APPENDIX A

DESCRIPTION OF STRATIGRAPHIC UNITS IN TRENCHES AT THE BAILEYS LAKE SITE

Unit[1]	USCS[2]	Texture (wt. %)[3]	Plast.[4]	Dens./ Consist.[5]	Carb. Morph.[6]	Rxn w/HCl[7]	Clast Ang.[8]	Bedding[9]	Lower Bound.[10]	Color, dry (moist)[11]	Soil Development	Comments and Genesis
11	ML	99/1/0	M–H	VSt	none	M	—	NS	Ab–Cl	10YR 6/2 (10YR 4/2)	Modern platy A horizon (soil unit S2); burrowed/root-mixed; pinhole structure, root pores	Organic-rich clayey silt; discontinuous, locally filling in topographic depressions; massive, overprinted by modern A horizon; ***Loess***
10	ML, OL	95/5/0	M	VSt	none	M–S	—	NS	Cl	10YR 6/2 (10YR 4/2)	Organics throughout deposit; locally root-penetrated and burrowed	Disaggregated soil with silt; colluvium composed of small granular soil blocks eroded from prismatic soil (soil unit S1); massive; may be in part contemporaneous with unit 11; ***Scarp-Derived Colluvium (BL1 wedge)***
9	ML	99/1/0	M	VSt	none–II	S	—	NS	Ab–Cl	10YR 8/1 (10YR 7/2)	Prismatic soil (buried; soil unit S1); abundant carbonate (both primary and pedogenic); minor Fe staining; abundant root pores, heavily burrowed	Massive silt with clay; ***Loess***
8	CL	98/2/0	L–M	VSt	none–II	S	—	WS	Ab–Cl	5Y 7/1 (2.5Y 6/2)	Vertical jointing; root pores, locally burrowed	Finely laminated clay, silt, and carbonate (marl); bedding locally wavy; locally cemented with carbonate (depositional); ***Lacustrine (Gilbert episode)***
7	SP	2/98/0	NP	H	none	S	SA	WS	Ab	10YR 5/1 (10YR 3/2)	No soil development; minor burrowing	Dark gray, medium to coarse sand and minor silt; clast-supported texture; locally thinly bedded, fining upward, and cemented with carbonate (likely depositional); thins westward; ***Lacustrine (Gilbert episode [shorezone sand])***

Unit[1]	USCS[2]	Texture (wt. %)[3]	Plast.[4]	Dens./ Consist.[5]	Carb. Morph.[6]	Rxn w/HCl[7]	Clast Ang.[8]	Bedding[9]	Lower Bound.[10]	Color, dry (moist)[11]	Soil Development	Genesis and Comments
6	ML	99/1/0	M	VSt	none–II	M–S	—	V	Ab–Cl	10YR 6/2 (10YR 5/3) to 10YR 8/1 (10YR 6/2)	Organics throughout fine-grained "soil stringers"; some organics mixed with fine-grained colluvium; burrowed; local carbonate cementation	Colluvium comprising disaggregated fragments (fine gravel size) of clay, silt, and sand eroded from scarp, interbedded with 0.5–3 cm thick, organic-rich, fine grained "soil stringers" that thicken to the east and have slope-parallel geometry; ***Scarp-Derived Colluvium (BL2 wedge)***
5	CL	99/1/0	L	VSt	none	S	—	WS	Cl	10YR 7/1 (2.5Y 6/3)	Vertical jointing; root pores with minor Fe staining; minor burrowing	Laminated clay and silt with carbonate (marl); conformably drapes pre-existing topography; locally differentiated as 5a and 5b; upper unit (5b)— finely laminated; lower unit (5a)— laminated to thin bedded, locally massive; few ostracodes, mostly unidentifiable fragments; ***Lacustrine (Gilbert episode)***
4	SW, CH	10/80/10	NP, H	M, VSt	none	S	A–SA	WS–V	Ab	10YR 8/1 (10YR 8/2)	No soil development	Primarily carbonate fragments (reworked "hash") with local in situ precipitated carbonate (locally well-cemented, wavy tufa mats); locally includes clay, silt, and fine to coarse sand; clast-supported texture; ***Lacustrine (Gilbert episode, transgressive [shorezone tufa])***
3	CH	90/10/0	H	VSt	none	W–M	—	WS	Ab	2.5Y 7/2 (5Y 5/2)	Root pores; Fe and Mn staining; pervasive vertical jointing	Finely laminated greenish clay and silt; blocky weathering due to joints and silt partings; prominent parting observed locally 25–30 cm above base; few ostracodes, most broken; ***Lacustrine (Bonneville, regressive phase)***

Unit[1]	USCS[2]	Texture (wt. %)[3]	Plast.[4]	Dens./ Consist.[5]	Carb. Morph.[6]	Rxn w/HCl[7]	Clast Ang.[8]	Bedding[9]	Lower Bound.[10]	Color, dry (moist)[11]	Soil Development	Genesis and Comments
2e	CH, ML	99/1/0	H	VSt	none	W, S	—	WS	Ab	7.5YR 7/3 (7.5YR 5/4)	Root pores and Fe staining; vertical jointing	Massive red clay with 2–3-cm-thick silty clay (upper) and sandy silt (lower) interbeds exhibiting open, upright folds; red color grades to gray in uppermost 10–18 cm; few to abundant ostracodes; ***Lacustrine (Bonneville, mid- to late transgressive phase)***
2d	CL–SP	50/50/0	M–NP	VSt–H	none	M	—	WS	Ab	2.5Y 6/2 (2.5Y 5/3)	No soil development; local Fe staining	Upper part: ~10-cm-thick clay with silt and fine sand; Lower part: ~10-cm-thick fine sand with thin, red and green clay fragments (rip-up clasts); ***Turbidite Marker Bed (Bonneville, mid- to late transgressive phase)***
2c	CH ML–SP	99/1/0 50/50/0	H NP	St M–H	none none	W W	— —	WS WS	Ab Ab	7.5YR 7/2 (7.5YR 5/3) 2.5Y 7/3 (2.5Y 5/3)	Root pores and minor filaments; minor Fe staining	Red clay with gray, 2–10-cm-thick silt and fine sand interbeds; clay beds contain ostracodes, some broken; ***Lacustrine (Bonneville, transgressive phase with turbidites)***
2b	CH	99/1/0	H	St	none	W–S	—	PS	Ab	U: 5YR 8/2 (5YR 4/3) L: 2.5Y 8/2 (2.5Y 7/2)	Root pores, decayed filaments, and considerable oxidation (Fe and Mn) in upper ~0.5 m, where red clay grades to gray with depth; minor carbonate nodules	Massive light gray clay (red in upper ~0.5 m) with few laterally continuous silt partings; prominent parting 15 cm below top; few to abundant ostracodes; ***Lacustrine (Bonneville, transgressive phase)***

Unit[1]	USCS[2]	Texture (wt. %)[3]	Plast.[4]	Dens./ Consist.[5]	Carb. Morph.[6]	Rxn w/HCl[7]	Clast Ang.[8]	Bedding[9]	Lower Bound.[10]	Color, dry (moist)[11]	Soil Development	Genesis and Comments
2a	SM	40/60/0	NP–H	M	none	M	—	WS	Ab	10YR 6/3 (10YR 4/2)	No soil development; local weak to moderate Fe staining; locally cemented with nodular carbonate, especially near fault zone	Ripple-laminated, locally cross-bedded (westerly apparent dip) silty sand with clay interbeds; generally fining upward; gastropod shells and shell fragments and few ostracodes in clay; ***Lacustrine (Bonneville, early transgressive phase)***
1	CH	99/1/0	H	St	none	W–M	—	V	NE	5Y 6/2 (5Y 4/2) to 2.5Y 7/0 (2.5Y 5/0)	Root pores with minor oxidation (mottling), decayed filaments; ≥30-cm-thick oxidized zone; weak vertical structure (fractures); local burrowing	Gray to brown clay thinly interbedded with white fine sand; ***Pre-Bonneville Wetland/Alluvial Marsh***

[1] Units as shown on plate 1, listed in stratigraphic order (top to bottom).
[2] Unified Soil Classification System (ASTM D2488).
[3] Percentages of fines/sand/gravel fractions are field estimates.
[4] Plasticity: NP – nonplastic, L – low, M – medium, H – high.
[5] Density: Ls – loose, L – low, M – medium, H – high; Consistency: Vsf – very soft, S – soft, St – stiff, VSt, very stiff.
[6] Pedogenic carbonate morphology; stage designations after Machette (1985) and Birkeland and others (1991).
[7] Reaction with HCl: W – weak, M – moderate, S – strong.
[8] Clast angularity: A – angular, SA – subangular, SR – subrounded, R – rounded.
[9] Bedding: NS – nonstratified, PS – poorly stratified, WS – well stratified, V – variable.
[10] Lower boundary: Ab – abrupt, Cl – clear, Gr – gradual, NE – not exposed.
[11] Munsell color of matrix. L, lower part of unit; U, upper part of unit.

