

AURORA

Meeting Minutes for Aurora Spring Board Meeting

*Salt Lake City, Utah
April 11-13, 2017*



Meeting Minutes for Aurora Spring Board Meeting

Meeting at Utah DOT Traffic Operations Center

Hotel: Salt Lake Marriott Downtown

Salt Lake City, Utah

Tuesday (April 11, 2017) -- -- -- -- --

Open and General Items

Location: @ Utah DOT Traffic Operations Center

Host state discussion and welcome

Jeff Williams (Utah DOT) welcomed the group to the Traffic Operations Center and provided a general description of the facility. A tour was later provided. All attendees introduced themselves and the agency they represented. Several individuals were first time board meeting attendees.

Neal reviewed the meeting agenda and schedule. Tim Boyer made a motion to approve the minutes from the previous Aurora meeting. Mike Adams seconded the motion. An all “aye” vote followed. Meeting attendance is noted below:

First Name	Last Name	Agency
Lisa	Idell-Sassi	Alaska
Mark	Trennepohl	Arizona
Steve	Hancock	California
Thomas	Aguilar	Colorado
David	Johnson	Colorado
John	Williams	Colorado
Anne	Brown	Delaware
Frank	Sharpe	Illinois
Tina	Greenfield	Iowa
Dale	Kirmer	Kansas
Dawn	Gustafson	Michigan
Jon	Bjorkquist	Minnesota
Travis	Lutman	North Dakota
Timothy	Boyer	Ohio
Alain	Beaulieu	Ontario
Jason	Norville	Pennsylvania
Jeff	Williams	Utah
Mike	Adams	Wisconsin
Cody	Oppermann	UDOT
Roemer	Alfelor	FHWA
Heather	Reeves	NOAA/NSSL
Roham	Abtahi	NOAA Federal
Randy	Graham	SLC NWS
Rick	Nelson	AASHTO-SICOP
Zach	Hans	CTRE
Neal	Hawkins	CTRE
Judy	Thomas	CTRE

National and Local Technical Presentations

Multi-Radar/Multi-Sensor (MRMS) Systems

Heather Reeves (NOAA National Severe Storms Laboratory) made a presentation on [Multi-Radar/Multi-Sensor \(MRMS\) Systems](#) and discussed the possible transportation-related applications. She then asked the group for feedback regarding the possible value of the product and desired components. The group indicated that MRMS would be potentially useful and each attendee provided feedback. Some additional interest areas included: integration into MDSS, integration with 511, use of RWIS data, differentiation of precipitation types and identification of transition areas and identification of lake effect snow and snow squalls.



Driver Awareness and Risk Communication: Implications for Winter Weather Messaging

Randy Graham (National Weather Service – Salt Lake City) presented on [Driver Awareness and Risk Communication: Implications for Winter Weather Messaging](#) which is an effort to quantify travel impacts associated with snowfall events and contrast them with non-storm days. He also discussed winter weather messaging and potential communication strategies.



Tour of Utah DOT TOC

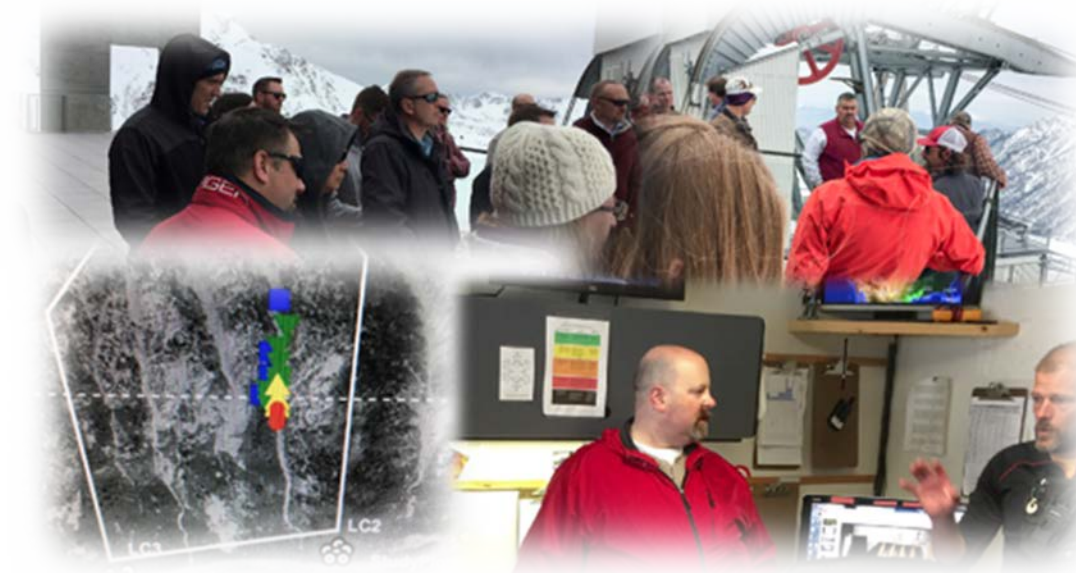
The group was provided with a tour of the TOC and discussions with TOC staff. The group was divided into two parts, allowing in-depth discussions with TOC engineers and meteorologists. See photos below:



Snowbird and Avalanche Center Tour

The group traveled from the TOC to Snowbird and took the aerial tram to the Snowbird summit. While at the summit, the group met with Bill Nalli and Matt McKee (Avalanche Center staff) who discussed their avalanche control and mitigation efforts as well as experiences. The Snowbird summit provided an excellent vantage point for Avalanche Center staff to describe various areas of the canyon, highway and habitual problem areas. Upon descending from the summit, the group traveled to the Avalanche Center for a tour. The group was divided into two parts for discussion within the facility and review of proximate equipment.

More information can be found at: <https://www.youtube.com/watch?v=7TZGBKVKmCA>



Wednesday (April 12, 2017) -- -- -- -- --

Location: @ Utah DOT Traffic Operations Center

National Focus and Perspective

FHWA Briefing

Roemer Alfelor (FHWA) provided an update of the USDOT Road Weather Management Program, which included topics such as Weather-Savvy Roads Every Day Counts Initiative, and CMF workshops. Shared documents include: [RWMP Program Update April 2017](#); [2017 Road Weather Management Stakeholder Meeting](#)

NOAA Federal

Roham Abtahi (NOAA) provided a brief introduction to his role as liaison to the FHWA. He would like to get Pathfinder states in contact with WFOs. He would also like to establish relationships between state DOTs and WFOs. Transportation-related messaging is an area of interest.

2017 National Winter Maintenance Peer Exchange

Rick provided updates on the upcoming [Peer Exchange](#). The meeting will take place in Pittsburgh during the week of September 11, 2017. The Aurora Board decided to travel on Sunday, meet Monday morning and afternoon and Tuesday morning. There will be no Aurora board meeting on Thursday afternoon. Committee briefings will be provided before the meeting this year.

TRB Task Forces and Committees

Tina Greenfield provided an update on related TRB committees. An exemplary paper award will honor Lee Smithson and be awarded each year at TRB.

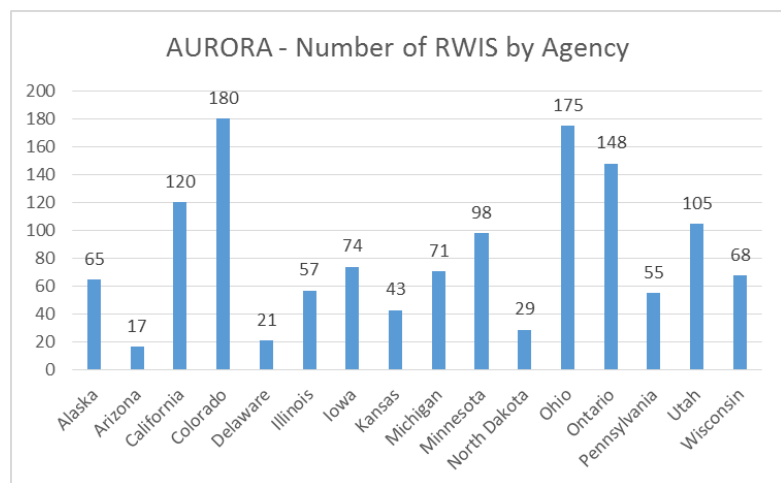
Tina Greenfield: Chair: Winter Maintenance Committee [AHD65](#)

