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Wassuk Range fault zone (Class A) No. 1300

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Synopsis	This long, prominent fault zone bounds the east side of the Wassuk Range and of Anchorite Hills. Together the Wassuk Range and the Anchorite Hills define a west-tilted structural block. Although the rake of striae at one location suggest a dextral component, the Wassuk Range fault zone is generally considered to have predominately normal movement. The overall right stepping geometry of the fault zone from east of Butler Mountain north lead previous investigators to speculate that right-lateral displacement characterizes movement along the east flank of the northern Wassuk Range and in the Weber Reservoir area. The range-front faults juxtapose Quaternary piedmont-slope deposits against bedrock along the abrupt, precipitous front of the Wassuk Range that, in the vicinity of Mt. Grant (elev. 3,426 m), exceeds 2,200 meters of topographic relief. Reconnaissance photogeologic and field-based mapping of the fault zone are the sources of data. Trench investigations and detailed studies of scarp morphology

	have not been completed; currently the fault zone is being mapped in detail, based on analysis of recently acquired 1:12,000-nominal-scale low-sun-angle photography by Sheryl Fontaine and Steve Wesnousky, University of Nevada Reno.
Name comments	Refers to faults bounding east side of the Wassuk Range and Anchorite Hills, mapped by Slemmons (1966, unpublished Walker Lake 1:250,000-scale map; 1968, unpublished Reno 1:250,000-scale map), King (1978 #2897), Stewart and others (1981 #2892; 1981 #2893; 1981 #2894; 1981 #2898; 1982 #2873), Dohrenwend (1982 #2481; 1982 #2870), Bell (1984 #105), Demsey (1987 #2896), and Yount and others (1993 #621); several investigators have referred to it as the Wassuk Range fault zone (*e.g.*, Demsey, 1987 #2896). **Fault ID:** Refers to fault numbers WL11A, WL11B, and WL11C (Wassuk Range fault system) of dePolo (1998 #2845).
County(s) and State(s)	LYON COUNTY, NEVADA MINERAL COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Fault locations chiefly based on 1:62,500-scale map of Stewart and others (1981 #2892; 1981 #2893; 1981 #2894; 1981 #2898). These locations were checked against 1:250,000-scale map of Dohrenwend (1982 #2481), which was produced by photogeologic analysis of 1:58,000-nominal-scale color-infrared photography transferred directly to 1:100,000-scale topographic quadrangle maps enlarged to scale of the photographs. North of 39° north latitude, fault locations are mainly based on 1:250,000-scale map of Bell (1984 #105) and supplemented by same scale map of Slemmons (1966, unpublished Walker Lake 1:250,000-scale map; 1968, unpublished Reno 1:250,000-scale map). Mapping by Bell (1984 #105) is from photogeologic analysis of 1:40,000-scale low sun-angle aerial photography, supplemented with 1:12,000-scale of selected areas, and several low-altitude aerial reconnaissance flights and field reconnaissance of major structural and stratigraphic relationships. Mapping by Slemmons is from analysis of 1:60,000-scale AMS photography transferred to mylar overlaid onto a 1:250,000-scale topographic map using

