

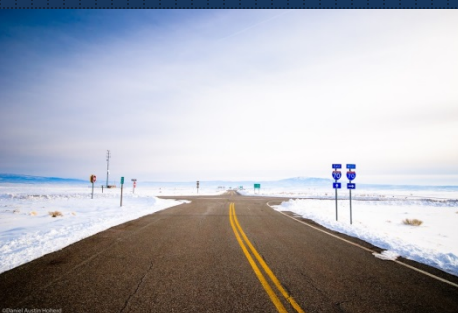


Winter Weather Events, Crashes and Traffic Impacts: Applying Environmental Communication Strategies to Winter Weather Messaging

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2018 Pathfinder Summit



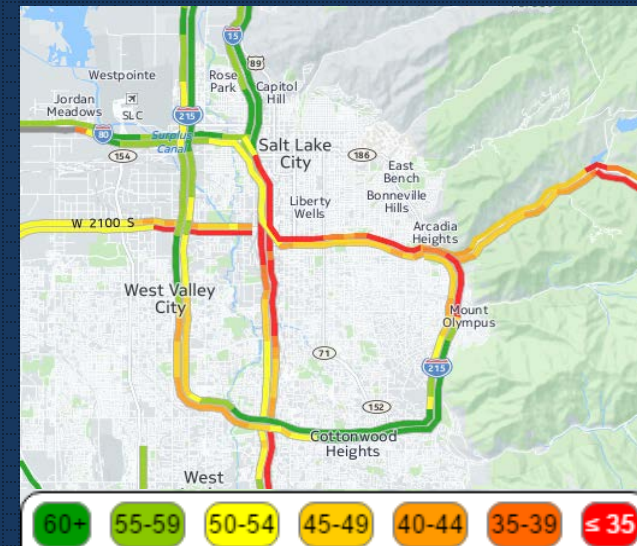
Project Goals

- Quantify travel impacts associated with snowfall events
 - Crash rates, travel times, varied impacts based on time of day, day of week, snowfall intensity & road temperatures
 - Create crash & traffic climatology
- Leverage risk communication strategies to create improved NWS/UDOT messaging based on impacts



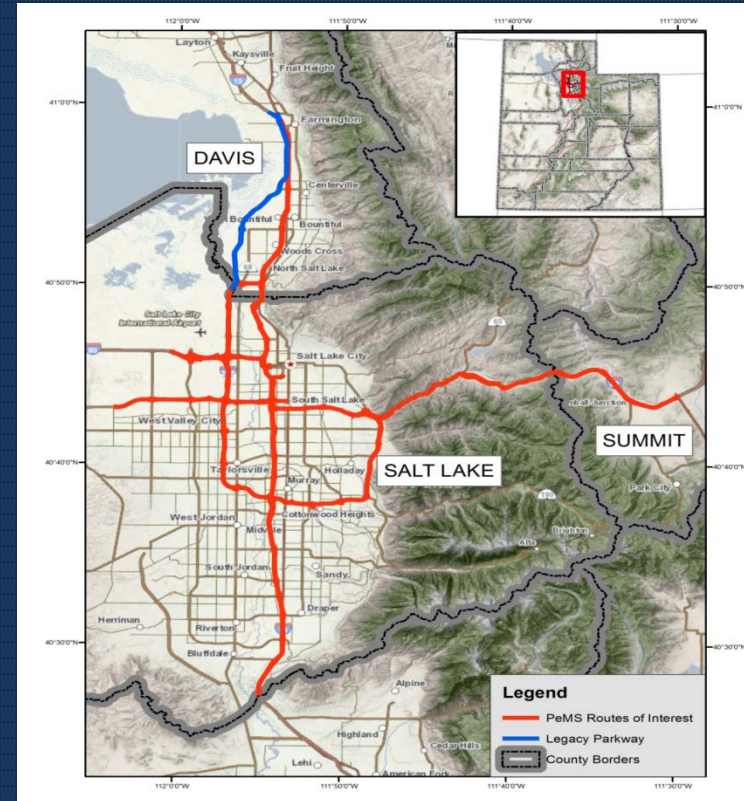
Weather & Travel – Why do we care?