APPENDIX B

DESCRIPTION OF PEDOGENIC SOIL UNITS IN TRENCHES AT THE BAILEYS LAKE SITE

Unit[1]	Horizon	Depth (cm)	Color, dry (moist)[2]	Structure (type, grade, size)[3]	Gravel (%)	Consistence, dry (wet)[4]	Texture	Clay Films (amount, distinctness, location)	Lower Boundary[5]	Comments
Site 1: West(N) trench, south wall, horizontal meter mark 34.0										
S2	A	0–13	10YR 6/2 (10YR 4/2)	gr–pl, moderate, fine to medium	0	sh (ss, ps)	Silty clay loam	None	a, w	Root penetrated, abundant pores; no visible carbonate.
S2	AB	13–20	10YR 6/2 (10YR 4/2)	massive	0	h (ss, ps)	Silty clay loam	None	a–c, w	Soil developed on loess; abundant roots, root pores, burrowing; no visible carbonate.
S1	Bt	20–40	10YR 6/2 (10YR 4/2)	pr–abk, moderate, fine	0	h (ss, ps)	Silty clay loam to silty clay	Few, faint, clay films line tubular or interstitial pores	c–g, w	Abundant roots, root pores, minor burrowing; minor carbonate, likely inherited from parent material (loess and playa clays).
Site 2: West(N) trench, south wall, horizontal meter mark 15.8										
S2	A	0–20	10YR 6/2 (10YR 4/2)	gr–pl, moderate, fine to medium	0	sh (ss, ps)	Silty clay loam	None	a, w	Root penetrated, abundant pores, burrowed; no visible carbonate.
S2	AB	20–32	10YR 6/2 (10YR 4/2)	massive	0	h (ss, ps)	Silty clay loam	None	a–c, w	Soil developed on loess; abundant roots, root pores, burrowing; no visible carbonate.
S1	Bt	32–47	10YR 6/2 (10YR 4/2)	pr–abk, moderate, fine	0	h (ss, ps)	Silty clay loam to silty clay	Few, faint, clay films line tubular or interstitial pores	c–g, w	Abundant roots, root pores, minor burrowing; minor carbonate, likely inherited from parent material (loess and playa clays).

Note: Abbreviations and symbols used to describe soil properties after Birkeland and others (1991).
[1] Units as shown on plate 1.
[2] Munsell color of matrix.
[3] Structure type: gr – granular, abk – angular blocky, sbk – subangular blocky, pr – prismatic, cpr – columnar, pl – platy.
[4] Dry consistence: lo – loose, so – weakly coherent, sh – slightly hard, h – hard, vh – very hard, eh – extremely hard. Wet consistence (stickiness): so – nonsticky, ss – slightly sticky, s – sticky, vs – very sticky. Wet consistence (plasticity): po – nonplastic, ps – slightly plastic, p – plastic, vp – very plastic.
[5] Boundary distinctness: a – abrupt (<2 cm), c – clear (2–5 cm), g – gradual (5–15 cm), d – diffuse (>15 cm). Topography: s – smooth, w – wavy, i – irregular, b – broken.

APPENDIX C

PROCESSING AND ANALYSIS OF RADIOCARBON SAMPLE MATERIAL FROM THE BAILEYS LAKE SITE BY PALEORESEARCH INSTITUTE

Table C.1. Correlation of original and final sample identification numbers.

Original Field ID[1]	Final ID[2]	Comments
BL-R1	BL-R1	–
BL-R2a	BL-R2-1	–
BL-R2b	BL-R2-2	–
BL-R3a	–	Possible contamination from burrowing; not submitted for processing
BL-R3b	BL-R3-1	7 fragments unidentified hardwood (PRI)
	BL-R3-2	45 fragments unidentifiable charcoal and stems (PRI)
BL-R4	BL-R4	–
BL-R5	BL-R5	–

[1] Sample identification used in PaleoResearch Institute (PRI) report (this appendix).
[2] Sample identification used in this report.

EXAMINATION OF BULK SEDIMENT AND MICROCHARCOAL EXTRACTION FOR SAMPLES FROM THE BAILEYS LAKE TRENCH SITE, SALT LAKE CITY, UTAH

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INTRODUCTION

Six bulk soil samples from two paleoseismic trenches were floated to recover organic fragments suitable for radiocarbon analysis. These samples were collected from the Baileys Lake trench site on the Granger fault in Salt Lake City, Utah, as part of the Utah Geological Survey's efforts to develop detailed information on the timing and recurrence of paleoearthquakes in the West Valley fault zone. Botanic components and detrital charcoal were identified, and potentially radiocarbon datable material was separated. Four of the samples yielded sufficient charred material that can be submitted for AMS radiocarbon analysis. In the absence of larger-sized charred remains, one of the samples was extracted to recover microscopic charcoal/particulate soil organics for dating. Samples for AMS radiocarbon dating will be submitted to Woods Hole Institute.

METHODS

Flotation and Charcoal Identification

The samples were water-screened a 150 micron mesh sieve, taking care to retain all material that passed through the screen for possible microcharcoal and/or humate extraction. The water-screened portion was floated using a modification of the procedures outlined by Matthews (1979). Each sample was added to approximately 3 gallons of water, then stirred until a strong vortex formed. The floating material (light fraction) was poured through a 150 micron mesh sieve. Additional water was added and the process repeated until all floating material was removed from the sample (a minimum of five times). The material that remained in the bottom (heavy fraction) was poured through a 0.5-mm mesh screen. The floated portions were allowed to dry. The light fractions were weighed, then passed through a series of graduated screens (US Standard Sieves with 2-mm, 1-mm, 0.5-mm and 0.25-mm openings) to separate charcoal debris and to initially sort the remains. The contents of each screen then were examined.

Charcoal fragments, when present, were separated and broken to expose fresh cross, radial, and tangential sections, then examined under a binocular microscope at a magnification of 70x and under a Nikon Optiphot 66 microscope at magnifications of 320-800x. The weights of each charcoal type were recorded. The material that remained in the 2-mm, 1-mm, 0.5-mm, and 0.25-mm sieves was scanned under a binocular stereo microscope at a magnification of 10x, with some identifications requiring magnifications of up to 70x. The material that passed through the 0.25-mm screen was not examined. Remains were recorded as charred and/or uncharred, whole and/or fragments. The term "seed" is used to represent seeds, achenes, caryopses, and other disseminules. Macrofloral remains, including charcoal, are identified using manuals (Carlquist 2001; Hoadley 1990; Martin and Barkley 1961; Musil 1963; Panshin and de Zeeuw 1980; Schopmeyer 1974) and by comparison with modern and archaeological references. Because charcoal and possibly other botanic remains were to be submitted for radiocarbon dating, clean laboratory conditions were used during flotation and identification to avoid contamination. All instruments were washed between samples, and samples were protected from contact with modern charcoal.

Microcharcoal Recovery

Now it is possible to recover microscopic charcoal (microcharcoal) from sediments for the purpose of obtaining an AMS radiocarbon age. Microscopic charcoal fragments are far superior to humates because they provide dates with the same precision as those obtained from larger pieces of charcoal, with the single exception that the individual pieces of microscopic charcoal are not identified to taxon.

A chemical extraction technique based on that used for pollen, and relying upon heavy liquid extraction, has been modified to recover microcharcoal for the purpose of obtaining an AMS radiocarbon age. After removing calcium carbonates and iron with hydrochloric acid (10%), the sample was screened through 150 micron mesh. The material remaining in the screen was examined for the presence of macroscopic charcoal. Since no macroscopic charcoal was found, the screened sample then was rinsed until neutral, and a small quantity of sodium hexametaphosphate was added. The sample then was filled with reverse osmosis, deionized (RODI) water and allowed to settle according to Stoke's Law. After two hours the supernatant, containing clay, was poured off and the sample was rinsed with RODI water three more times, being allowed to settle according to Stoke's Law after each rinse to remove more clays. This settling process was repeated until the supernatant was clear of clays. Once the clays had been removed, the sample was freeze-dried using a vacuum system, freezing out all moisture at -107 °C. Sodium polytungstate (SPT), with a density of 1.8, was used for the flotation process. The sample was mixed with SPT and centrifuged at 1500 rpm for 10 minutes to separate organic from inorganic remains. The supernatant containing pollen, organic remains, and microcharcoal was decanted. Sodium polytungstate again was added to the inorganic fraction to repeat the separation process until all visible microcharcoal had been recovered. The microcharcoal was recovered from the sodium polytungstate and rinsed thoroughly with RODI water. Following this step, the sample was examined using a binocular microscope at a magnification of up to 30x to check the matrix for microscopic charcoal and other debris. Each sample received a treatment with hot hydrofluoric acid (40%) to remove all visible silica. RODI water rinses followed, with another examination with the binocular microscope. The hydrofluoric acid treatments were repeated, but it still was not possible to remove all of the inorganic remains.

DISCUSSION

The Bailey's Lake Site consists of three trenches excavated across two parallel strands of the Granger Fault, located within Salt Lake City in Utah's West Valley fault zone. The West Valley fault zone (WVFZ), previously termed the Jordan Valley fault zone, trends north-northeast through an urbanized area three miles southwest of downtown Salt Lake City. The Granger Fault in the southern WVFZ presents as an east-facing scarp with heights of as great as 6.1 meters. The site lies at the approximate elevation of the Late Holocene highstand of Great Salt Lake and below the elevation of the Gilbert shoreline of Lake Bonneville.

