

PALEOSEISMOLOGY OF UTAH, VOLUME 20

COMPILATION OF U.S. BUREAU OF RECLAMATION SEISMOTECTONIC STUDIES IN UTAH, 1982–1999

Compiled by William R. Lund, Steve D. Bowman, and Lucille A. Piety



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*Cover photo: Jordanelle Dam, Wasatch County, Utah
(photo courtesy of the U.S. Bureau of Reclamation).*



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FOREWORD

This Utah Geological Survey Miscellaneous Publication, *Paleoseismology of Utah, Volume 20—Compilation of U.S. Bureau of Reclamation Seismotectonic Studies in Utah, 1982–1999*, is the twentieth report in the Paleoseismology of Utah series. This series makes the results of paleoseismic investigations in Utah available to geoscientists, engineers, planners, public officials, and the general public. These studies provide critical information regarding paleoearthquake parameters such as earthquake timing, recurrence, displacement, slip rate, fault geometry, and segmentation, which can be used to characterize potential seismic sources and evaluate the long-term seismic hazard of Utah's Quaternary faults.

As part of the Paleoseismology of Utah series, the Utah Geological Survey has begun to acquire, scan, and release in digital format previously hard to access "legacy" reports of paleoseismic fault investigations conducted in Utah. This compilation of eight seismotectonic reports pertaining to seismic safety evaluations conducted during the 1980s and 1990s for U.S. Bureau of Reclamation dams in Utah is the first such legacy document released in the Paleoseismology series. In chronological order, the reports in the compilation include:

- Seismotectonic Report 82-1, 1982, *Seismotectonic Study for Soldier Creek Dam, Central Utah Project*
- Seismotectonic Report 85-2, 1985, *Seismotectonic Study for Taskeech Dam and Reservoir Site, Upalco Unit, and Upper Stillwater Dam and Reservoir Site, Bonneville Unit, Central Utah Project, Utah*
- Seismotectonic Report 86-4, 1986, *Seismotectonic Study for Mona Dam and Reservoir, Central Utah Project, Utah*
- Seismotectonic Report 86-7, 1986, *Seismotectonic Study for Joes Valley, Scofield, and Huntington North Dams, Emery County and Scofield Projects, Utah*
- Seismotectonic Report 87-2, 1987, *Seismic Sources, Maximum Credible Earthquakes, and Related Seismic Hazards for Monks Hollow Dam Site, Central Utah Project, Utah*
- Seismotectonic Report 88-5, 1988, *Central Utah Regional Seismotectonic Study for USBR Dams in the Wasatch Mountains*
- Seismotectonic Report 88-6, 1988, *Seismotectonic Study for Jordanelle Dam, Bonneville Unit, Central Utah Project, Utah*
- Seismotectonic Report 98-2, 1999, *Seismotectonic Report for Flaming Gorge Dam, Colorado River Storage Project, Northeastern Utah*

These reports were performed at varying levels of detail depending on the dam or dams involved, but generally include descriptions of regional geology, tectonics, and seismicity, and details of the seismotectonic investigations conducted for the dams (geologic mapping, geomorphic evaluations, trenching, test borings, geophysics, surface-fault-rupture-hazard analyses, and design earthquake magnitude estimates).

This compilation presents the first paleoseismic information generated for many of the Quaternary faults in the report study areas, and while some of the data contained here have since been superseded by subsequent investigations, for several faults these reports remain the only available paleoseismic information. In addition to being a valuable historical archive, this compilation will be useful for professionals and governmental agencies involved with current paleoseismic investigations; other geological, geotechnical, and environmental investigations; and land-use planning efforts.

Determining the paleoseismic parameters for Utah's Quaternary faults is important because those data help refine fault activity and hazard models and improve earthquake-hazard evaluations for the region, all of which help reduce Utah's earthquake-related risk.

William R. Lund, Editor

Paleoseismology of Utah Series

PALEOSEISMOLOGY OF UTAH SERIES PUBLICATIONS

UGS publications produced as part of the Paleoseismology of Utah series may be found online at http://geology.utah.gov/ghp/consultants/paleoseismic_series.htm.