- Nearly 23% of all auto accidents associated with winter weather events
- Annually, weather-related accidents result in:
 - 6,253 deaths, 480K+ injured & involve 1M people
 - Est costs = \$5.7B in property damage, \$3.1B for medical care & \$8.2B for lost productivity
- Non-recurring traffic delays & congestion result in annual cost of \$450 million in Salt Lake City
- Vast majority of high impact travel days in SLC are associated with inclement weather (UDOT)



Driver Awareness and Response to Winter Storms

- Two events were surveyed
 - Heavy snow event during PM commute
 - Freezing rain event during AM commute
- Phone surveys led by PEGUS Research
- 400 surveys completed per event
 - Awareness of weather forecast
 - Sources of weather and road information
 - Modification of travel plans
 - Perception of storm impacts & severity



Winter Storm Message Sources

- Queried about 11 possible sources of weather info
 - Personal (friends, social media)
 - Media (TV, radio)
 - Government (UDOT, NWS)
- Most heavily utilized sources
 - Personal observation – 59%
 - Local TV – 57%
 - Local radio – 43%
 - **Government sources – 27%**



Self-reported Behavior Change

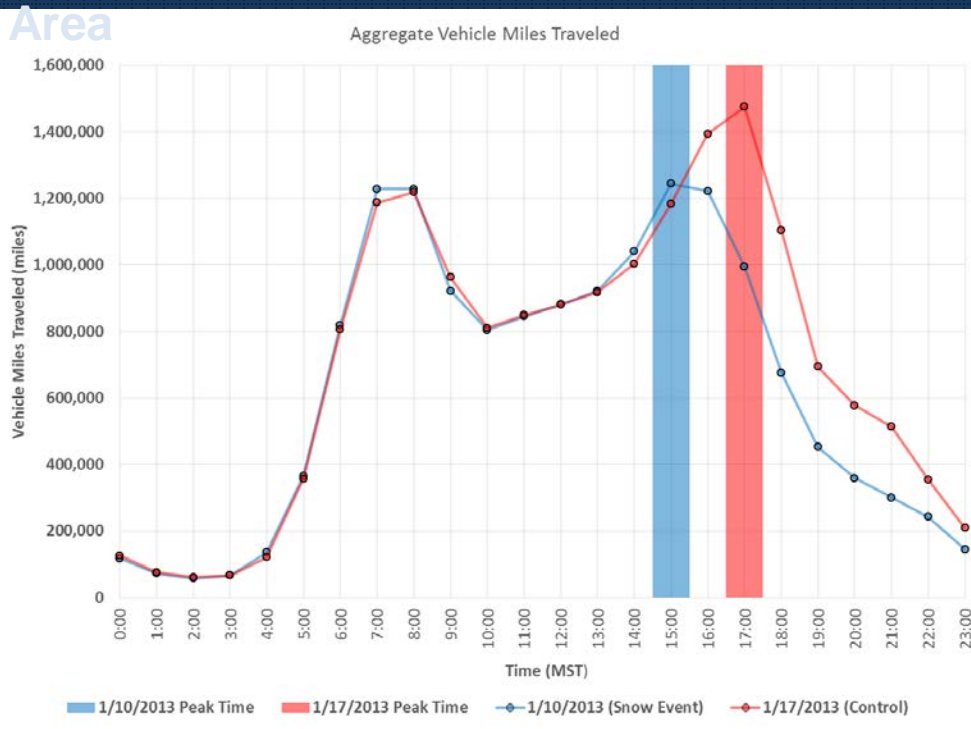
Many indicated that they modified their travel plans

Type of Change	Percent
Changed schedule	62%
Changed route	26%
Did not travel	13%
Used mass transit	6%



Actual Behavior Change

PeMS Data across Salt Lake City Metro Area



- Commute shifted by 2 hours
- Significant volume decrease
 - 43% less at typical peak
- Supports reported behavior
 - Peak before it began snowing!
- **Predictor of behavior change**
 - **Government & personal sources**



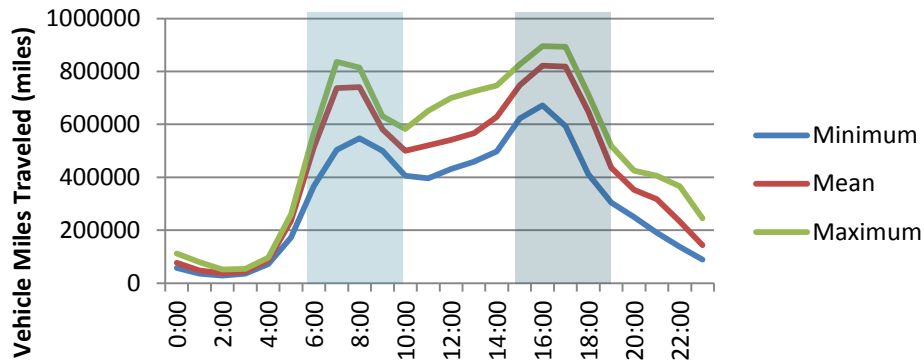
Data Analysis

- Cool seasons of 2013-14 through 2015-16
- Drew correlations between a variety of data sets
 - Weather data (visibility, current weather)
 - Road condition info (road temperature)
 - Traffic data from UDOT PeMS (flow, VMT)
 - Crash data
- Identified differences in crash frequency, commute times, delays for:
 - Storm versus non-storm days
 - Storms at different times of day
 - Storms on different days of the week