Modern surface vegetation in this area includes saltbush (*Atriplex*), rabbitbrush, (*Chrysothamnus*), and grasses (Poaceae) (Michael Hylland, personal communication, November 2010). This area has experienced modifications from the excavation of canals, ditches, and pipeline trenches, as well as introduction of fill for roadside embankments and footings for powerline towers. The site also has been intermittently grazed by livestock. Excavations at the Bailey's Lake trench site exposed possible pre-Bonneville marsh deposits, sandy to clayey Bonneville lake-cycle deposits, fine-grained wetland and/or Gilbert lake-cycle deposits, sandy fluvial sediment, loess, and fault-scarp-derived colluvium. Six bulk soil samples from these excavations were submitted for macrofloral analysis prior to radiocarbon dating.

West(N) Trench

Sample BL-R1 was collected from the north wall of the northern-most of the two western trenches from soil S3 and was buried by P1 colluvium (Table 1). This sample will provide a broad minimum date for P2. Several fragments of charcoal too small and vitrified for identification were present in this sample, as well as several small, unidentified charred stem fragments (Table 2, Table 3). Vitrified charcoal has a shiny, glassy appearance due to fusion by heat. The charred stem fragments and the charcoal fragments were noted only in the 0.25 mm screen and were so small that it was difficult and time consuming to try and separate these remains; therefore the charred material was left combined and yielded a total weight of 0.0112 g. Four charred *Scirpus*-type seeds also were noted and suggest the presence of bulrush growing along the lake margin. Uncharred bark scale fragments, an uncharred *Erodium* seed, and uncharred roots and rootlets reflect modern plants in the area. The sample also yielded a few, small uncharred bone fragments, two insect chitin fragments, a few snail shell fragments, and a small amount of muscovite.

Sample BL-R2 was processed as two separate samples, designated BL-R2a and BL-R2b. Sample BL-R2a is a fragmented bulk soil sample collected from dark, inclined beds in P2 colluvium in the north wall of the northern West trench. This sample will provide a possible minimum age for P2 and a broad maximum age for P1. A charred Cheno-am perisperm and six charred *Scirpus*-type seed fragments were noted in sample BL-R2a, each weighing less than 0.0001 g. Cheno-am seed perisperm (similar to endosperm) consists of the nutritive tissue of the seed, surrounding and absorbed by the embryo. It represents a mature seed that has lost the outer seed coat (testa). Charred unidentified stem fragments and charcoal fragments too small and vitrified for identification from the 0.25 mm screen weighed a total of 0.0052 g. In addition, the sample contained a few root fragments, numerous rootlets, a few small bone fragments, an insect chitin fragment, and a moderate amount of snail shells.

Sample BL-R2b was recovered from dark, inclined beds in P2 colluvium as an intact block and will provide a possible minimum age for P2 and a broad maximum age for P1. Charred unidentified stem fragments and small, vitrified charcoal fragments from the 0.25 mm screen of sample BL-R2b yielded a total weight of 0.0043 g. A charred unidentified fruit fragment weighing less than 0.0001 g, a few uncharred rootlets, a few snail shells, and a small amount of muscovite also were noted.

Sample BL-R3b was taken from P1 colluvium in the north wall of the northern-most of the two western trenches and will provide a possible minimum age for P1. This sample yielded seven fragments of hardwood charcoal too small for further identification weighing 0.0055 g. Charcoal too small for identification and several charred unidentified stem fragments from the 0.25 mm screen weighed a total weight of 0.0077 g.

<u>West(S) Trench</u>

Sample BL-R4 was collected from the upper part of Unit 1a, a possible pre-Bonneville marsh deposit, in the south wall of the southern-most of the two western trenches. This sample will act as an age control for the lacustrine sequence and will provide a broad maximum age for P4. Recovery of three charred *Scirpus*-type seed fragments weighing less than 0.0001 g again note the presence of bulrush. A single piece of charcoal noted in the 0.25 mm screen weighing less than 0.0001 g was too small and vitrified for identification and too small for radiocarbon dating. As a result, the sediment that passed through the 150 micron mesh sieve during water-screening was processed to recover microcharcoal or particulate soil organics. Microcharcoal extraction resulted in a total weight of 0.0025 g, approximately 25-30% of which is insoluble microminerals. This microcharcoal sample is sufficient for AMS radiocarbon dating.

Sample BL-R5 is a bulk soil sample collected from Unit 3, a late Pleistocene-early Holocene wetland or shallow lacustrine deposit, in the south wall of the southern-most of the two western trenches to provide the maximum age for P3 and a broad minimum age for P4. No organic material was noted in this sample, which contained only clay and muscovite.

SUMMARY AND CONCLUSIONS

Macrofloral analysis of sediment samples from paleoseismic trenches at the Baileys Lake trench site on the Granger fault in Salt Lake City, Utah, yielded charred organic remains that can be submitted for AMS radiocarbon dating. All four samples from the West(N) trench contained small charred stem fragments and charcoal too small and vitrified for identification in sufficient quantities for dating. Sample BL-R4 from the West(S) trench did not yield sufficient macroscopic charred remains; however, a sufficient quantity of microscopic charcoal fragments were recovered for dating. Sample BL-R5 yielded no organic remains.

TABLE 1
PROVENIENCE DATA FOR SAMPLES FROM THE BAILEYS LAKE SITE, SALT LAKE CITY, UTAH

Sample Number	Trench	Wall	Sample location (horiz., vert.)	Provenience/ Description	Analysis
BL-R1	West(N)	North	22.1-22.4m, 3.3m	Bulk sample from soil S3 buried by P1 colluvium; maximum age for P1, broad minimum for P2	Macrofloral
BL-R2a			22.1m, 3.1-3.2m	Bulk sample from dark, inclined beds in P2 colluvium; minimum(?) age for P2, broad maximum for P1	Macrofloral
BL-R2b			22.1m, 3.1-3.2m	Bulk sample from dark, inclined beds in P2 colluvium; minimum(?) age for P2, broad maximum for P1	Macrofloral
BL-R3b			22.2m, 3.5m	Bulk sample from P1 colluvium; minimum (?) age for P1	Macrofloral
BL-R4	West(S)	South	25.8m, 1.1m	Bulk sample from upper part of unit 1a (possible pre-Bonneville marsh deposits); age control for lacustrine sequence, broad maximum age for P4	Macrofloral Microcharcoal
BL-R5			17.4m, 2.2m	Bulk sample from unit 3 (latest Pleistocene-early Holocene wetland or shallow lacustrine deposits); maximum age for P3, broad minimum for P4	Macrofloral

TABLE 2
MACROFLORAL REMAINS FROM THE BAILEYS LAKE SITE, SALT LAKE CITY, UTAH

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
BL-R1	Liters Floated						1.00 L
West(N) trench North wall	Light Fraction Weight						0.445 g
	FLORAL REMAINS:						
	Scirpus-type	Seed		4			< 0.0001 g
	Unidentified	Bark scale			2		
	Erodium	Seed			1		
	Roots					X	Few
	Rootlets					X	Numerous
	CHARCOAL/WOOD:						
	Total charcoal $\geq$ 0.25 mm						0.0112 g
	Unidentifiable charcoal - vitrified, small + Unidentified charred stem fragments	Charcoal/ Stem		X			0.0112 g
	NON-FLORAL REMAINS:						
	Bone < 2 mm					X	Few
	Gravel					X	Few
	Insect	Chitin				2	
	Muscovite					X	Few
	Snail shell < 2 mm					X	Few
BL-R2a	Liters Floated						0.40 L
West(N) trench North wall	Light Fraction Weight						0.468 g
	FLORAL REMAINS:						
	Cheno-am	Perisperm	1				< 0.0001 g
	Scirpus-type	Seed		6			< 0.0001 g
	Roots					X	Few
	Rootlets					X	Numerous
	CHARCOAL/WOOD:						
	Total charcoal $\geq$ 0.25 mm						0.0052 g
	Unidentifiable charcoal - vitrified, small + Unidentified charred stem fragments	Charcoal/ Stem		X			0.0052 g

TABLE 2 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
BL-R2a	NON-FLORAL REMAINS:						
West(N) trench North wall	Bone < 2 mm					X	Few
	Gravel					X	Few
	Insect	Chitin				1	
	Muscovite					X	Few
	Snail shell ≥ 2 mm					1	0.003 g
	Snail shell < 2 mm				10	X	Moderate
BL-R2b	Liters Floated						0.10 L
West(N) trench North wall	Light Fraction Weight						0.788 g
	FLORAL REMAINS:						
	Unidentified	Fruit		1			< 0.0001
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 0.25 mm						0.0043 g
	Unidentifiable charcoal - vitrified, small + Unidentified charred stem fragments	Charcoal/ Stem		X			0.0043 g
	NON-FLORAL REMAINS:						
	Gravel					X	Few
	Muscovite					X	Few
	Snail shell < 2 mm					X	Few
BL-R3b	Liters Floated						0.90 L
West(N) trench North wall	Light Fraction Weight						3.073 g
	FLORAL REMAINS:						
	Unidentified	Bark scale			3		
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 0.5 mm						0.0132 g
	Unidentified hardwood	Charcoal		7			0.0055 g
	Unidentifiable charcoal - vitrified, small + Unidentified charred stem fragments	Charcoal/ Stem		45			0.0077 g

