2025 UTAH QUATERNARY FAULT PARAMETERS WORKING GROUP MEETING SUMMARY

Monday, February 10, 2025
Utah Department of Natural Resources Building, Auditorium
1594 W. North Temple, Salt Lake City, Utah

WELCOME AND INTRODUCTION

Adam Hiscock (Utah Geological Survey [UGS]) called the 2025 Utah Quaternary Fault Parameters Working Group (UQFPWG) meeting to order at 8:30 a.m. Mountain Standard Time (MST). This meeting was held at the Utah Department of Natural Resources Building Auditorium, with an additional hybrid virtual component using the Google Meet platform. After welcoming Working Group members and guests, he summarized the agenda for this year's meeting and the UQFPWG's past activities, purposes, as well as goals for the future.

UQFPWG Purpose and Goals

- Serves as a committee to help set and coordinate Utah's earthquake-hazard research agenda.
- Reviews ongoing paleoseismic, earthquake timing, and fault characterization in Utah, with the goal of updating 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 faults for future research in Utah.
- Group depends on the active involvement of researchers (academic, governmental, etc.), consultants, and the public.

U.S. Geological Survey (USGS) Update

Chris DuRoss, Intermountain West (IMW) Regional Coordinator for the U.S. Geological Survey (USGS) Earthquake Hazards Program (EHP) gave an update on the status of the External Grants Program for the last (Fiscal Year [FY] 2024) and current (FY2025) fiscal year funding cycles, as well as information on the upcoming (FY2026) funding announcement for proposals. The FY2026 funding announcement is expected to come out in mid-March 2025, with proposals due in mid-May 2025. He mentioned the USGS is currently soliciting feedback on the External Grants process and IMW research priorities, and to reach out to him via email (cduross@usgs.gov) with feedback.

TECHNICAL PRESENTATIONS

Presentations available at UQFPWG website (*denotes presentation unavailable online):
https://geology.utah.gov/hazards/info/workshops/working-groups/q-faults/

- Working Group on Utah Earthquake Probabilities II – Paleoseismology Group Update: Chris DuRoss, USGS*
- Working Group on Utah Earthquake Probabilities II – Determining Rupture Rates for use in Time-Dependent Probabilities: Alex Hatem, USGS*
- Updated Paleoseismic Data for Recent Events on the Weber Segment of the Wasatch Fault Zone at the East Layton Site, Layton Utah: Robert Givler, Lettis Consultants International, Inc.*

- Paleoseismic and Geologic Constraints on the Location and Timing of Surface Faulting along the Provo Segment of the Wasatch Fault Zone in Orem, Utah: Robert Givler, Lettis Consultants International, Inc.
- Examining the Spatial Variability of Uplift Along the Wasatch Fault and Adjacent Basin and Range Normal Faults Using Normalized Channel Steepness (Ksn) and Mountain Front Sinuosity (MFS): Nate Toke, Utah Valley University
- Towards an Improved Salt Lake Valley Community Velocity Model Through Seismic and Gravity Joint Inversion: HyeJeong Kim, University of Utah
- Characterizing the Frictional Strength, Stability, and Fabric Evolution of the Wasatch Fault Zone Through Laboratory Experiments: Srisharan Shreedharan, Utah State University*
- Modeling Evolving Shear Tractions on the Wasatch Fault since 5 ka: Grasshopper Anderson-Merritt, University of Massachusetts Amherst
- Utah Quaternary Fault Mapping Updates: Adam Hiscock, UGS
- sUAS-based Lidar for Fault Mapping: Adam Hiscock, UGS
- Utah Seismic Safety Commission (USSC) Update: Adam Hiscock, UGS

DISCUSSION ITEMS

Adam Hiscock led a discussion in the afternoon addressing topics that were brought up throughout the meeting, as well as fault investigation priorities for the FY2026 USGS funding announcement. He mentioned refining and simplifying the list of highest priority faults which comes out of this meeting annually. He suggested several topics from the 2024 list that could be removed and refined from the list for 2025.

