

# WYDOT's Variable Speed Limits

# Legislation (WS-31-5-302)

- Legislation went into effect 7/1/2008
  - Grants authority to set the speed limit based on **“vehicle or weather emergency”**
  - “...differing limits may be established for different times of day, different types of vehicles, varying weather conditions, and other factors bearing on safe speeds, **which shall be effective when posted upon appropriate fixed or variable signs.**◆”

# I-80 Variable Speed Limit

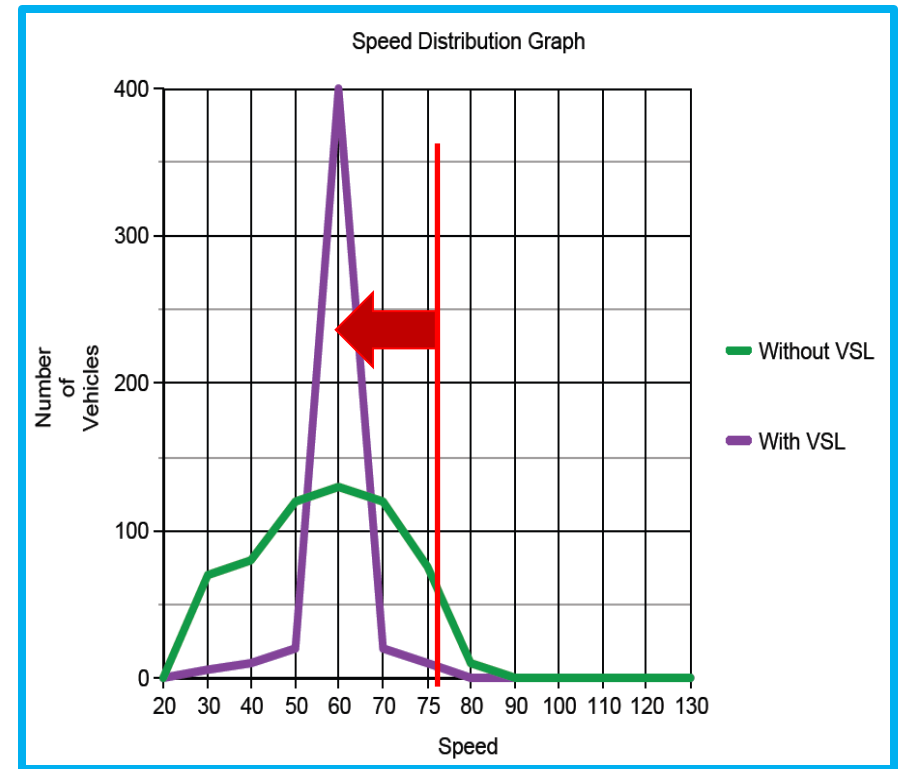
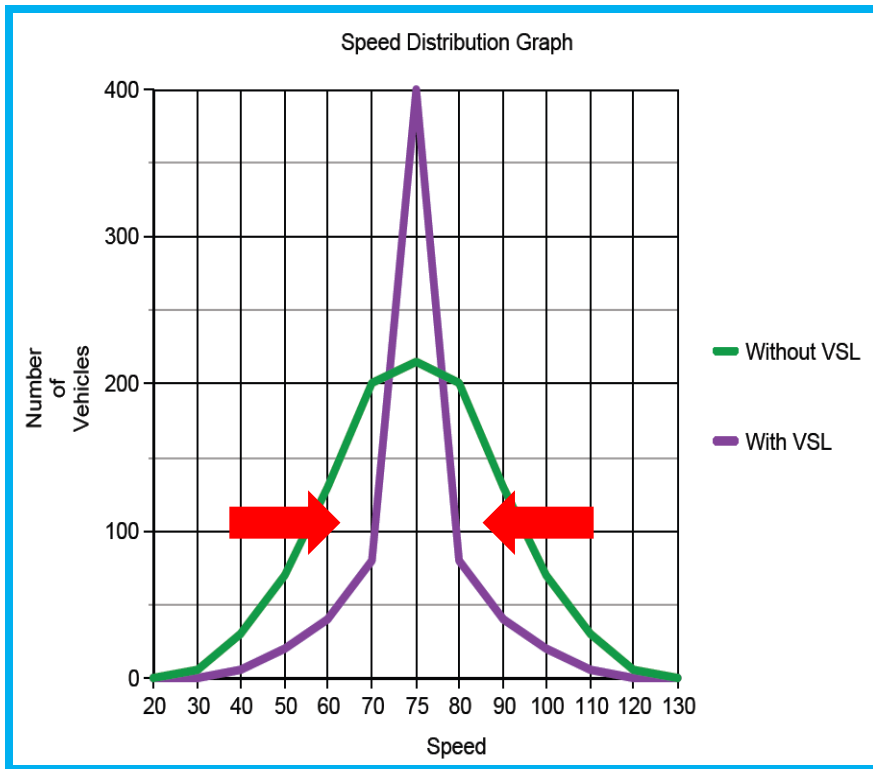


# I-80 Variable Speed Limit

- The main objectives of this research project were to:
  - Implement a Variable Speed Limit (VSL) system to improve safety and reduce closure frequency/durations on the I-80 Elk Mountain corridor.
  - Create a decision support system to implement the VSL system. The decision support system is to be created to reduce the speed variability in the corridor during adverse weather conditions.

