4926), McCrory (1996 #1217).
Dip	25–30° NE

	Comments: Woodward-Clyde Consultants (1980 #4934), Carver and Burke (1988 #4926), McCrory (1996 #1217).
Paleoseismology studies	Eight trenches and two auger holes were dug across a rounded scarp on the western trace at the Little Salmon Creek paleoseismic site (15-1) revealing a deformed zone 75 m wide and a shallow NE-dipping thrust that offsets a sequence of late Holocene soils and floodplain deposits (Carver and Burke, 1988 #4926; Clarke and Carver, 1992 #4091). Based on radiocarbon age determinations, at least three events occurred in late Holocene time, the last during the past 400–500 years: a slip rate of 5.5 mm/yr was determined from this site 15-1. Dip-slip per event was estimated to be 3.3–4.5 m for the western trace (Carver and Burke, 1988 #4926). The eastern trace of the Little Salmon fault was also trenched nearby and similar but smaller surface displacements were interpreted "that may be synchronous" with the three events on the main trace (Clarke and Carver, 1992 #4091). Total slip per event for both traces was estimated to be 4.5–7 m (Carver, 1992 #4919). Based on the same data, McCrory (1996 #1217) recalculated the offsets per event and made more conservative slip-rate estimates. Another paleoseismic site [15-2] on the Goose Lake fault trace indicated at least two displacements of lakebeds dated at 16,100±110 yrs B.P. and a possible slip rate of 0.3 to 1.0 mm/yr (Woodward-Clyde Consultants, 1980 #4934). A sharp step in the soil shown on the log of trench T-1 suggests late (?) Holocene displacement. Based on four late Holocene subsidence events in the nearby Freshwater syncline (Vick, 1988 #4932), additional late Holocene events have been identified that may be related to the Little Salmon fault (Carver and others, 1989 #4927), however, McCrory (1996 #1217) considers this relationship as unconfirmed. Other trench and boring investigations by Woodward-Clyde Consultants (1980 #4934) near the College of the Redwoods and Humboldt Bay revealed the location and geometry of several late Quaternary thrust faults and other structures related to the Little Salmon fault. Their work is summarized in some detail by McCrory (1996 #1217).
Geomorphic expression	Locally defined by linear scarps, benches and breaks in slope along southwest-facing escarpment, but mostly not well defined

	geomorphically. Some traces concealed by water, young alluvium or landslides (Smith, 1982 #4930; Carver and Burke, 1988 #4926; Wills, 1990 #4933).
Age of faulted surficial deposits	All faults offset late Pleistocene units with the exception of the Yager fault, which offsets sediment of the Eel River/Rio Dell Formation of Pliocene-Pleistocene age (Ogle, 1953 #4929; Woodward-Clyde Consultants, 1980 #4934; McCrory, 1996 #1217). The west and east traces of the Little Salmon fault offset Holocene alluvium and soils radiocarbon dated at 430±70 yrs B.P. (Carver and Burke, 1988 #4926) and the Goose Lake trace offsets lakebeds dated as 16,100±110 yrs B.P.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Carver and Burke (1988 #4926) date the last event as occurring in the past 430±70 yrs, based on a radiocarbon date of the uppermost faulted soil.
Recurrence interval	400 to 800 yrs (<1,700 yrs) *Comments:* Carver and Burke (1988 #4926) interpret three events in the past 1,700 yrs. McCrory (1996 #1217) reviewed the data and estimated a recurrence of 400–1,000 years.
Slip-rate category	Greater than 5.0 mm/yr *Comments:* Clarke and Carver (1992 #4091) estimated a combined late Holocene deformation rate of 6–12 mm/yr across the western (main) and eastern traces. McCrory (1996 #1217) has a more conservative estimate of 3.3–4.3 mm/yr on the western (main) trace but does not suggest a slip rate for the eastern trace. Her estimate for the Yager fault is 3.6–5.4 mm/yr during the past 1.0–1.5 m.y.
Date and Compiler(s)	1999 Earl W. Hart, California Geological Survey
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Questions or comments?