1. Fault behavior and earthquake recurrence on the Provo segment of the Wasatch fault zone at Mapleton, Utah County, Utah—Paleoseismology of Utah, Volume 1, 1991, by Lund, W.R., Schwartz, D.P., Mulvey, W.E., Budding, K.E., and Black, B.D.: Utah Geological Survey Special Study 75, 41 p.
2. Paleoseismic analysis of the Wasatch fault zone at the Brigham City trench site, Brigham City, Utah and the Pole Patch trench site, Pleasant View, Utah—Paleoseismology of Utah, Volume 2, 1991, by Personius, S.F.: Utah Geological Survey Special Study 76, 39 p.
3. The number and timing of paleoseismic events on the Nephi and Levan segments, Wasatch fault zone, Utah—Paleoseismology of Utah, Volume 3, 1991, by Jackson, M.: Utah Geological Survey Special Study 78, 23 p., 3 plates.
4. Seismotectonics of north-central Utah and southwestern Wyoming—Paleoseismology of Utah, Volume 4, 1994, by West, M.W.: Utah Geological Survey Special Study 82, 93 p., 5 plates, scale 1:100,000.
5. Neotectonic deformation along the East Cache fault zone, Cache County, Utah—Paleoseismology of Utah, Volume 5, 1994, by McCalpin, J.P.: Utah Geological Survey Special Study 83, 37 p.
6. The Oquirrh fault zone, Tooele County, Utah—surficial geology and paleoseismicity—Paleoseismology of Utah, Volume 6, 1996, by Lund, W.R., editor: Utah Geological Survey Special Study 88, 64 p., 2 plates, scale 1:24,000.
7. Paleoseismic investigation on the Salt Lake City segment of the Wasatch fault zone at the South Fork Dry Creek and Dry Gulch sites, Salt Lake County, Utah—Paleoseismology of Utah, Volume 7, 1996, by Black, B.D., Lund, W.R., Schwartz, D.P., Gill, H.E., and Mayes, B.H.: Utah Geological Survey Special Study 92, 22 p., 1 plate.
8. Paleoseismic investigation at Rock Canyon, Provo segment, Wasatch fault zone, Utah County, Utah—Paleoseismology of Utah, Volume 8, 1998, by Lund, W.R., and Black, B.D.: Utah Geological Survey Special Study 93, 21 p., 2 plates.
9. Paleoseismic investigation of the Clarkston, Junction Hills, and Wellsville faults, West Cache fault zone, Cache County, Utah—Paleoseismology of Utah, Volume 9, 2000, by Black, B.D., Giraud, R.E., and Mayes, B.H.: Utah Geological Survey Special Study 98, 23 p., 1 plate.
10. Post-Bonneville paleoearthquake chronology of the Salt Lake City segment, Wasatch fault zone, from the 1999 “megatrench” site—Paleoseismology of Utah, Volume 10, 2002, by McCalpin, J.P.: Utah Geological Survey Miscellaneous Publication 02-7, 38 p.
11. Post-Provo paleoearthquake chronology of the Brigham City segment, Wasatch fault zone, Utah—Paleoseismology of Utah, Volume 11, 2002, by McCalpin, J.P., and Forman, S.L.: Utah Geological Survey Miscellaneous Publication 02-9, 46 p.
12. Neotectonics of Bear Lake Valley, Utah and Idaho; a preliminary assessment—Paleoseismology of Utah, Volume 12, 2003, by McCalpin, J.P.: Utah Geological Survey Miscellaneous Publication 03-4, 43 p.

13. Holocene earthquake history of the northern Weber segment of the Wasatch fault zone, Utah—Paleoseismology of Utah, Volume 13, 2006, by Nelson, A.R., Lowe, M., Personius, S., Bradley, L., Forman, S.L., Klauk, R., and Garr, J.: Utah Geological Survey Miscellaneous Publication 05-8, 39 p., 2 plates.
14. Paleoseismic investigation and long-term slip history of the Hurricane fault in southwestern Utah—Paleoseismology of Utah, Volume 14, 2007, by Lund, W.R., Hozik, M.J., and Hatfield, S.C.: Utah Geological Survey Special Study 119, 81 p., CD.
15. Surficial-geologic reconnaissance and scarp profiling on the Collinston and Clarkston Mountain segments of the Wasatch Fault Zone, Box Elder County, Utah—paleoseismic inferences, implications for adjacent segments and issues for diffusion-equation scarp-age modeling—Paleoseismology of Utah, Volume 15, 2007, by Hylland, M.D.: Utah Geological Survey Special Study 121, 18 p., CD.
16. Paleoseismic reconnaissance of the Sevier fault, Kane and Garfield Counties, Utah—Paleoseismology of Utah, Volume 16, 2008, by Lund, W.R., Knudsen, T.R., and Vice, G.S.: Utah Geological Survey Special Study 122, 31 p., CD.
17. Paleoseismic investigation of the northern strand of the Nephi segment of the Wasatch fault zone at Santaquin, Utah—Paleoseismology of Utah, Volume 17, 2008, by DuRoss, C.B., McDonald, G.N., and Lund, W.R.: Utah Geological Survey Special Study 124, 33 p., 1 plate.
18. Paleoseismic investigation of the northern Weber segment of the Wasatch fault zone at Rice Creek trench site, North Ogden, Utah—Paleoseismology of Utah, Volume 18, 2009, by DuRoss, C.B., Personius, S.F., Crone, A.J., McDonald, G.N., and Lidke, D.J.: Utah Geological Survey Special Study 130, 37 p., 2 plates, CD.
19. Late Quaternary faulting in East Canyon Valley, Northern Utah—Paleoseismology of Utah, Volume 19, 2010, by Piety, L.A., Anderson, L.W., and Ostenaar, D.A.: Utah Geological Survey Miscellaneous Publication 10-5, 40 p., CD.