TABLE 2 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
BL-R3b	NON-FLORAL REMAINS:						
West(N)	Bone ≥ 2 mm					2	0.035 g
trench	Bone < 2 mm					X	Few
North wall	Bone	Vertebra			1		< 0.001 g
	Gravel					X	Few
	Insect	Chitin				2	
	Snail shell < 2 mm				2	X	Moderate
Bl-R4	Liters Floated						1.10 L
West(S)	Light Fraction Weight						0.787 g
trench	FLORAL REMAINS:						
South wall	*Scirpus*-type	Seed		3			< 0.0001 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 0.25 mm						< 0.0001 g
	Unidentifiable - small, vitrified	Charcoal		1			< 0.0001 g
	NON-FLORAL REMAINS:						
	Insect	Chitin				5	
	Light orange clay clumps					X	Few
	Muscovite					X	Moderate
BL-R5	Volume Water-screened						0.10 L
West(S)	Water-screened Sample Weight						0.853 g
trench	NON-FLORAL REMAINS:						
South wall	Clay					X	Few
	Muscovite					X	Few

W = Whole
F = Fragment
X = Presence noted in sample
L = Liter
g = grams
mm = millimeters
L = liters

TABLE 3
INDEX OF MACROFLORAL REMAINS RECOVERED FROM THE BAILEYS LAKE SITE, SALT LAKE CITY, UTAH

Scientific Name	Common Name
FLORAL REMAINS:	
Cheno-am	Includes goosefoot and amaranth families
Erodium	Storksbill, Filaree
Scirpus-type (includes *Amphiscirpus*, *Bolboshoenus*, *Isolepis*, *Shoenoplectus*, and *Scirpus*)	Bulrush
CHARCOAL/WOOD:	
Unidentified hardwood	Wood from a broad-leaved flowering tree or shrub
Unidentifiable - vitrified	Charcoal exhibiting a shiny, glassy appearance due to fusion by heat
NON-FLORAL REMAINS:	
Muscovite	The most common mica, found in granites, pegmatites, gneisses and schists, with a layered structure of aluminum silicate sheets weakly bonded together by layers of potassium ions

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APPENDIX D

SUMMARY OF RADIOCARBON DATING, BAILEYS LAKE SITE

Sample No.	NOSAMS[1] Accession No.	Trench, wall	Station[2] (m)	Depth[3] (m)	Unit Sampled[4]	Material Sampled	Organic Material Dated[5]	Pre-Treatment Method	$\delta^{13}C$[6]	Relation to Earthquake[7]	Age[8] (^{14}C yr B.P.)	Age[9] (cal yr B.P.)
BL-R1	OS-86493	West(N), north	21.8, 3.3	0.48	S1 (top)	Paleosol	Unidentifiable charcoal (vitrified, small) and unidentified stem fragments (charred) (11.2 mg)	Acid-base-acid	-25	Max – BL1	5400 ± 30	6220 ± 100
BL-R2-1	OS-86491	West(N), north	22.1, 3.1	0.82	6	Scarp-derived colluvium (organic interbed) (BL2)	Unidentifiable charcoal (vitrified, small) and unidentified stem fragments (charred) (5.2 mg)	Acid-base-acid	-25	Min – BL2	675 ± 30	620 ± 80
BL-R2-2	OS-86573	West(N), north	22.1, 3.1	0.82	6	Scarp-derived colluvium (organic interbed) (BL2)	Unidentifiable charcoal (vitrified, small) and unidentified stem fragments (charred) (4.3 mg)	Acid-base-acid	-25	Min – BL2	1800 ± 25	1740 ± 100
BL-R3-1	OS-86492	West(N), north	22.3, 3.5	0.40	10	Scarp-derived colluvium (BL1)	7 fragments unidentified hardwood charcoal (5.5 mg)	Acid-base-acid	-25	Min – BL1	3890 ± 30	4330 ± 100
BL-R3-2	OS-86494	West(N), north	22.3, 3.5	0.40	10	Scarp-derived colluvium (BL1)	45 fragments unidentifiable charcoal (vitrified, small) and unidentified stem fragments (charred) (7.7 mg)	Acid-base-acid	-25	Min – BL1	4280 ± 30	4850 ± 60
BL-R4	OS-86572	West(S), south	25.8, 1.1	2.97	1	Wetland clay	1 fragment unidentifiable charcoal (vitrified, small) and microcharcoal (1.7 mg)	Acid-base-acid	-25	—	31,400 ± 350	35,780 ± 820
BL-R5	—	West(S), south	17.4, 2.2	1.38	3 (base)	Lacustrine clay and silt	None; sample lacked organic material	—	—	Min – BL4	—	—

[1] National Ocean Sciences Accelerator Mass Spectrometry Facility, Woods Hole Oceanographic Institution (Woods Hole, Massachusetts).
[2] Station coordinates are horizontal and vertical meter marks along arbitrary reference grid for trench (see plate 1).
[3] Depth below ground surface.
[4] See appendix A for descriptions of stratigraphic units, and appendix B for description of pedogenic soil unit S1.
[5] Separation and identification by Paleo Research Institute (Golden, Colorado); see appendix C.
[6] Assumed delta ^{13}C value.
[7] Min (max) indicates minimum (maximum) limiting time constraint for a surface-faulting earthquake (e.g., BL1).
[8] Laboratory-reported radiocarbon age with one standard deviation uncertainty. B.P. is before present (AD 1950).
[9] Mean calendar-calibrated age and 2σ uncertainty, rounded to nearest decade, determined using OxCal calibration software (v. 4.1.7; Bronk Ramsey, 2009) and the IntCal09 atmospheric data set (Reimer and others, 2009).

APPENDIX E

SUMMARY OF LUMINESCENCE DATING, BAILEYS LAKE SITE

Sample No.[1]	Trench, wall	Station[2] (m)	Depth[3] (m)	Unit Sampled[4]	Material Sampled	Water Content[5] (%)	Water Saturation History[6] (%)	K[7] (%)	U[7] (ppm)	Th[7] (ppm)	Cosmic Dose Additions[8] (Gy/kyr)	Total Dose Rate OSL[9] (IRSL)[10] (Gy/kyr)	Equivalent Dose OSL[9] (IRSL)[10] (Gy)	n[11]	Relation to Earthquake[12]	Laboratory Age OSL[9] (IRSL)[10] (yr before 2011)
BL-L1	West (S), south	25.7, 1.3	2.65	2a	Fine lacustrine sand	2 (23)	85	1.28 ± 0.03	1.83 ± 0.12	5.18 ± 0.26	0.19 ± 0.02	1.64 ± 0.05 (2.31 ± 0.07)	51.8 ± 2.28 (72.0 ± 3.71)	19 (21)	—	31,590 ± 1670 (31,150 ± 1930)
BL-L2	West (S), south	25.7, 1.6	2.35	2a	Fine lacustrine sand	20 (25)	85	1.49 ± 0.04	1.89 ± 0.14	5.93 ± 0.34	0.20 ± 0.02	1.79 ± 0.06 (2.49 ± 0.09)	55.8 ± 2.85 (68.8 ± 2.22)	20 (20)	—	31,170 ± 1940 (27,620 ± 1310)
BL-L3	West (S), south	19.6, 0.9	2.75	2c	Lacustrine silt	2 (18)	85	2.28 ± 0.04	2.91 ± 0.11	11.3 ± 0.35	0.19 ± 0.02	3.01 ± 0.06 (4.33 ± 0.09)	73.4 ± 7.34 (115 ± 4.54)	13 (30)	—	24,440 ± 2,500 (26,470 ± 1,200)
BL-L4	West (S), south	19.7, 1.2	2.40	2c	Fine lacustrine sand	7 (22)	85	2.14 ± 0.03	3.08 ± 0.11	10.4 ± 0.29	0.20 ± 0.02	2.95 ± 0.05 (4.27 ± 0.08)	131 ± 15.3 (83.0 ± 2.19)	6 (28)	—	43,380 ± 5,140 (19,440 ± 620)
BL-L5	West (S), south	19.6, 1.4	2.20	2d	Fine to medium lacustrine sand	19 (29)	85	2.39 ± 0.04	3.12 ± 0.15	13.2 ± 0.40	0.20 ± 0.02	3.42 ± 0.07 (4.98 ± 0.10)	67.8 ± 8.07 (136 ± 4.65)	5 (24)	—	19,810 ± 2,380 (27,390 ± 1,080)
BL-L7	West (N), south	21.7, 1.9	1.80	2e	Lacustrine silt	15 (39)	85	2.21 ± 0.05	3.15 ± 0.22	10.6 ± 0.55	0.21 ± 0.02	3.20 ± 0.10 (4.64 ± 0.15)	61.8 ± 1.01 (94.6 ± 2.01)	20 (20)	Max – BL4	19,300 ± 380 (20,380 ± 570)
BL-L8	West (N), south	21.4, 2.2	1.55	3	Fine lacustrine sand	19 (46)	70	1.18 ± 0.02	2.49 ± 0.08	8.17 ± 0.28	0.22 ± 0.02	1.93 ± 0.04 (2.89 ± 0.07)	27.2 ± 0.053 (41.1 ± 1.93)	20 (20)	Min – BL4	14,070 ± 820 (14,220 ± 740)
BL-L9	West (N), south	20.7, 2.4	1.25	3	Lacustrine clay, silt, and fine sand	18 (50)	70	1.31 ± 0.02	2.75 ± 0.09	7.89 ± 0.29	0.23 ± 0.02	2.02 ± 0.05 (2.99 ± 0.07)	26.2 ± 1.11 (37.8 ± 2.12)	19 (20)	Max – BL3	12,960 ± 620 (12,660 ± 770)
BL-L10	West (N), south	22.2, 3.5	0.15	11	Loess	6 (29)	90	1.54 ± 0.02	2.82 ± 0.08	8.26 ± 0.27	0.32 ± 0.02	2.51 ± 0.06 (3.66 ± 0.08)	8.05 ± 0.61 (11.9 ± 0.55)	16 (20)	Min – BL1	3210 ± 250 (3240 ± 160)
BL-L11	West (N), north	19.8, 2.8	0.80	9	Loess	9 (37)	70	1.00 ± 0.03	1.65 ± 0.11	3.87 ± 0.36	0.25 ± 0.02	1.57 ± 0.05 (2.21 ± 0.07)	19.6 ± 0.90 (29.2 ± 1.49)	16 (16)	—	12,470 ± 700 (13,200 ± 810)
BL-L12	West (N), north	22.0, 3.3	0.55	S1	Paleosol	7 (34)	70	1.61 ± 0.03	2.48 ± 0.12	8.28 ± 0.28	0.25 ± 0.02	2.89 ± 0.07 (4.25 ± 0.13)	17.4 ± 1.36 (28.5 ± 1.03)	18 (20)	Max – BL1	6020 ± 500 (6710 ± 310)
BL-L13	West (N), north	21.4, 2.8	1.00	5	Lacustrine clay, silt, and fine sand	4 (29)	70	1.01 ± 0.02	1.92 ± 0.07	3.93 ± 0.23	0.24 ± 0.02	1.68 ± 0.09 (2.41 ± 0.12)	21.0 ± 1.10 (29.9 ± 0.75)	19 (20)	Max – BL2 Min – BL3	12,530 ± 910 (12,390 ± 710)
BL-L14	West (N), south	18.7, 2.6	1.00	7	Fine to coarse lacustrine sand	2 (27)	70	1.37 ± 0.03	1.83 ± 0.09	5.41 ± 0.31	0.24 ± 0.02	2.07 ± 0.07 (2.90 ± 0.10)	23.8 ± 5.36 (31.3 ± 1.96)	13 (13)	Min – BL2	11,510 ± 2610 (10,800 ± 770)
BL-L16	West (S), south	27.9, 2.0	2.15	2a	Fine lacustrine sand	6 (34)	85	1.33 ± 0.03	1.86 ± 0.15	6.07 ± 0.35	0.20 ± 0.02	1.94 ± 0.07 (2.76 ± 0.10)	60.2 ± 3.14 (57.4 ± 1.70)	24 (24)	—	31,030 ± 1960 (20,790 ± 970)