Kathy Ahlenius: Chair: Standing Committee on Surface Transportation Weather [AH010](#)

Max Perchanok: Chair: Section - Maintenance and Preservation [AHD00](#)

State Round Robin

This portion of the meeting provides a forum for states to openly discuss opportunities and challenges faced specific to RWIS. Topics are not recorded so one needs to be there to engage in the beneficial exchange of information. These topics ranged from the current number of RWIS, plans for additional stations or equipment installations, forecasting, power, maintenance, staffing, equipment issues, etc. Other topics included snow plows, AVL, route optimization, 511, etc. The April 2017 summary totaling 1,326 RWIS stations are shown here by agency. (Ten additional RWIS stations, not shown, are managed by a Turnpike Authority.)



Some documents shared during the round robin include:

Dawn Gustafson: [Michigan DOT North Region Weather Messaging and AWS](#)

Cody Oppermann: [The Utah Department of Transportation's Winter Road Weather Index, Storm Intensity Index, and Snow and Ice Performance Measure](#)

Rapid Fire Research Ideas

The group brainstormed what it should be focused on in 2017, possible research and focus areas. Following is an overview of the ideas suggested.

- Sensors
 - Invasive, non-invasive
 - Cost/year
 - Savings (closure/non-closure)
 - Accuracy
 - Virtual RWIS sites v. actual
 - Lifespan for non-invasive or invasive (for equipment)
 - Calibration requirements for both (e.g. how often, remote versus on-site)
 - Salinity (measurement capabilities)
 - Mobile friction sensors - How should the information be used?
 - Mobile RWIS
 - Mobile pavement sensors
 - Use of Vaisala sensors
- Forecasts
 - Criteria for good forecasts
 - How far in advance are getting good forecast?
 - How good identifying begin/end?
 - Picking up roadway details
 - When to plan for staffing, e.g. % chance?
 - Tracking accuracy compared to actual (observed)
 - Forecasting of lake effect snow
 - Forecasting of flash freeze
- Connected vehicles
 - How to integrate, use data?
 - How to integrate weather, roadway data into vehicles?
 - How to get info back from vehicles?
 - How should data be packaged into something useful?
- VSL
 - How different weather conditions, observations can be used before speed impact
 - DMS messaging
 - Thresholds for speed limits
 - Automated, semi-automated
- Training
 - Who and how to get to appropriate level?
 - Adoption by appropriate levels

- Measure who is using, to what extent
- AVL
 - Applications
 - Opportunities
 - Case studies
- Mobile RWIS
 - Applications, opportunities
 - Why build a program, what is the value?
- Performance management for winter maintenance
 - How to use weather indices?
 - Find existing, best practices
 - How to integrate indices with other data, measures?
 - Snow, ice performance weather (measures)
 - Storm intensity index
 - Snow intensity rate standards
 - When storm begins, ends
 - Bridge gap between storm indices and maintenance performance
- Where does RWIS fit into an agency?
 - May differ among agencies
 - Where does funding originate?
- Camera imagery and video
 - How is value added?
 - How to use?
 - Issues, storage, frequency
- Other
 - Big data analytics
 - Cognitive systems
 - Successful applications of more advanced weather messaging
 - Current state of road conditions – timely, accurate (sources)
 - Snow fall rate determination
 - Siting criteria
 - Cost comparisons among states

Thursday (April 13, 2017) -- -- -- -- --

Location: @ Marriott Salt Lake City, UT

Aurora Program Administration

Neal shared a presentation that he provides to agencies and individuals interested in learning more about Aurora. He also provided an overview of the Aurora website (www.aurora-program.org) and indicated that it is currently under revision.

Zach shared that there is a current effort to update the list of completed projects, locate all final reports and have the InTrans publications group review and edit the reports for formal posting on the Aurora website.

Neal presented current commitments, expenditures and encumbrances. See tables below.

