SUMMARY
Utah Quaternary Fault Parameters Working Group Meeting
Wednesday, February 5, 2014
Utah Department of Natural Resources Building, Room 2000
1594 West North Temple, Salt Lake City

WELCOME AND INTRODUCTION

Bill Lund (Utah Geological Survey [UGS]) called the 2014 Utah Quaternary Fault Parameters Working Group (UQFPWG) meeting to order at 8:20 a.m. After welcoming Working Group members and guests (attachment 1), Bill summarized the UQFPWG's past activities and outlined the Working Group's purpose and goals for the future.

UQFPWG Purpose and Goals

- Helps set and coordinate the earthquake-hazard research agenda for the State of Utah.
- Reviews ongoing paleoseismic research in Utah, and updates the Utah consensus slip-rate and recurrence-interval database as necessary.
- Provides advice/insight regarding technical issues related to fault behavior in Utah and the Basin and Range Province.
- Identifies and prioritizes future Utah Quaternary fault paleoseismic investigations.

TECHNICAL PRESENTATIONS

The following presentations were made on current paleoseismic research and related activities in Utah (note that titles of the presentations listed here may vary from the titles listed in the meeting agenda (attachment 2), most presentations are available at http://geology.utah.gov/ghp/workgroups/pdf/uqfpwg/UQFPWG-2014_Presentations.pdf.

- Update on trenching of the Nephi segment; Chris DuRoss, Utah Geological Survey (UGS)
- Preliminary results from the Flat Canyon paleoseismic trench site, southern Provo segment, Wasatch fault – Potential implications for Holocene fault segmentation; Scott Bennett, U.S. Geological Survey (USGS)
- Evidence for multiple surface ruptures along structures between the Salt Lake City and Provo segments of the Wasatch fault; Nathan Toké, Utah Valley University (UVU)

- Newly discovered Holocene-active basin floor fault in Goshen Valley, Utah County, Utah; Adam McKean, UGS

- The Bear River fault zone, Wyoming and Utah – Complex ruptures on a young normal fault; David Schwartz, USGS

- Updates about Pleistocene earthquakes in east Cache Valley, Utah; Susanne Janecke, Utah State University (USU)

- Contemporary deformation of the Wasatch Front, Utah, and its implication for interseismic loading of the Wasatch fault zone; Wu-Lung Chang, National Central University, Taiwan and the University of Utah (UU)

- New high-resolution LiDAR data for the Wasatch fault zone, and Salt Lake and Utah Counties, and hazard mapping; Steve Bowman, UGS

- Forecasting large earthquakes along the Wasatch Front; Ivan Wong, URS Corporation

- Upcoming investigations of the Salt Lake City segment of the Wasatch fault near Corner Canyon (DuRoss), and Upcoming investigations of the Provo segment of the Wasatch fault near Dry Creek and Maple Canyon (Bennett); Chris DuRoss, UGS and Scott Bennett, USGS

- Basin and Range Seismic Hazard Summit III; Bill Lund, UGS (no PowerPoint)

Note that a scheduled presentation by Jim McCalpin, GEO-HAZ Consulting, on the U.S. Bureau of Reclamation Joes Valley fault study had to be cancelled (attachment 2) due to inclement weather that prevented Jim from traveling to the meeting.

TECHNICAL DISCUSSION ITEMS

No technical discussion items came before the Working Group this year.

UQFPWG 2013 FAULT STUDY PRIORITIES

In 2005, the UQFPWG recommended that 20 Quaternary faults/fault segments in Utah be investigated to "adequately characterize Utah's earthquake hazard to a minimally acceptable level" (Lund, 2005). Since then, the Working Group has added an additional 11 faults/fault segments to the list: five in 2007, one in 2009, one in 2010, and four in 2011 (see table 1 below).