[1] Analyses by U.S. Geological Survey Luminescence Dating Laboratory (Denver, Colorado); samples BL-L6 and BL-L15 collected as duplicates (not analyzed) of samples BL-L7 and BL-L10, respectively.
[2] Station coordinates are horizontal and vertical meter marks along arbitrary reference grid for trench (see plate 1).
[3] Depth below ground surface.
[4] See appendix A for descriptions of stratigraphic units, and appendix B for description of pedogenic soil unit S1.
[5] Field moisture; complete sample saturation percent in parentheses.
[6] Estimated water saturation history (i.e., time below water table) of sampled material.
[7] Analyses obtained using laboratory gamma spectrometry (high-resolution Ge detector), and readings were delayed after 21 days of being sealed in the planchet (used for dose rates).
[8] Cosmic doses and attenuation with depth were calculated using the methods of Prescott and Hutton (1994); Gy – gray.
[9] Dose rate and optically stimulated luminescence (OSL) age for fine-grained (90–125 microns) quartz sand; linear + exponential fit used on equivalent dose, single aliquot regeneration; ages rounded to nearest decade, errors to 1σ.
[10] Dose rate and infrared stimulated luminescence (IRSL) age for fine grains (4–11 microns) of polymineral silt; exponential fit used for equivalent dose, multiple aliquot additive dose; ages rounded to nearest decade, errors to 1σ; fade tests indicate no correction.
[11] Number of replicated equivalent dose (De) estimates used to calculate the mean; total number of measurements made, including failed runs with unusable data, in parentheses.
[12] Min (max) indicates minimum (maximum) limiting time constraint for a surface-faulting earthquake (e.g., BL1).

APPENDIX F

OSTRACODE IDENTIFICATION AND INTERPRETATION, BAILEYS LAKE SITE

Sample No.[1]	Trench, wall	Station[2] (m)	Unit Sampled[3]	Ostracodes	Comments[4]	Interpretation
O-13	West(N), south	19.6, 2.4	5	None identifiable	Few ostracodes, mostly unidentifiable fragments (probably *Candona* sp.); some ostracode fragments carbonate-coated	Gilbert episode
O-12	West(N), south	18.4, 2.2	3	*Limnocythere ceriotuberosa* *Candona caudata*(?) *Candona adunca* *Cytherissa lacustris*	Few ostracodes, most broken; sediment lumps, sand	Bonneville, regressive phase
O-11	West(S), south	17.7, 2.1	2e	*Limnocythere ceriotuberosa* *Candona adunca*	Abundant clean ostracodes; sand	Bonneville, mid- to late transgressive phase
O-10	West(S), south	17.7, 1.9	2e	*Limnocythere ceriotuberosa* *Candona caudata*(?) *Candona adunca*	Few ostracodes, some clean, some carbonate-coated; sand	
O-9	West(S), south	20.8, 1.7	2e	*Limnocythere ceriotuberosa* *Candona adunca*	Abundant clean ostracodes; sand; few redox lumps	
O-8	West(S), south	19.3, 1.3	2c	*Limnocythere ceriotuberosa* *Candona caudata*(?) *Candona adunca*	Clean ostracodes; sand	Bonneville, transgressive phase
O-7	West(S), south	19.4, 1.1	2c	*Limnocythere staplini* *Limnocythere ceriotuberosa* *Candona caudata*(?)	Sand; black sulfide lumps	
O-6	West(S), south	26.4, 2.6	2b	*Limnocythere staplini* *Limnocythere ceriotuberosa* *Candona caudata*(?)	Clean ostracodes; sand; redox lumps	
O-5	West(S), south	26.4, 2.5	2b	*Limnocythere staplini*	Few ostracodes, some clean, some carbonate-coated; broken *Candona* sp.; carbonate-coated redox lumps; sand	
O-4	West(S), south	26.0, 1.6	2a	*Limnocythere staplini* *Candona rawsoni*	Abundant curved flakes of carbonate, some with linear impressions on smooth concave sides, convex sides are rough (flakes appear to be leaf or stem encrustations); redox lumps; snail-shell fragments and whole shells; hollow tubes of redox-cemented sand	Bonneville, early transgressive phase
O-3	West(S), south	25.6, 1.4	2a	*Limnocythere staplini* *Candona rawsoni* *Cytherissa lacustris*	Few ostracodes; snail-shell fragments; sediment lumps, sand	
O-2	West(S), south	25.6, 1.2	1	*Candona rawsoni*	Few ostracodes (fragments); charophyte stem encrustations; redox lumps	Pre-Bonneville wetland/alluvial marsh
O-1	West(S), south	25.6, 0.8	1	*Candona rawsoni*	Few ostracodes, some shells carbonate-coated; charophyte stem encrustations; sulfide lumps, sand	

[1] Samples listed in stratigraphic order (top to bottom).
[2] Station coordinates are horizontal and vertical meter marks along arbitrary reference grid for trench (see plate 1).
[3] See appendix A for descriptions of stratigraphic units.
[4] Redox lumps = iron minerals, some oxidized (yellow colors), some reduced (black), mostly cementing sand; sulfide lumps = lumps of black iron sulfide minerals.

APPENDIX G

OXCAL MODEL FOR THE GRANGER FAULT AT THE BAILEYS LAKE SITE

An OxCal model for the Granger fault at the Baileys Lake site was created using OxCal calibration and analysis software (version 4.1.7; Bronk Ramsey, 2009; using the IntCal09 calibration curve of Reimer and others, 2009). The models include *C_Date* for luminescence ages, *R_Date* for radiocarbon ages, and *Boundary* for undated events (paleoearthquakes). These components are arranged into ordered sequences based on the relative stratigraphic positions of the samples. The sequences may contain *phases*, or groups where the relative stratigraphic ordering information for the individual radiocarbon ages is unknown. The model is presented here in reverse stratigraphic order, following the order in which the ages and events are evaluated in OxCal.