TPF-5(290) Commitments

Aurora Pooled Fund Commitment Summary				
Agency	2014 Amount	2015 Amount	2016 Amount	2017 Amount
Alaska DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
California DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Colorado DOT	\$ -	\$ 25,000	\$ 25,000	\$ 25,000
Delaware DOT	NA	NA	NA	\$ 25,000
Illinois DOT	\$ 25,000	\$ 25,000	\$ 25,000	
Iowa DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Kansas DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Michigan DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Minnesota DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
New York State DOT	\$ 25,000	\$ 25,000	\$ 25,000	
North Dakota DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Ohio DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Ontario	In-Kind	In-Kind	In-Kind	In-Kind
Pennsylvania DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Utah DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Virginia DOT	\$ 25,000	\$ 25,000	\$ -	
Wisconsin DOT	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Annual Totals	\$ 350,000	\$ 375,000	\$ 350,000	\$ 325,000
Running Total	\$ 350,000	\$ 725,000	\$ 1,075,000	\$ 1,400,000

TPF-5(290) Expenditures & Encumbrances

Project		Budget	Billed	% Billed	BOD Champion
FY2012/2013					
cancelled	2012-01 Validate the accuracy of pavement condition predictions	\$ -			
FY2014					
active	2014-01 Seasonal Weight Restrictions Demonstration Phase 2	\$ 213,621	\$ 20,426.27	9.56%	Max Perchanok
active	2014-02 Quantifying Salt Concentration on Pavement Phase 2	\$ 115,000			Max Perchanok
cancelled	2014-03 Validate Accuracy of PavementPredictions Phase 2	\$ -			Mike Adams
FY2015					
cancelled	2014-03 Validate Accuracy of Pavement.....Predictions Phase 2	\$ -			
completed	2015-01 Snow Liquid Water Equivalent for Forward Scatter PWD Sensors	\$ 55,000	\$ 54,541.21	99.17%	Lisa Idel-Sassi
completed	2015-02 2015 Peer Exchange	\$ 45,000			
completed	2015-03 Improving Traffic Speed Estimation Phase 2 (474-17-26)	\$ 12,439			Tina Greenfield
completed	2015-04 Review Synthesis of Alternatie Power Supplies	\$ 30,000	\$ 29,085.28	96.95%	
in kind Ontario	2015-05 Best Practices in Data Storage	\$ -			
cancelled	2015-06 Non-Traditional RWIS	\$ -			
completed	Extra to FY15 Admin (Peer Exchange Board Member Meeting Costs Only)	\$ 10,000			
FY2016					
completed	2016 International Conference & Workshop on Winter Maintenance	\$ 7,500	\$ 7,500.00	100.00%	
not scoped	2016-01 Snow and Ice Performance Tool for Aurora	\$ 15,000			Jeff Williams
not scoped	2016-02 Winter Severity Index support to Clear Roads	\$ 20,000			Tina Greenfield
active	2016-03 RWIS Sensor Density and Location, Phase 2	\$ 102,960			Max Perchanok
completed	Management Support for the Aurora Program (474-78-66)	\$ 123,064	\$ 116,959.65	95.04%	
FY2017					
active	Management Support for the Aurora Program (474-79-75)	\$ 124,109	\$ 12,473.96	10.05%	
active	2017-01 2017 National Winter Maintenance Peer Exchange	\$ 45,000			

Spent and/or Encumbered against TPF-5(290)	\$ 918,693
Total Commitments (Years 2014 - 2017)	\$ 1,400,000
Effective Balance	\$ 481,307

Summary of active Aurora projects

Updates were provided for active and pending Aurora projects. See table below.

Project No.	Fiscal Year	Status	Name	Funding	Agency	Champion
ACTIVE PROJECTS						
2014-01	FY 2014	Active	Seasonal Weight Restrictions Demonstration, Phase 2	\$213,621	USDA Forest	Max Perchanok
2014-02	FY 2014	Active	Quantifying Salt Concentration on Pavement, Phase 2	\$120,000	WTI	Max Perchanok
2016-03	FY 2016	Active	RWIS Sensor Density and Location, Phase 2	\$102,960	Uof Alberta	Max Perchanok
2017-01	CY 2016	Active	2017 National Winter Maintenance Peer Exchange	\$45,000		Tina Greenfield
2015-05	FY 2015	Scoping	Survey of best practices in Data Storage	\$0	Ontario In-Kind	Max Perchanok
APPROVED BUT NOT ACTIVE OR SCOPED PROJECTS						
2016-01	FY 2016	Scoping	Snow and Ice Performance Tool for Aurora	\$150,000	TBD	Jeff Williams
2016-02	FY 2016	Scoping	Winter Severity Index support to Clear Roads	\$20,000	TBD	Tina Greenfield