	proportional dividers.
Geologic setting	This fault zone consists of: (1) range-front faults bounding entire east front of the Wassuk Range and of Anchorite Hills; (2) piedmont and intrabasin faults in Whiskey Flat, from Whiskey Spring northwest to west of Hawthorne, southwest of Schurz, and extending from White Mountain near north end of range northwest approximately 17 km to southeast of Parker Butte and northward across Campbell Valley and Sunshine Flat to south side of Desert Mountains; (3) intermontane faults in the Anchorite Hill southeast of Anchorite Pass and from south of Box Canyon northward to Jim Canyon; and (4) intra-plateau faults in the southwestern part of Excelsior Mountains from west of Government Well in Huntoon Valley to south edge of Whiskey Flat (Slemmons, 1966, unpublished Walker Lake 1:250,000-scale map; 1968, unpublished Reno 1:250,000-scale map; King, 1978 #2897; Stewart and others, 1981 #2892; 1981 #2893; 1981 #2894; 1981 #2898; 1982 #2873; Dohrenwend, 1982 #2481; 1982 #2870; Bell, 1984 #105; Demsey, 1987 #2896; Yount and others, 1993 #621). Together the Wassuk Range and the Anchorite Hills define a west-tilted structural block (Stewart, 1988 #1654). Although the rake of striae at one location suggest a dextral component, the Wassuk Range fault zone is considered to have predominately normal movement (Stewart, 1988 #1654).
Length (km)	116 km.
Average strike	N5°W
Sense of movement	Normal *Comments:* Even though the fault is generally reported to exhibit normal displacement (Slemmons, 1966, unpublished Walker Lake 1:250,000-scale map; 1968, unpublished Reno 1:250,000-scale map; King, 1978 #2897; Demsey, 1987 #2896), Stewart (1978 #2866) reported evidence for normal-dextral movement at one site where a N. 20° W.-striking fault exhibits slickenside striae raking 60° S. Bell (1981 #2875) stated that although no definitive evidence exists in the Weber Reservoir area for right-lateral movement, the morphology of the scarps is similar to scarps along strike-slip faults in the Pyramid Lake fault zone. Bingler (1978 #2966) believed that northwest-striking faults bounding east front of northern Wassuk Range are possible Walker Lane structures, implying strike-slip motion.

Dip	45° E. *Comments:* Stewart (1978 #2866, p. 690) reported that the Wassuk fault dips 45° E. at an unspecified location without reference to faulted materials.
Paleoseismology studies	
Geomorphic expression	The northern part of the fault is expressed by discontinuous scarps on Holocene and upper Pleistocene alluvium and on latest Pleistocene lacustrine deposits at and adjacent to east front of the northern Wassuk Range, by piedmont faults southwest of Schurz to north and northwest of Reservation Hill, and intra basin fault extending across Campbell Valley and Sunshine Flat to south side of Desert Mountains (Slemmons, 1968, unpublished Reno 1:250,000-scale map; King, 1978 #2897; Dohrenwend, 1982 #2481; Stewart and others, 1982 #2873; Bell, 1984 #105; Demsey, 1987 #2896; Yount and others, 1993 #621). Demsey (1987 #2896) reported evidence of two paleoearthquakes that ruptured the northern section during the Holocene, producing scarps that represent 6–7 m of vertical displacement. The average vertical displacement the most recent fault scarps ranges from 2–4 m (Demsey, 1987 #2896). King (1978 #2897) reported scarp heights as high as 9–65 m along this part of the fault, however, the larger scarps may include wave-cut slopes identified by Slemmons (1968, unpublished Reno 1:250,000-scale map). The fault near Walker Lake is similarly expressed as short discontinuous northwest-trending scarps on Holocene and Pleistocene alluvium and by faults that juxtapose middle and lower Pleistocene alluvium against bedrock (Stewart and others, 1981 #2892; 1981 #2898). Demsey (1987 #2896) reported that average vertical displacement represented by the most recent scarps is 1–2.5 m A few short faults in Cretaceous bedrock are expressed as aligned drainages and saddles. These faults are included in this group because they are in close proximity and are aligned with faults having demonstrably Quaternary displacement. South of Hawthorne, Nev., the range-front fault bounds a large east-facing salient at front of the southern Wassuk Range and extends south along the Anchorite Hills (Stewart and others, 1981 #2893; Dohrenwend, 1982 #2481; 1982 #2870). On the northeast