Model Input

```
Plot()
 {
  Sequence("Baileys Lake, full chronology")
  {
   Boundary("Start");
   R_Date("BL-R4, C14 31,400 +/-350",31400,350);
   C_Date("BL-L1, OSL 31,590 +/-1670",-29580,1670);
   C_Date("BL-L2, OSL 31,170 +/-1940",-29160,1940);
   C_Date("BL-L16, OSL 31,030 +/-1960",-29020,1960);
   C_Date("BL-L3, OSL 24,440 +/-2500",-22430,2500);
   C_Date("BL-L5, OSL 19,810 +/-2380",-17800,2380);
   C_Date("BL-L7, OSL 19,300 +/-380",-17290,380);
   Boundary("BL4");
   C_Date("BL-L8, OSL 14,070 +/-820",-12060,820);
   C_Date("BL-L9, OSL 12,960 +/-620",-10950,620);
   Boundary("BL3");
   C_Date("BL-L13, OSL 12,530 +/-910",-10520,910);
   Boundary("BL2");
   C_Date("BL-L14, OSL 11,510 +/-2610",-9500,2610);
   C_Date("BL-L11, OSL 12,470 +/-700",-10460,700);
   Phase("Soil S1");
   {
    C_Date("BL-L12, OSL 6020 +/-500",-4010,500);
    R_Date("BL-R1, C14 5400+/-30",5400,30);
   };
   Boundary("BL1");
   Phase("Unit 10, P1 Colluvium");
   {
    R_Date("BL-R3-2, C14 4280+/-30",4280,30);
    R_Date("BL-R3-1, C14 3890+/-30",3890,30);
   };
   C_Date("BL-L10, OSL 3210 +/-250",-1200,250);
   Boundary("Begin historical record",1847 AD);
  };
 };
```

Model Output

Baileys Lake Full Chronology	Unmodelled (BP)		Modelled (BP)		Agreement
	mean	sigma	mean	sigma	
Boundary Start	38450	3010			
R_Date BL-R4, C14 31,400 ±350	35850	420	35780	410	99.7
C_Date BL-L1, OSL 31,590 ±1670	31530	1670	32660	1250	97.5
C_Date BL-L2, OSL 31,170 ±1940	31110	1940	31090	1240	119
C_Date BL-L16, OSL 31,030 ±1960	30970	1960	29470	1400	95.6
C_Date BL-L3, OSL 24,440 ±2500	24380	2500	24730	1990	109.3
C_Date BL-L5, OSL 19,810 ±2380	19750	2380	21050	1340	112.5
C_Date BL-L7, OSL 19,300 ±380	19240	380	19210	380	100.3
Boundary BL4			**15700**	**1690**	
C_Date BL-L8, OSL 14,070 ±820	14010	820	14080	630	112.5
C_Date BL-L9, OSL 12,960 ±620	12900	620	13360	460	95
Boundary BL3			**12960**	**530**	
C_Date BL-L13, OSL 12,530 ±910	12470	910	12640	520	121.2
Boundary BL2			**12340**	**570**	
C_Date BL-L14, OSL 11,510 ±2610	11450	2610	11890	580	136.2
C_Date BL-L11, OSL 12,470 ±700	12410	700	11450	560	62.6
Phase Soil S1					
C_Date BL-L12, OSL 6020 ±500	5960	500	6540	260	76.8
R_Date BL-R1, C14 5400±30	6220	50	6220	50	98
Boundary BL1			**5540**	**400**	
Phase Unit 10, P1 Colluvium					
R_Date BL-R3-2, C14 4280±30	4850	30	4850	30	98.9
R_Date BL-R3-1, C14 3890±30	4330	50	4330	50	99.9
C_Date BL-L10, OSL 3210 ±250	3150	250	3150	250	100
Boundary Begin historical record, 1847	100	0	100	0	100

APPENDIX H

WEST VALLEY FAULT ZONE EARTHQUAKE TIMING CONSTRAINTS FROM CONSULTANTS' TRENCHES

Two trenches excavated by consultants (as part of pre-development fault-setback investigations required by local governments) have yielded useful earthquake timing data for the West Valley fault zone where the Utah Geological Survey was able to sample organic sediment for radiocarbon dating. One trench was near the north end of the Taylorsville fault at about 2100 West and 1300 North (between the Salt Lake City International Airport and Interstate 215), and was excavated by AGRA Earth and Environmental, Inc. in September 1997 (figures H1 through H4). The other trench was on the middle part of the westernmost trace of the Granger fault in the northeastern quadrant of the intersection of 4800 West and California Avenue (1300 South), near the "1300 South" site of Keaton and Currey (1989), and was excavated by Terracon Consultants, Inc. in March 1998 (figures H5 through H7); see figure 4 in the main report for site locations. These trenches were open only briefly, precluding detailed logging, so the geologic context of the samples is not well established. Because of this, as well as the nature of the radiocarbon ages (apparent mean residence time [AMRT] ages from bulk-soil samples, with applied mean residence correction [MRC] and carbon age span [CAS] factors; see discussion in Machette and others, 1992, appendix), relatively large uncertainty exists in the relation between the radiocarbon ages and earthquake timing. Also, we must assume that the soil samples were not contaminated by young organic material. Notwithstanding these caveats, the radiocarbon ages provide constraints on the timing of two surface-faulting earthquakes that are younger than the most recent surface-faulting earthquake documented at the Baileys Lake site.

UGS geologists collected two bulk-soil samples from the AGRA trench on the Taylorsville fault: sample AGRA-RC1 was collected from crack-fill sediment/fault-zone colluvium and yielded an AMRT radiometric age of 2350 ± 80 ^{14}C yr B.P., and sample AGRA-RC2 was collected from sag pond deposits beneath the possible colluvial wedge and yielded an AMRT age of 2520 ± 70 ^{14}C yr B.P. (unpublished UGS data; figure H4). Applying a 200-yr MRC and 200-yr CAS, these radiocarbon ages calendar calibrated to 2110 +210/-200 cal yr B.P. (AGRA-RC1) and 2330 +120/-170 cal yr B.P. (AGRA-RC2) (unpublished UGS data). Solomon (1998) reported the earthquake time as "roughly 2200 years" (the average of the two ages).

UGS geologists collected a single bulk-soil sample from the Terracon site on the Granger fault. Sample GFT-RC1 was interpreted as being from scarp-derived colluvium and yielded an AMRT radiometric age of 1880 ± 80 ^{14}C yr B.P. (unpublished UGS data). Applying a 300-yr MRC and 200-yr CAS, the radiocarbon age calendar calibrated to 1460 +170/-130 cal yr B.P. (unpublished UGS data). If the sample indeed came from the heel of the colluvial wedge as described in unpublished UGS file information, the radiocarbon age may provide a close minimum time constraint for the earthquake, as an age from scarp-derived colluvium can generally be interpreted as a minimum limit on earthquake timing (e.g., McCalpin, 1996; Yeats and others, 1997). However, our review of site photographs (figures H6 and H7) raises the possibility that the sample may have been obtained from a faulted soil A horizon that was buried on the hanging wall by scarp-derived colluvium. Extensive burrowing and soil carbonate and/or evaporite mineral precipitation (associated with a shallow, fluctuating water table) appear to obscure geologic contacts within the fault zone. If sample GFT-RC1 came from a buried soil beneath the colluvial wedge, it would provide a maximum time constraint for the earthquake.

We used OxCal calibration and analysis software (version 4.1.7; Bronk Ramsey, 2009; using the IntCal09 calibration curve of Reimer and others, 2009) to provide updated calendar calibration of the radiocarbon ages and to model earthquake times. The models include *R_Date* for radiocarbon ages, *Delta_R* for MRC factors, and *Boundary* for undated events (paleoearthquakes). As noted in appendix G, these components are arranged into ordered sequences based on the relative stratigraphic positions of the samples. The models are presented in reverse stratigraphic order (table H1), following the order in which the ages and events are evaluated in OxCal. Because of the uncertainty as to whether sample GFT-RC1 provides a minimum or maximum limiting time constraint, we constructed two models to account for both possibilities (table H1 and figure H8).

The OxCal models indicate two paleoearthquakes. The older earthquake occurred around 2.2 ± 0.2 ka (2σ), consistent with the time estimated by Solomon (1998). The modeled age of the younger earthquake is 1.7 ± 0.3 ka if sample GFT-RC1 is considered to provide a minimum limiting time constraint; if GFT-RC1 provides a maximum limiting time constraint, the modeled age of the younger earthquake is 1.2 ± 0.6 ka (2σ). Lacking a solid basis for interpreting GFT-RC1 as either a minimum or maximum time constraint, we combined the modeled earthquake times to yield a mean time of 1.4 ± 0.7 ka. Both of these earthquakes are younger than the most recent paleoearthquake documented at the Baileys Lake site (see tables 3 and 4, and figure 15 in the main report).

Figure H1. Fault trench on the Taylorsville fault between the Salt Lake City International Airport and Interstate 215, excavated by AGRA Earth and Environmental, Inc. in September 1997; view looking east. Photo by UGS staff.