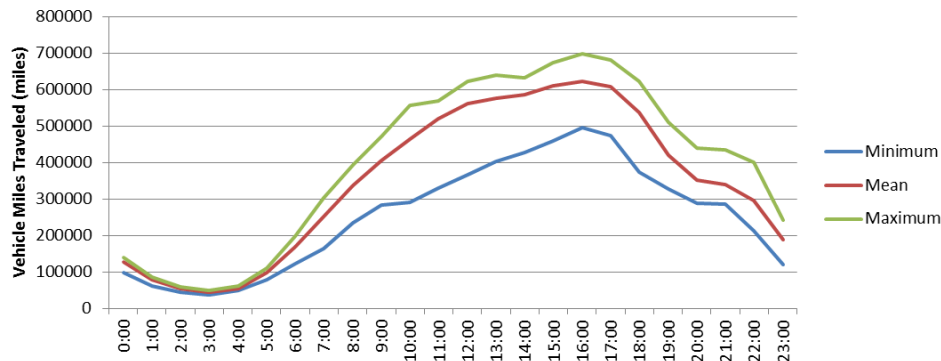


Results of Weather, Road, Traffic and Crash Data

Vehicle Miles Traveled by Time of Day






Average Vehicle Miles Traveled - Saturday's

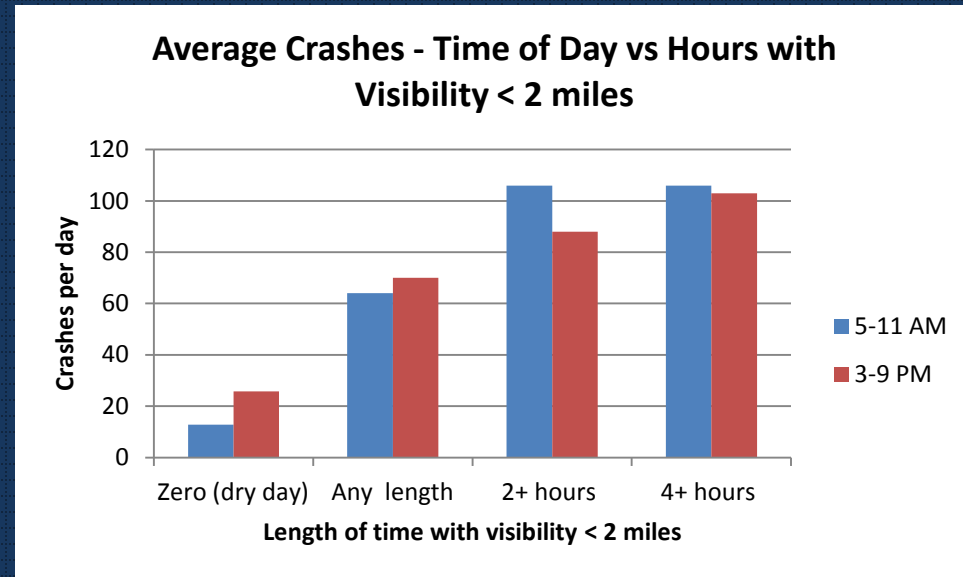


- Weekdays were divided into 4 distinct travel periods
- Emphasis on AM and PM commute windows
- Saturdays showed a broad peak from 10 AM to 6 PM – VMT > than PM commutes



Crash Climatology for Snowfall Events

- Utilized visibility as proxy for snowfall intensity
 - Less than ~2 miles defined as 'moderate' snow by Transportation Canada and FAA
- With 2+ hours of Vsby < 2 miles
 - AM commute crashes  by 8x
 - PM commute crashes  by 3-4x
 - Commutes took 1.5-2x as long
 - Saturday crashes  by 2x
- Need to have skillful forecasts!