UQFPWG 2025 UTAH FAULT INVESTIGATION PRIORITIES FOR USGS IMW EXTERNAL GRANTS

The Working Group's list of highest priority faults for future investigation in Utah is based on the list from 2024, but modified and simplified based on input from the 2025 UQFPWG meeting.

- Acquire new slip-rate and other paleoseismic data for faults lacking sufficient data and have ongoing or completed lidar fault mapping projects:
    - East and West Cache fault zones (Cache Valley regional faults)
    - Data gaps in paleoseismic records for the five central segments of the Wasatch fault zone (Brigham City, Weber, Salt Lake City, Provo, and Nephi segments)
    - Oquirrh and Southern Oquirrh Mountains fault zones (Tooele/Rush Valley faults)
    - Washington, Hurricane, and Sevier fault zones (Southern Utah regional faults)

- Use recently acquired lidar data to more accurately map fault traces. Specifically:
    - Faults in rural areas of western Utah (Escalante Desert, Sevier Desert, Pilot Valley, Tintic Valley, Skull Valley, Hansel Valley, Beaver Basin, Scipio Valley)
    - Basin and Range – Colorado Plateau Transition faults (Thousand Lake fault, Paunsaugunt fault, Joes Valley faults, etc.)
    - Faults that cross zones of critical infrastructure across Utah

- Use geophysical methods to improve subsurface models of basins along the Wasatch fault, including the densely populated Provo, Salt Lake, and Weber basins.
    - Improve 3D Basin structural models using gravity data, well data, and seismic data
    - Community velocity model input improvements
    - Use geophysical methods to better model and study listric faults

- Opportunistic trenching sites – Funding for dating samples left over from other projects that have been stored and would be useful.

- Great Salt Lake and Utah Lake faults – Improve upon previous work to better map and characterize these faults using new methods and techniques.

- Slip-rate data for Quaternary faults in Utah included in the 2023 USGS National Seismic Hazard Maps (NSHM) Update – Slip-rates needed for many of these faults for the next NSHM update.

This list does not include other priorities that have carried over from previous years, which are identified in Table 2.

WORKING GROUP PRODUCTS AND RELATED DATA

The final agenda, speaker presentations, and this summary document are available on the UQFPWG website at https://geology.utah.gov/hazards/info/workshops/working-groups/q-faults/. Paleoseismic investigations developed out of the UQFPWG meetings and published by the UGS are available in the *Paleoseismology of Utah* series at https://geology.utah.gov/hazards/info/paleoseismology/. Most of the USGS-funded investigations for Utah that were not published by the UGS are compiled in UGS Miscellaneous Publication 13-3 https://doi.org/10.34191/MP-13-3.

Utah Quaternary Fault and Fold Database

The UGS has periodically updated the *Utah Quaternary Fault and Fold Database,* which is now part of the webmap *Utah Geologic Hazards Portal*, with the most recent update being in November 2024, incorporating new mapping and fault attributes. Continuous and ongoing updates are being reviewed by the UGS for Quaternary faults mapped in peer-reviewed publications from 2013 to 2025. Users of any Quaternary fault trace and related data acquired from the UGS or the Utah Geospatial Resource Center (UGRC) State Geographic Information Database (SGID) in the past are advised to use the updated database available from the UGRC SGID (https://gis.utah.gov/data/geoscience/quaternary-faults/). This single, comprehensive feature class will be periodically updated as new and/or updated data become available.

MEETING ATTENDANCE

Registration for the meeting was completed through Eventbrite. Below is a list of in-person and virtual attendees who registered for the meeting. Specific attendance was not taken. **Denotes meeting speaker.*

In-Person Attendees:

Adam Hiscock	Utah Geological Survey
Adam McKean	Utah Geological Survey
Alba Rodriguez Padilla	Utah State University
Alex Hatem	U.S. Geological Survey
Alexis Ault	Utah State University
Caleb Reavley	IGES Inc.
Christie Rowe	Nevada Seismological Laboratory
Christopher DuRoss	U.S. Geological Survey
Darlene Batatian	Utah Geological Survey
Dylan Butt	IGES Inc.
Eduardo Guerrero	Oregon Department of Geology and Mineral Industries
Emily Kleber	Utah Geological Survey
Emily Morton	University of Utah Seismograph Stations
Fan-Chi Lin	University of Utah
Greg McDonald	Utah Geological Survey
Gregory Pyle	IGES Inc.
HyeJeong Kim	University of Utah
Ivan Wong	Lettis Consultants International
James Mauch	Wyoming State Geological Survey
James Pechmann	University of Utah
Jordan Culp	Quanta Infrastructure Solutions Group
Josh Johnson	IGES Inc.
Keith Koper	University of Utah
Kelian Dascher-Cousineau	Utah State University
Kristi Rasmussen	Utah Geological Survey
Lee Liberty	Boise State University
Mandy Willingham	Montana Bureau of Mines and Geology
Maria Jaimes	IGES Inc.
Mark Zellman	BGC Engineering
Matthew Holli	IGES Inc.
Michael Hansen	RB&G Engineering Inc
Michael Hylland	Utah Geological Survey, Retired
Mike Stickney	Montana Bureau of Mines and Geology
Nathan Toke	Utah Valley University
Parker Farnworth	IGES Inc.
Peter Doumit	IGES Inc.

Rachel Adam	Utah Geological Survey
Rich Giraud	Utah Geological Survey, Retired
Rich Koehler	Nevada Bureau of Mines and Geology, University of Nevada Reno
Robert Givler	Lettis Consultants International, Inc.
Sean Hutchings	University of Utah
Srisharan Shreedharan	Utah State University
Steve Bowman	Utah Geological Survey
Wade Renard	IGES Inc.
Yann Gavillot	Montana Bureau of Mines and Geology
Zach Lifton	Idaho Geological Survey

Virtual Attendees:

Ana Vargo	U.S. Department of Agriculture - Natural Resources Conservation Service
Austin Elliott	U.S. Geological Survey
Ben Laabs	U.S. Bureau of Reclamation
Carl Ege	Utah Division of Water Resources
Chuck Williamson	Utah Dam Safety / Division of Water Rights
Claudio Berti	Idaho Geological Survey
Daniel Seely	IGES, Inc.
Daren Rasmussen	State of Utah
David Dinter	University of Utah
Dru Nielson	Delve Underground (Jacobs Associates)
Ellen Lamont	U.S. Bureau of Reclamation
Enrique Chon	Colorado Geological Survey
Gordon Seitz	California Geological Survey
James Evans	Utah State University
Jeri Ben-Horin	Arizona Geological Survey, University of Arizona
Judith Zachariasen	California Geological Survey
Julia Frazier	BGC Engineering
Kris Hornsby	BGC Engineering
Michael Braunagel	University of Minnesota Duluth
Michael Cline	U.S. Bureau of Reclamation
Nadine Reitman	U.S. Geological Survey
Nick Ellett	U.S. Bureau of Reclamation
Patrick Emery	Gordon Geotechnical Engineering
Patrick Emery	Gordon Geotechnical Engineering
Patrick lam	Delve Underground
Ron Harris	Brigham Young University
Scott Miller	University of Utah
Stormie Elmer	Utah Geological Survey
Susan Jänecke	Utah State University
Suzanne Hecker	U.S. Geological Survey (Retired)

Tabor Reedy — U.S. Bureau of Reclamation
William Lund — Utah Geological Survey

Table 1. Earthquake sources (faults and fault segments) in the USGS *National Seismic Hazard Maps (NSHM)* or the UGS Hazus Utah fault database (UGS Open-File Report 631). These faults may warrant additional investigation (from 2015 UQFPWG meeting).