Seasonal Weight Restrictions (Aurora 2014-01)

Max provided a written update on the project status, which is in its early stages. Phase 2 is the follow-on to Aurora project 2012-05 (Phase 1). Phase II includes implementation of selected models and comparison of results with each other and with observed thaw depths and pavement strength. The following models were selected for Phase II:

- MnDOT critical dates (spring 2015 and 2016)
- Lakehead U (Ontario) critical dates (spring 2016 only)
- Lakehead U (Ontario) and Model 158 degree-day thaw depth (spring 2015 and 2016)
- CLARUS (spring 2016 only; subcontracted to UND).

Model demonstrations will be run at instrumented sites in Ontario, Michigan, Wisconsin, Iowa, North Dakota and Alaska. The Clarus demonstration will include only winter 2015-16 because due to Clarus limited archive of weather data for all areas. The Clarus model will include temperature profile forecast but will not include modulus forecast. Participants have provided weather and subsurface data and will obtain FWD or LWD measurements during the thaw period as available.

Quantifying Salt Concentration on the Pavement, Phase 2 (Aurora 2014-02)

Max provided a written update on the project status, which is in its early stages. The Luis-Lata research group withdrew their device from the testing due to uncertainty with past results. It was decided to proceed with the lab testing phase of the project using 2 spectral sensors in which the presence or concentration of salt can be estimated from the depth of ice and the temperature. WTI provided a revised plan and budget for lab testing and it was decided that field testing will be considered after the lab testing is completed and reported. The revised proposal has not yet been reviewed by the project team. WTI has an arrangement with Colorado DOT whereby field testing can be set up quickly if we decide to proceed with that.

Best Practices in Data Storage (Aurora 2015-05)

Max provided a written update on the project status, which is nearing completion. This project was approved in 2015 with no action taken. MTO agreed to deliver it in-house as an in-kind project at the Buffalo meeting in fall 2016. A survey monkey questionnaire was developed and distributed to approximately 50 individuals plus the snow-ice list server in March 2017. 27 responses received. A written report will be prepared.

RWIS Network Density (Aurora 2016-03)

Max provided a written update on the project status, which will be initiated upon contracting. Since Dr. Kwon has moved from University of Waterloo to University of Alberta, the contract for Phase 2 is with University of Alberta. The planned duration is 2 years. There are five primary objectives.

1. Develop location and density optimization models and solutions for all other members of AURORA that were not covered in our previous project;
2. Extend the methodology to account both spatial and temporal attributes of road weather and surface conditions;
3. Develop an empirical optimal density model and related guidelines based on results for all topographic-climate zones in central North America;
4. Evaluate the effects of spatial demarcation on RWIS planning, and examine the implications of RWIS deployment at different geographical/jurisdictional levels (e.g., leveraging the RWIS stations in neighbor states/provinces); and
5. Integrate the developed solutions into LORWIS (www.lorwis.com) – a prototype web-based RWIS location visualization platform for demonstrating the proposed models and the resulting solutions. The system will be made available to Aurora members for a two-year period after completion of the project.

Winter Severity Index Support for Clear Roads (Aurora 2016-02)

Tina is currently obtaining more information about the project. Brian Burn, from Maine is the champion, and leading the project.

2017 National Winter Maintenance Peer Exchange (Aurora 2017-01)

Neal provided an update on Aurora’s collaborative support, with Clear Roads, of the Peer Exchange. Each group commits \$45,000 to fund participation by invited guests.

Recently completed Aurora projects

Neal provided an updated list of completed projects. See table below. Some of these projects did not have a formal report. Other project reports are currently being located, or InTrans publications group is reviewing and editing them. They will be incrementally posted to the Aurora website at www.aurora-program.org. Three recently completed projects include the following. Their reports are currently, or will soon be, available at the Aurora website.