Odds Ratios

- Presenting the likelihood of an event relative to the historical likelihood (i.e., 10x more likely to occur)
- People respond more to odds ratios than probabilities
 - Lipkus noted that risk of getting lung cancer from smoking is rather small, but it is much higher than for nonsmokers
- Expressing the increase in odds over climatology leads to better decisions for extreme & rare events
- Data analysis results utilized to create odds ratio messages



Normative Messaging

- Communication that activates social norms can be effective in producing beneficial conduct
 - People more likely to litter in a littered environment
- Communication must align descriptive norms (what people do) with injunctive norms (what people find un/acceptable)
 - Individuals tend to do what is approved by society & popular
 - Should avoid messaging that highlights common offenses
 - Message must be present when desired behavior is expected
- Utilized this strategy to reference positive behavior change such as many changing their commute



Threat Appeals

- Threat messages are “persuasive messages that arouse fear” with the intention of motivating behavior change
- Mixed results from this strategy
 - Some research shows that these can paralyze individuals
 - Others have shown that they play role in individual response
- Key seems to be related to self efficacy
- Explored mild threat appeals using words & imagery
 - Tried to emphasize self-efficacy



Visual Priming

- Imagery can “prime” an individual to take action when paired with an effective message
- Those with experience with an event (tornadoes, winter storms) are less likely to take action than those with no experience
- When visually primed with damage imagery both all are more likely to take protective action
- Implications for winter weather travel appeals
 - Accident imagery
 - Traffic backup imagery
 - Avoid strong threat imagery



UDOT Communication Platforms

- UDOT Messaging Platforms
 - Variable Message Signs (VMS)
 - Social Media
 - Website and 511 phone service
- Created messaging examples for each platform for consideration
- Allowed for different approaches which leveraged the strengths of the medium used
- Messages assessed by 3 communication experts
 - *Dr. Jen Henderson*
 - *Dr. Susan Jasko*
 - *Dr. Julie Demuth*



Variable Message Signs

Your really
Important message
goes here!

Ice to meet you!
Snowy AM commute =
8x as many crashes

Like to sleep in?
Great idea.
Avoid AM commute

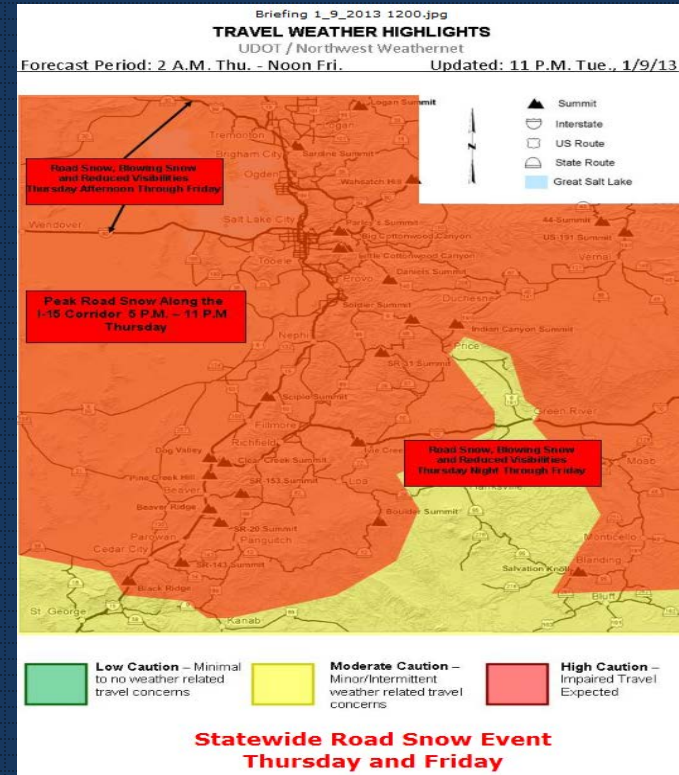
- Variable Message Signs (VMS)
 - Limited number of characters
 - Need to capture attention
 - UDOT has history of using humor
 - Research found that majority indicated messages are useful
 - Assertive messages most effective (fines, fatalities)



Website and 511 Phone Service

- Allow for a bit more verbose messages
 - Normative appeals
 - Odds ratios

It's going to be a snowy commute tomorrow morning. Join thousands of other savvy commuters in shifting your commute time, taking mass transit, or staying home. You've got options.



Social Media Messages

2018 Pathfinder Summit – June 2018



Potential Social Media Examples

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3 Things

- Noted increase in crash risk & travel times associated with winter weather events that occur during weekday commutes & Saturday peak travel window
- Risk communication messages can be crafted for specific dissemination platforms utilizing travel & crash information & proven risk communication techniques
- Review of preliminary messages by risk communication experts supported the idea that this approach has the potential to improve driver response