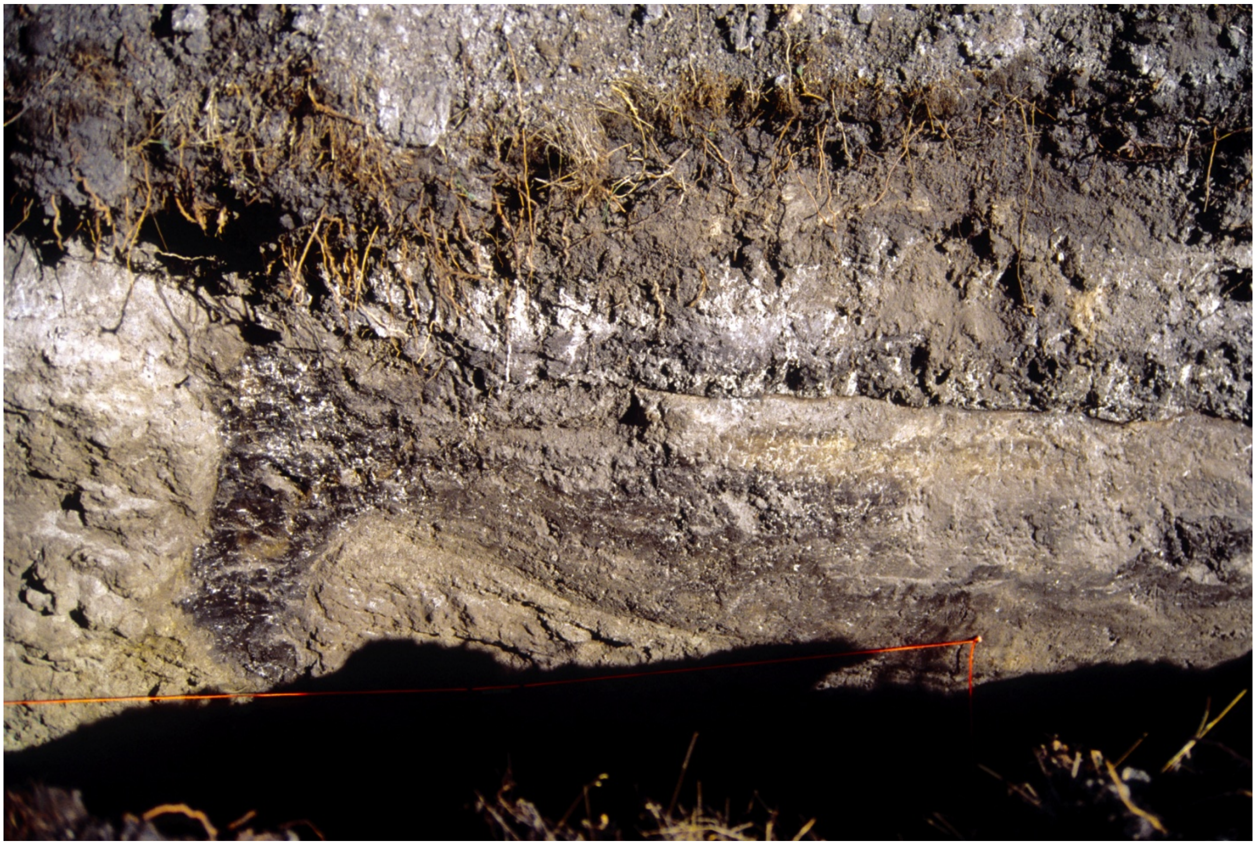

Figure H2. Fault-zone exposure, north wall of AGRA trench on the Taylorsville fault, September 1997. See figure H4 for interpretation. Photo by UGS staff.

Figure H3. Exposed stratigraphy immediately to the right (east) of the fault zone, north wall of AGRA trench on the Taylorsville fault, September 1997. See figure H4 for interpretation. Photo by UGS staff.

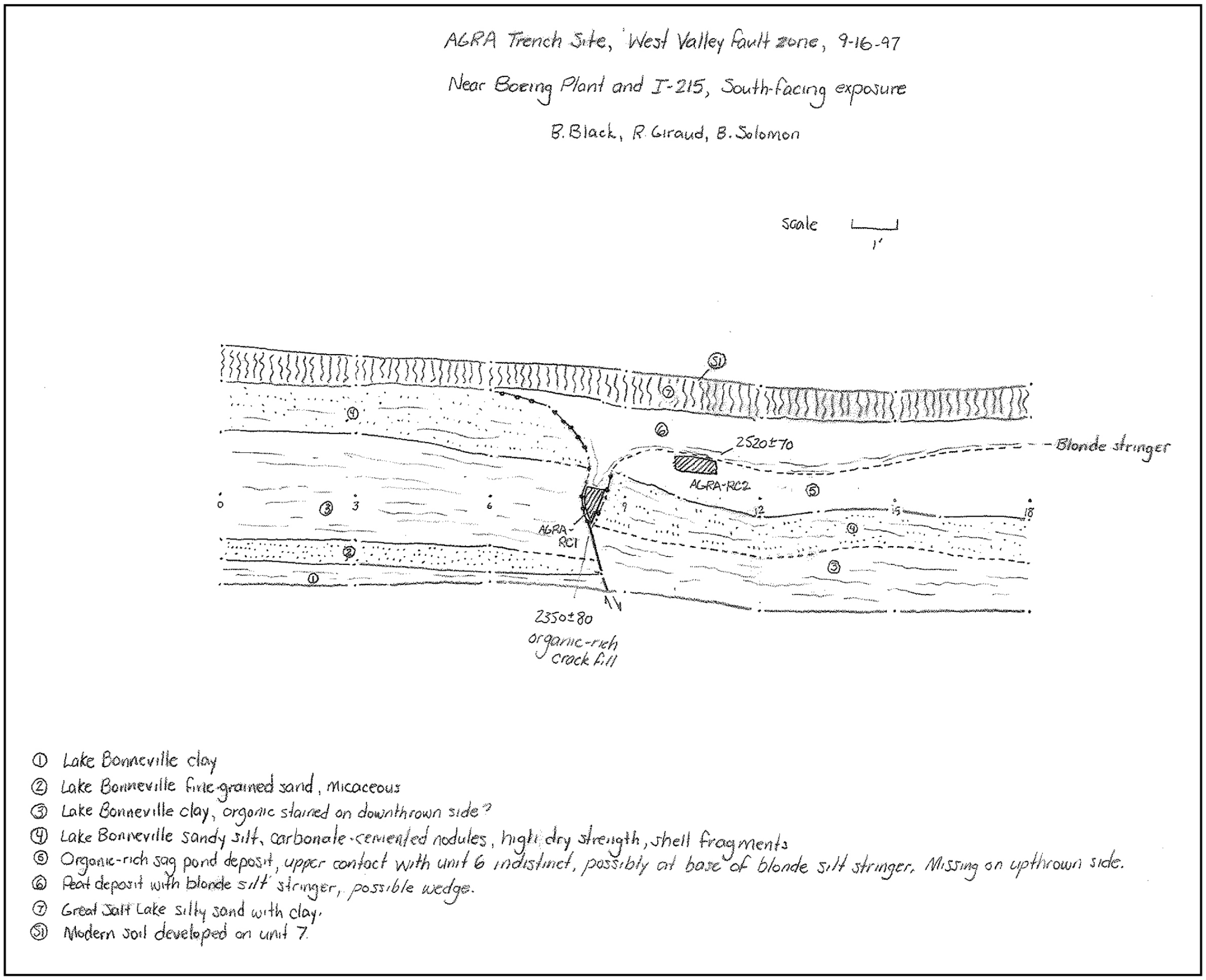

Figure H4. Trench log of north wall of the AGRA trench on the Taylorsville fault (from unpublished UGS files).

Figure H5. Fault trench on the Granger fault at 4800 West and California Avenue (1300 South), excavated by Terracon Consultants, Inc. in March 1998; view looking east. Photo by UGS staff.

Figure H6. Fault-zone exposure, north wall of Terracon trench on the Granger fault, March 1998. Photo by UGS staff.