- Improving Estimations of Real-Time Traffic Speeds during Weather for Winter Performance Measurement (2013-03/2015-03)
- An Analysis of the PWD Precipitation Rate Estimates as Compared to a Hotplate Snow Gauge (2015-01)
- Review Synthesis of Alternative Power Supply (2015-04)

Project No.	Fiscal Year	Status	Name	Funding	Agency	Champion
COMPLETED PROJECTS						
2007-05	FY 2007	Completed	Multiple-Use ITS Data Collection Practices	\$15,000		Jack Stickel
2009-01	FY2009	Completed	Summary and Comparison of Agency Experience w/ S	\$5,000	MDOT	Dawn Gustafson
2010-02	FY 2010	Completed	Mobile Weather Data Collection Guidelines	\$5,000	MnDOT	Curt Pape
2010-04	FY 2010	Completed	RWIS Sensor Density and Location	\$143,833	UofWaterloo	Max Perchanok
2011-04	FY 2011	Completed	Study of MDSS Costs	\$5,000		Mike Adams
2012-02	FY 2012	Completed	Weather Index User's Guide	\$5,000	?	Tina Greenfield
2012-03	FY 2012	Completed	Cameras and Operational Impact of Remote ... Monit	\$25,000		Travis Lutman
2012-05	FY 2012	Completed	Seasonal Weight Restrictions Demonstration	\$50,000	USDA Forest	Max Perchanok
2013-01	FY 2013	Completed	2013 National Winter Maintenance Peer Exchange	\$35,000		Tina Greenfield
2013-04	FY 2013	Completed	Quantifying Salt Concentration on Pavement	\$29,976	WTI	Max Perchanok
2015-02	FY 2015	Completed	2015 National Winter Maintenance Peer Exchange	\$45,000		Tina Greenfield
2013-06	FY 2013	Completed	Make the Aurora Winter Severity Index Available to A	\$23,193	AccuWeather	Tina Greenfield
2010-03a	FY 2010	Completed	Eval Sensor Tech for Road Condition Monitoring, Ph	\$154,830	UofWaterloo	Max Perchanok
2010-03b	FY 2010	Completed	Eval Sensor Tech for Road Condition Monitoring, Ph	\$104,832	UofWaterloo	Max Perchanok
2011-02	FY 2011	Completed	RWIS Training Tool	\$264,983	Iteris	Tina Greenfield
2013-03	FY 2013	Completed	Improving Estimation ... for Performance Measureme	\$129,896	ISU Stats	Tina Greenfield
2015-01	FY 2015	Completed	Snow Liquid Water Equivalent for...PWD Sensors	\$55,000	NCAR	Jack Stickel
2015-03	FY 2015	Completed	Improving Traffic Speed Estimation Phase 2	\$12,439	ISU Stats	Tina Greenfield
2015-04	FY 2015	Completed	Review Synthesis of Alternative Power Supplies	\$30,000	Univ Alaska-Fa	Lisa Idel-Sassi

Proposed Aurora projects

Descriptions of the proposed projects were distributed to the group and discussed.

Snow and Ice Performance Tool for Aurora (Aurora 2016-01)

Jeff introduced the recently updated scope of work for the project. The group discussed the updated scope and suggested some revisions. Jeff will provide a new scope for this project and remove Task 6 – GUI (Wire Frame).

Comparability of pavement temperature readings from invasive and non-invasive pavement sensors

Tim introduced this proposed project with the group. Feedback included that some of research has already been done in this area. Tim will perform a literature review first, present the results to the group, who may then decide if the project should formally proceed.

[INSERT LINK]

Transferability of Thaw Depth Forecasts for Spring Load Restrictions

Max's proposed project was reviewed by the group. Limited discussion followed.

Steve made a motion to approve both new projects. Dale seconded this motion. Everyone favored the motion with a vote of "aye". The motion carried. Funding the two new projects should leave ~\$275,000 in the Aurora budget.

Additional Discussion

The group decided to have two calls between the Spring 2017 meeting and the next meeting. Steve will schedule these meetings well in advance, so that they can be added early to participant calendars.

Adjourn

The meeting was adjourned at ~11:30 am with a motion by Steve Hancock, seconded by Tina, all aye.



Salt Lake City, 2017