Utah Fault or Fault Segments	Included In		
	2023 NSHM	2015 NSHM	Utah Hazus
Beaver Basin intrabasin/eastern margin faults	Yes	--	Yes
Crater Bench/Drum Mountains fault zone	Yes	--	Yes
Crawford Mountains (west side)	Yes	--	Yes
Cricket Mountains fault (west side)	Yes	--	Yes
Fish Springs fault	Yes	--	Yes
House Range (west side) fault	Yes	--	Yes
Joes Valley fault zone	Yes	Yes	Yes
Little Valley faults	Yes	--	Yes
Malad segment, Wasatch fault zone	Yes	--	Yes
Mineral Mountains (west side) faults	Yes	--	Yes
North Promontory fault	Yes	Yes	Yes
Oquirrh fault zone	Yes	--	Yes
Oquirrh-Southern Oquirrh Mountains fault zone	Yes	Yes	Yes
Parowan Valley faults	--	--	Yes
Pavant/Tabernacle/Beaver Ridge/Meadow-Hatton/White Sage Flat faults	--	--	Yes
Porcupine Mountain faults	Yes	--	Yes
Scipio/Pavant Range/Maple Canyon/Red Canyon faults	Yes	--	Yes
Skull Valley faults (southern part)	--	--	Yes
Snake Valley faults	Yes	--	Yes
Snow Lake graben	--	--	Yes
Stansbury fault zone	Yes	Yes	Yes
Strawberry fault	Yes	Yes	Yes
Wah Mountains (south end)	Yes	--	Yes
West Cache fault, Wellsville section	Yes	Yes	Yes
West Bear Lake fault	Yes	--	Yes

Table 2. Status of proposed and published paleoseismic-related investigations based on priorities developed by the UQFPWG since 2005. If there are any missing publications, please send the reference to adamhiscock@utah.gov.

Study Type	Utah Fault or Fault Segment	UQFPWG Priorities		Investigation Status (as of 3/2024)
		2005	Additions	
Earthquake Timing	Nephi segment, Wasatch fault zone	1	2012 2017	UGS FTR Report, 05HQGR0098 (2005) USGS SI Map 2966 (2007) UGS Special Study 124 (2008) UGS FTR Report, G12AP20076 (2014) UGS Special Study 151 (2014) UGS Special Study 159 (2017) UGS FTR, G17AP00001 (2018)
	West Valley fault zone	2		
	Granger fault		2017	UGS Special Study 149 (2014)
	Taylorsville fault		2011 2017	UGS FTR, G15AP00117 (2017) UGS Special Study 169 (2022) UGS FTR, G22AP00313 (In Review, 2025)
	Weber segment, Wasatch fault zone – most recent event and multiple events	3 4	2012 2017	UGS Miscellaneous Publication 05-8 (2006) UGS FTR, 07HQGR0093 (2007) UGS Special Study 130 (2009)
	Utah Lake faults and folds	5		
	Acquire earthquake timing information to investigate the relation of earthquakes to large earthquakes on the Provo segment		2015 2017	UUGG FTR Report, G08AP0016 (2014)
	Great Salt Lake fault zone	6		
	Rozelle section, East Great Salt Lake fault Carrington fault, Great Salt Lake fault zone		2007	UUGG FTR Report, G08AP0016 (2014) Janecke and Evans (2017)
	Collinston and Clarkston Mountain segments, Wasatch fault zone	7	--	UGS Special Study 121 (2007) UGS Open-File Report 638 (2015)
	Sevier and Toroweap faults	8	2016	UGS Special Study 122 (2008)
	Washington fault zone (includes Dutchman Draw fault)	9	--	UGS Open-File Report 583 (2011) UGS Miscellaneous Publication 15-6 (2015)
	Cedar City-Parowan monocline (removed 2016) and Paragonah fault	10	--	UGS Map 270 (2015) 2016 presentation file Paragonah fault, no activity
	Enoch graben	11	--	UGS Open-File Report 628 (2014)
	East Cache fault zone	12	2013	USU FTR Report, 07HQGR0079 (2012)
	Clarkston fault	13	--	UGS Special Study 98 (2000) UGS Special Study 121 (2007) UGS Open-File Report 638 (2015) UGS FTR, G17AP00001 (2018)