The UQFPWG conducts an annual review of progress made toward investigating the faults/fault segments on their priority list. Based on that review, the Working Group establishes a short list of the highest priority faults/fault segments for future study. The list of highest

priority faults/segments is published on the UGS website, which is then referenced by the USGS in their annual National Earthquake Hazards Reduction Program (NEHRP) request for proposals. The Working Group's highest priority list for 2014 includes: (1) Acquire new paleoseismic information for the five central segments of the Wasatch fault zone to address data gaps – e.g., (a) the rupture extent of earthquakes on the Brigham City and Salt Lake City segments, (b) long-term earthquake records for the northern Provo, southern Weber, and Salt Lake City segments, and (c) the subsurface geometry and connection of the Warm Springs and East Bench faults on the Salt Lake City segment; (2) acquire long-term earthquake record for the West Valley fault zone – Taylorsville fault; (3) improve the long-term earthquake record for Cache Valley (East and West Cache fault zones); and (4) use recently acquired LiDAR data to more accurately map the traces of the Wasatch, West Valley, and Hurricane fault zones, and search for and map as appropriate previously undiscovered mid-valley Quaternary faults.

Table 2 shows both the 2014 highest priority fault/fault segment recommendations, and the current investigation status for all faults/fault segments identified by the UQFPWG as requiring additional study. Note that the faults/fault segments listed in table 2 as having received some level of paleoseismic study does not imply that all of the paleoseismic data necessary to fully characterize those faults/fault segments has been acquired; further investigation of those structures may be (is likely) necessary. All of the faults/fault segments listed in table 2 remain priority structures and should be considered for future investigation if a compelling case can be made for the need to acquire additional paleoseismic data.

Table 1. List of Quaternary faults/fault segments identified by the UQFPWG as requiring additional study to adequately characterize Utah's earthquake hazard to a minimally acceptable level.

Fault/Fault Segment	Original UQFPWG Priority (2005)
Nephi segment WFZ	1
West Valley fault zone	2
Weber segment WFZ – most recent event	3
Weber segment WFZ – multiple events	4
Utah Lake faults and folds	5
Great Salt Lake fault zone	6
Collinston & Clarkston Mountain segments WFZ	7
Sevier/Toroweap fault	8
Washington fault	9
Cedar City-Parowan monocline/Paragonah fault	10
Enoch graben	11
East Cache fault zone	12
Clarkston fault	13
Wasatch Range back-valley faults	14
Hurricane fault	15
Levan segment WFZ	16
Gunnison fault	17
Scipio Valley faults	18
Faults beneath Bear Lake	19
Eastern Bear Lake fault	20
Bear River fault zone	2007
Brigham City segment WFZ – most recent event	2007
Carrington fault (Great Salt Lake)	2007
Provo segment WFZ – penultimate event	2007
Rozelle section – East Great Salt Lake fault	2007
Salt Lake City segment WFZ – northern part	2009
Warm Springs fault/East Bench fault subsurface geometry and connection	2010
Brigham City segment WFZ rupture extent (north and south ends)	2011
Long-term earthquake record northern Provo segment WFZ	2011
West Valley fault zone – Taylorsville fault	2011
Hansel Valley fault	2011
Use newly acquired LiDAR data to more accurately map the traces of the Wasatch, West Valley, and Hurricane fault zones, and search for and map as appropriate mid-valley Quaternary faults	2014

Table 2. UQFPWG 2014 list of highest priority Quaternary faults/fault segments requiring additional study to adequately characterize Utah's earthquake hazard to a minimally acceptable level, and status of current paleoseismic investigations for all currently identified Utah priority faults/fault segments.

2014 Highest Priority Faults/Fault Sections For Study		
Fault/Fault Section[1]	**Investigation Status**	**Investigating Institution[2]**
Acquire new paleoseismic information for the five central segments of the Wasatch fault zone (WFZ) to address data gaps – e.g., (a) the displacement and rupture extent of earthquakes on the Brigham City, Weber, and Salt Lake City segments, (b) long-term (early Holocene and latest Pleistocene) earthquake records for the southern Brigham City, southern Weber, and northern Provo segments, and (c) the subsurface geometry and connection of the Warm Springs and East Bench faults on the Salt Lake City segment.	1. Nephi segment Spring Lake and North Creek sites, ongoing 2. Provo segment Flat Canyon site, ongoing 3. Salt Lake City segment Corner Canyon site, commence summer 2014. 4. Provo segment Dry Creek and Maple Canyon sites, commence summer 2014	1. UGS/USGS 2. USGS/UGS 3. UGS/USGS 4. USGS/UGS
Acquire long-term earthquake record for the West Valley fault zone – Taylorsville fault	No activity	
Improve the long-term earthquake record for Cache Valley (East and West Cache fault zones)	No activity	
Use recently acquired LiDAR data to more accurately map the traces of the Wasatch, West Valley, and Hurricane fault zones, and search for and map as appropriate previously undiscovered mid-valley Quaternary faults.[3]	The UGS is currently mapping portions of the Wasatch and West Valley (Granger fault) fault zones	UGS