	and east sides of the salient, several short faults on the piedmont slope are expressed as discontinuous scarps that face both northeast and southwest (Stewart and others, 1981 #2893). Demsey (1987 #2896) reported average vertical displacements of upper piedmont-slope surfaces across the most recent fault scarps ranging 0.8–3.5 m. Another zone of distributed intrabasin faults forms a series of short northwest and southeast-facing scarps on Quaternary alluvium southeast of the salient in the vicinity of Whiskey Flat. Intermontane faults that we include here are expressed as aligned drainages and saddles, sidehill benches and small escarpments in the Anchorite Hills and southwestern Excelsior Mountains (Stewart and others, 1981 #2894). dePolo (1998 #2845) reported pronounced basal facets up to 317 to 365 m high along most of the Wassuk Range front, except where they have been obscured by landslides.
Age of faulted surficial deposits	Holocene; late Pleistocene; Pleistocene; Tertiary. Faults displace Holocene and late Pleistocene alluvium and juxtapose middle and late Pleistocene alluvium against bedrock (Bell, 1981 #2875; 1984 #105; Stewart and others, 1981 #2892; 1981 #2893; 1981 #2894; 1981 #2898; Dohrenwend, 1982 #2481; 1982 #2870; Demsey, 1987 #2896). Near the south end of the fault zone, many faults only offset bedrock but are included in this group because of there similar strike and proximity to demonstrably young faults.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Although timing of most recent event is not well constrained, a latest Quaternary time is shown by the offset of deposits that postdate the 13-ka highstand of pluvial Lake Lahontan (Slemmons, 1966, unpublished Walker Lake 1:250,000-scale map; 1968, unpublished Reno 1:250,000-scale map; Stewart and others, 1981 #2892; 1981 #2893; 1981 #2894; 1981 #2898; Dohrenwend, 1982 #2481; 1982 #2870; Bell, 1984 #105; Demsey, 1987 #2896; Dohrenwend and others, 1996 #2846).
Recurrence interval	4.5 k.y. (<13 ka) *Comments:* Demsey (1987 #2896) estimated a preferred recurrence interval of 4.5 ka based on two Holocene events along the northern part of the fault. Furthermore, he suggested that the

	recurrence interval for the southern Wassuk fault zone may be similar to the northern part of the fault.
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Near Rose Creek, Demsey (1987 #2896) estimated a vertical displacement rate of 0.4–0.5 mm/yr based on 6.3–7.7 m offset occurring after the highstand of pluvial Lake Lahontan (~13 ka). dePolo (1998 #2845) suggests a preferred reconnaissance vertical displacement rate of 0.55 mm/yr based on recalculating Demsey's scarp data and using a revised age for the highstand of 12.6–3.1 ka (Adams and Wesnousky, 1996 #2895).
Date and Compiler(s)	1999 Kenneth Adams, Piedmont Geosciences, Inc. Thomas L. Sawyer, Piedmont Geosciences, Inc.
References	#2895 Adams, K.D., and Wesnousky, S.G., 1996, Shoreline processes and the age and elevation of Lake Lahontan highstand in the Jessup Embayment, Nevada, *in* 1996 Quaternary history, isostatic rebound and active faulting in the Lake Lahontan Basin, Nevada and California: Friends of the Pleistocene Pacific Cell field trip guidebook, p. 24. #2875 Bell, J.W., 1981, Quaternary fault map of the Reno 1° by 2° quadrangle, Nevada-California: U.S. Geological Survey Open-File Report 81-982, 62 p., http://pubs.er.usgs.gov/publication/ofr81982. #105 Bell, J.W., 1984, Quaternary fault map of Nevada—Reno sheet: Nevada Bureau of Mines and Geology Map 79, 1 sheet, scale 1:250,000. #2966 Bingler, E.C., 1978, Geologic map of the Schurz quadrangle: Nevada Bureau of Mines and Geology Map 60, 1 sheet, scale 1:48,000. #2896 Demsey, K., 1987, Holocene faulting and tectonic geomorphology along the Wassuk Range, west-central Nevada: Tucson, University of Arizona, unpublished M.S. thesis, 64 p. #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.

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