Study Type	Utah Fault or Fault Segment	UQFPWG Priorities		Investigation Status (as of 3/2024)
		2005	Additions	
Earthquake Timing	Wasatch Range back-valley faults (includes Morgan fault and Main Canyon fault)	14	--	UGS Miscellaneous Publication 11-2 (2011) UGS Miscellaneous Publication 10-5 (2010)
	Hurricane fault zone	15	--	UGS Special Study 119 (2007)
	Levan and Fayette segments, Wasatch fault zone	16	--	UGS Map 229 (2008) UGS Open-File Report 640 (2015) UGS FTR G17AP00071 (2019)
	Gunnison fault	17	--	No activity
	Scipio Valley faults	18	2017	No activity
	Faults beneath Bear Lake	19		No activity
	Eastern Bear Lake fault zone	20	--	No activity
	Provo segment, Wasatch fault zone			
	Penultimate event and long-term earthquake record	--	2007 2011 2012 2017	UGS MP 02-7 (2002) URS FTR Report, 02HQGR0109 (2011) UGS FTR Report, G13AC00165 (2015) Bennett and others, 2018 (BSSA)
	Fort Canyon fault, Traverse Mountains salient	--	2012	UVU FTR, G16AP00104 (2017)
	Brigham City segment, Wasatch fault zone			
	Most recent event and rupture extent	--	2007 2011	UGS Special Study 142, (2012)
	Salt Lake City segment, Wasatch fault zone	--	2009	
	Penrose Drive site	--	2012	UGS FTR Report, G10AP00068 (2010) UGS Special Study 149 (2014)
	Corner Canyon site	--	2012	UGS FTR Report, G14AP00057 (2014)
	Bear River fault zone	--	2007	AGU Abstracts: 2012 and 2013 Hecker and others, 2021 (Tectonophysics) USGS SI-Map 3430 (2019)
	Acquire new paleoseismic information to address data gaps for the five central segments of the Wasatch fault zone	--	2012	DuRoss and Hylland, 2015 (BSSA) DuRoss and others, 2018 (GRL)
	Topliff Hills fault	--	2016	Trenching by Toke, Bunds, and UVU students, ongoing
	Northern Oquirrh fault zone	--	2015 2017	Bunds and others, Poster 1 and Poster 2

Study Type	Utah Fault or Fault Segment	UQFPWG Priorities		Investigation Status (as of 3/2024)
		2005	Additions	
High Res. Mapping & Trench Site ID	Wasatch and West Valley fault zones	--	2014 2017	UGS Open-File Report 638 (2015) UGS Open-File Report 640 (2015) UGS FTR G17AP00001 (2018) UGS RI-280 (2020)
	Hansel Valley fault zone	--	2011	No activity
	East Bear Lake fault zone	--	2015 2017	UGS/IGS FTR Report G19AP00072/G19AP00073 (2021)
	East and West Cache fault zones	--	2015 2017	UGS FTR Report, G17AP00071 (2020) UGS RI-286 (2024)
	Hurricane fault zone	--	2014 2017	UGS/AZGS FTR Report G20AP007/G20AP008 (2021)
	Oquirrh fault zone	--	2015 2017 2018 2021	Bunds and others, Poster 1, Poster 2, and Poster 3, and presentation Bunds UGS/IGS FTR Report G19AP00072/G19AP00073 (2021)
	Southern Utah faults			
	Sevier/Toroweap faults		2018	UGS/AZGS FTR Report G20AP007/G20AP008 (2021) UGS EHP Grant G24AS00292 (In Progress, 2025)
	Mineral Mountains (west side) faults		2018	No activity
	Beaver Basin faults		2018	No activity
	Crater Bench/Drum Mountain faults		2018	No activity
	Scipio Valley faults		2018	UGS EHP Grant G24AS00292 (In Progress, 2025)
	Little Valley faults		2018	No activity
	Paunsaugunt fault		2021	No activity
Salt Tect-onics	Levan and Fayette segments of the Wasatch fault zone	--	2016	UGS FTR G17AP00071 (2019) UGS Open-File Report 640 (2015)
	Main Canyon fault Sevier detachment/Drum Mountains fault zone Bear River fault zone Spanish Valley (Moab area) Joes Valley fault zone Scipio Valley faults Gunnison fault	--	2016	Scipio Valley and Bear River lidar data collected in 2018 Scipio Valley faults - UGS EHP Grant G24AS00292 (In Progress, 2025)
Other	Warm Springs fault/East Bench fault subsurface geometry and connection	--	2010	BSU FTR G15AP00054 (2015) BSU FTR G17AP00052 (2017)