Other Priority Faults/Fault Sections Requiring Further Study			
Fault/Fault Section	**Original UQFPWG Priority**	**Investigation Status**	**Investigating Institution**
Cedar City-Parowan monocline/Paragonah fault[4]	10	No activity	
Enoch graben	11	No activity	
Clarkston fault[4] (West Cache fault zone)	13	Black and others (2000)	
Gunnison fault	17	No activity	
Scipio Valley faults	18	No activity	
Faults beneath Bear Lake	19	No activity	
Eastern Bear Lake fault	20	No activity	
Carrington fault (Great Salt Lake)	2007	No activity	
Rozelle section, Great Salt Lake fault[5]	2007	No activity	

Studies of Priority Faults Complete or Ongoing[6]			
Fault/Fault Section	**Original UQFPWG Priority**	**Investigation Status[7]**	**Investigating Institution**
Nephi segment WFZ	1	UGS Special Study 124 USGS Map 2966	UGS/USGS
West Valley fault zone (Granger fault)	2	Contract deliverable FTR	UGS/USGS
Weber segment WFZ – most recent event	3	UGS Special Study 130	UGS/USGS
Weber segment WFZ – multiple events	4	UGS Special Study 130	UGS/USGS
Utah Lake faults and folds	5	Ongoing	UUGG/BYU
Great Salt Lake fault zone	6	Ongoing	UUGG
Collinston & Clarkston Mountain segments WFZ	7	UGS Special Study 121	UGS
Sevier/Toroweap fault	8	UGS Special Study 122	UGS
Washington fault zone	9	Contract deliverable FTR	UGS
East Cache fault zone	12	Contract deliverable FTR	USU
Wasatch Range back-valley fault (Main Canyon fault)	14	UGS Miscellaneous Publication 10-5	USBR
Hurricane fault	15	UGS Special Study 119	UGS
Levan segment WFZ	16	UGS Map 229	UGS
Brigham City segment WFZ – most recent event	2007	Contract deliverable FTR	UGS/USGS
Bear River fault zone	2007	Ongoing	USGS
Salt Lake City segment WFZ – north part	2009	Contract deliverable FTR	UGS/USGS
Hansel Valley fault[3]	2011	McCalpin (1985), Robinson (1986), McCalpin and others (1992), UUGG ongoing	UUGG
Long-term earthquake record Nephi segment WFZ	2012	Contract deliverable FTR	UGS/USGS

[1]*Not in priority order.*
[2]*BYU (Brigham Young University), UGS (Utah Geological Survey), USBR (U.S. Bureau of Reclamation), USGS (U.S. Geological Survey), USU (Utah State University), UUGG (University of Utah Department of Geology & Geophysics).*
[3]*LiDAR data of the Washington fault zone is currently available, and will be available summer 2014, for the Wasatch and West Valley fault zones at http://geology.utah.gov/databases/lidar/lidar.htm.*
[4]*Earthquake source on the USGS National Seismic Hazard Maps.*
[5]*Previous highest priority fault/fault segment.*
[6]*Faults/fault segments listed below have received some level of paleoseismic investigation; however, the fact that an investigation has been conducted or is ongoing does not imply that all of the paleoseismic data necessary to fully characterize these faults/fault segments has been acquired, and further investigation of these faults/fault segments may be (is likely) necessary.y*
[7]*FTR (Final Technical Report to the USGS, reports may be available at http://earthquake.usgs.gov/research/external/research.php).*