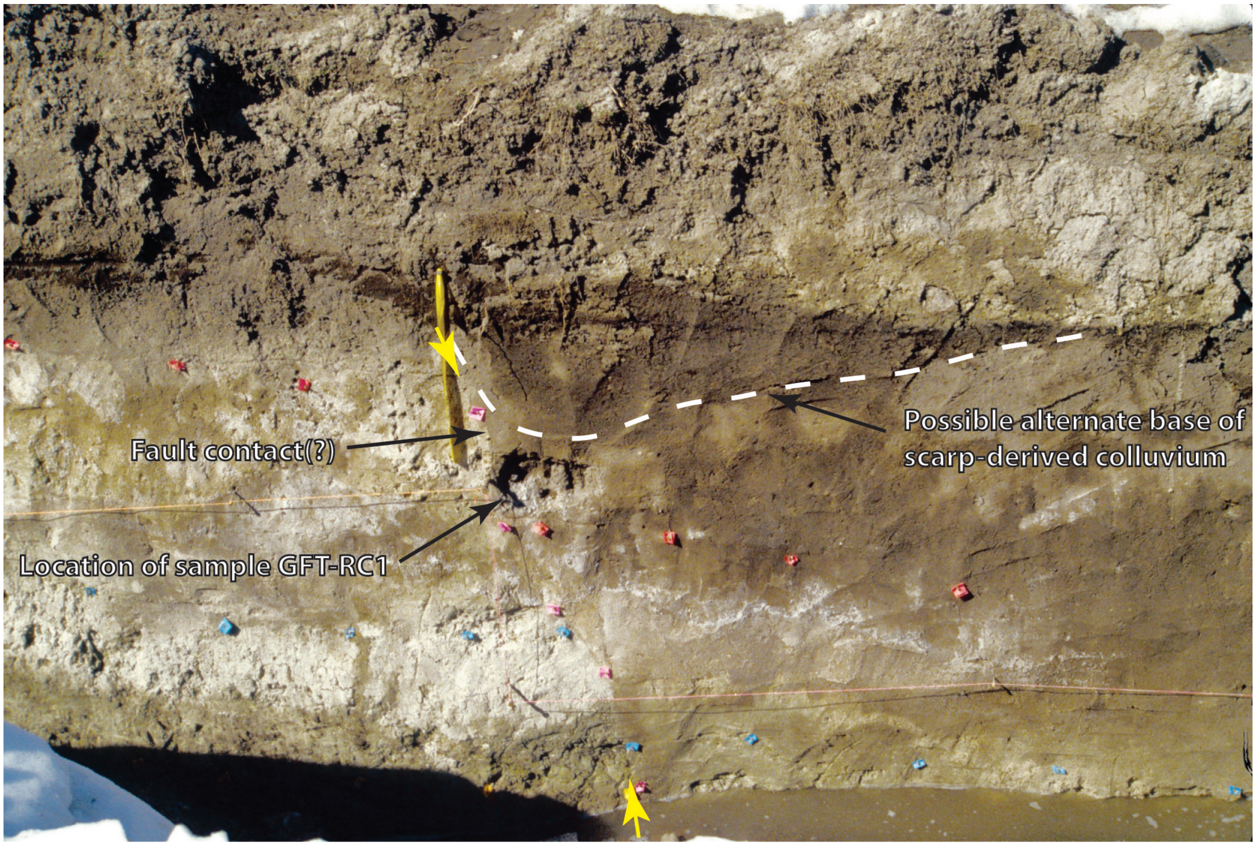

Figure H7. Detail of fault zone exposed in Terracon trench on the Granger fault, March 1998; fault between yellow arrows. Sample GFT-RC1 was originally interpreted as being from the "heel of the MRE [most recent event] colluvial wedge" (unpublished UGS file information), in which case the sampled sediment's age of 1880 ± 80 ^{14}C yr B.P. may provide a close minimum constraint on earthquake timing. An alternate interpretation is that the sample was from a soil that was faulted and subsequently buried by scarp-derived colluvium, in which case the age may provide a close maximum constraint on earthquake timing. Photo by UGS staff, annotation added for this study.

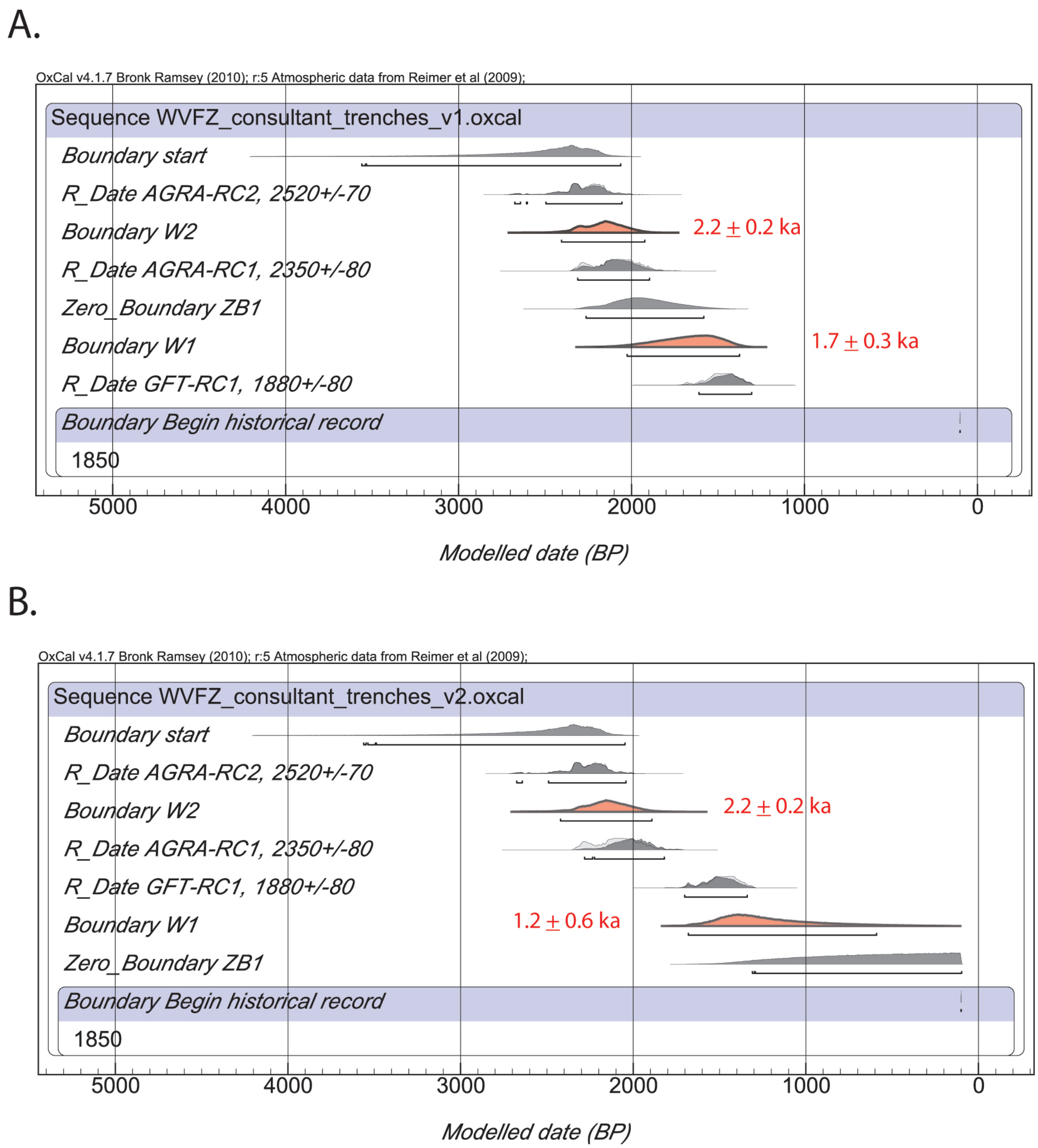

Figure H8. OxCal models for West Valley fault zone earthquake timing based on consultant trench data, showing stratigraphic ordering of ^{14}C ages and probability density functions (PDFs) for the timing of earthquakes W1 and W2 (red). Models constructed using OxCal version 4.1.7 (Bronk Ramsey, 2009) and the IntCal09 radiocarbon calibration curve (Reimer and others, 2009). Brackets below PDFs indicate 2σ time ranges. A and B show sample GFT-RC1 modeled as minimum and maximum age constraint, respectively, for earthquake W1 timing.

Table H1. OxCal model output for West Valley fault zone earthquake timing based on consultant trench data.

WVFZ_consultant_trench_v1.oxcal	**Unmodelled (BP)**		**Modelled (BP)**		**Agreement**
Version 1[1]	mean	sigma	mean	sigma	
Boundary start			2590	400	
Delta_R MRT-200yr	250	50	251	52	98
R_Date AGRA-RC2, 2520±70	2270	130	2280	120	101
Boundary W2[2]			**2170**	**120**	
R_Date AGRA-RC1, 2350±80	2090	120	2090	110	104
Zero_Boundary ZB1			1920	170	
Boundary W1[2]			**1680**	**170**	
Delta_R MRT-300yr	300	0	300	0	100
R_Date GFT-RC1, 1880±80	1480	90	1460	80	102
Boundary Begin historical record - 1850 AD	100	0	100	0	100

WVFZ_consultant_trench_v2.oxcal	**Unmodelled (BP)**		**Modelled (BP)**		**Agreement**
Version 2[3]	mean	sigma	mean	sigma	
Boundary start			2580	400	
Delta_R MRT-200yr	250	50	266	52	95
R_Date AGRA-RC2, 2520±70	2270	130	2270	120	103
Boundary W2			**2150**	**130**	
R_Date AGRA-RC1, 2350±80	2090	120	2020	110	96
Delta_R MRT-300yr	300	0	300	0	100
R_Date GFT-RC1, 1880±80	1480	90	1510	90	94
Boundary W1			**1210**	**290**	
Zero_Boundary ZB1			660	360	
Boundary Begin historical record - 1850 AD	100	0	100	0	100

Combined W1 (ver. 1) and W1 (ver. 2)[4]	mean:	1445 cal yr. B.P.
	2 sigma:	659 cal yr. B.P.
	5th percent:	805 cal yr. B.P.
	50th percent:	1490 cal yr. B.P.
	95th percent:	1920 cal yr. B.P.
	mode:	1510 cal yr. B.P.

[1] Sample GFT-RC1 modeled as minimum age constraint for earthquake W1 timing.
[2] "W1" and "W2" correspond to West Valley fault zone earthquakes W1 and W2 as given in tables 4 and 6, and figure 15 in the main report.
[3] Sample GFT-RC1 modeled as maximum age constraint for earthquake W1 timing.
[4] Mean modeled earthquake time and 2σ uncertainty used for earthquake W1 in preliminary West Valley fault zone chronology (see tables 3, 4, and 6, and figure 15 in the main report).