ATTACHMENT 1
MEETING ATTENDEES

Utah Quaternary Fault Parameters Working Group Members in Attendance

Steve Bowman, UGS* (UGS/UQFPWG Liaison)
Rich Briggs, USGS
Chris DuRoss, UGS*
Daniel Horns, UVU
Michael Hylland, UGS
Susanne Janecke, USU*
William Lund, UGS* (UQFPWG Chair)
Susan Olig, URS Corporation
Steve Personius, USGS
Joanna Redwine, USBR
David Schwartz, USGS*
Ivan Wong, URS Corporation*
Adolph Yonkee, WSU

Guests

Scott Bennett, USGS*
Bob Biek, UGS
Bob Carey, UDEM
Wu-Lung Chang, representing UUGG*
David Dinter, UUGG
Jamie Farrell, UUGG
Rich Giraud, UGS
Adam Hiscock, UGS
Greg McDonald, UGS
Adam McKean, UGS*
Bob Oaks, USU
Dean Ostenaa, Fugro Consultants, Inc.
Nathan Toké, UVU*
Anna Vargo, NRCS
Grant Willis, UGS

*Speaker
BYU (Brigham Young University), UDEM (Division of Emergency Management), NRCS (Natural Resources Conservation Service), UDWRi (Utah Division of Water Rights), UGS (Utah Geological Survey), USBR (U.S. Bureau of Reclamation), USGS (U.S. Geological Survey), USU (Utah State University), UUGG (University of Utah Department of Geology & Geophysics), UVU (Utah Valley University), WSU (Weber State University).

ATTACHMENT 2
AGENDA
QUATERNARY FAULT PARAMETERS WORKING GROUP
Wednesday, February 5, 2014
Utah Department of Natural Resources Building, Room 2000 (2nd floor)
1594 West North Temple, Salt Lake City

8:00 Continental breakfast

8:20 Welcome, overview of meeting, and review of last year's activities

8:30 Technical presentations of work completed or in progress
- 8:30 – Update on Nephi segment paleoseismic studies; Chris DuRoss, UGS
- 8:50 – Preliminary results from the Flat Canyon paleoseismic trench site, southern Provo segment, Wasatch fault—potential implications for Holocene fault segmentation along the Wasatch fault; Scott Bennett, USGS
- 9:10 – Geomorphic and paleoseismic evidence for multiple surface ruptures along structures between the Salt Lake City and Provo segments of the Wasatch fault; Nathan Toke, UVU
- 9:30 – Newly discovered Holocene-active basin floor fault in Goshen Valley, Utah County, Utah; Adam McKean, UGS
- 9:50 – U.S. Bureau of Reclamation Provo River fault study; Jim McCalpin, GEO-HAZ Consulting

CANCELLED

10:10 Break

10:40 Technical presentations of work completed or in progress
- 10:40 – New observations from the Bear River fault zone; Dave Schwartz, USGS
- 11:00 – Clustered earthquakes during the Bonneville high stand–an update; Susanne Janecke, USU
- 11:20 – Contemporary deformation of the Wasatch Front, Utah, and its implication for the interseismic loading of the Wasatch Fault Zone; Wu-Lung Chang, UUGG
- 11:40 – New high-resolution LiDAR data for the Wasatch fault zone, and Salt Lake and Utah Counties, and hazard mapping; Steve Bowman, UGS

12:00 Lunch

1:00 Technical presentations of work completed or in progress
- 1:00 – Working Group on Utah Earthquake Probabilities, an update; Ivan Wong, URS Corporation
- 1:20 – Update on planned UGS & USGS trenching on the Salt Lake City and Provo segments of the Wasatch fault; Chris DuRoss, UGS and Scott Bennett, USGS
- 1:40 – Basin and Range Province Seismic Hazard Summit III; Bill Lund, UGS

2:00 UQFPWG 2014 fault study priorities (see table 1 for UQFPWG list of faults requiring additional study; see table 2 for UQFPWG 2013 fault priority list)

3:30 Adjourn