# WYDOT's VSL Strategy

- Tighten speed distribution
- Regulatory speeds appropriate to conditions



# Real Storm Data

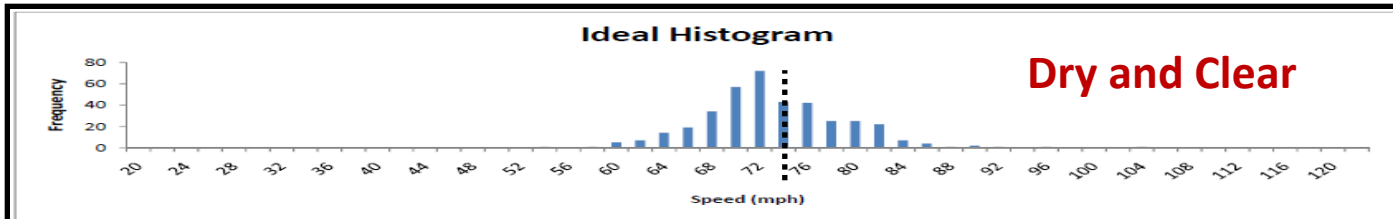


Figure 7 : Ideal histogram MP 256.25 December 1-2, 2009

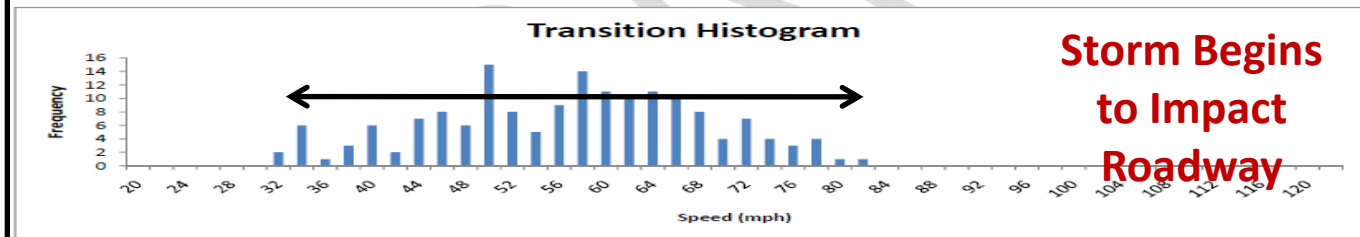


Figure 8: Transition histogram MP 256.25 December 1-2, 2009

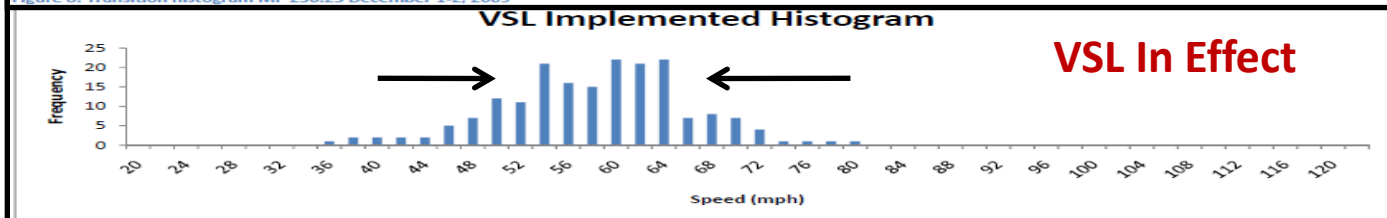


Figure 9: VSL implemented histogram MP 256.25 December 1-2, 2009

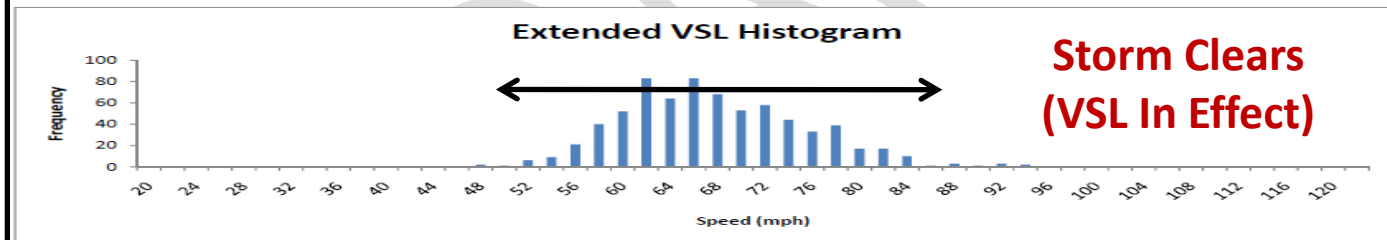
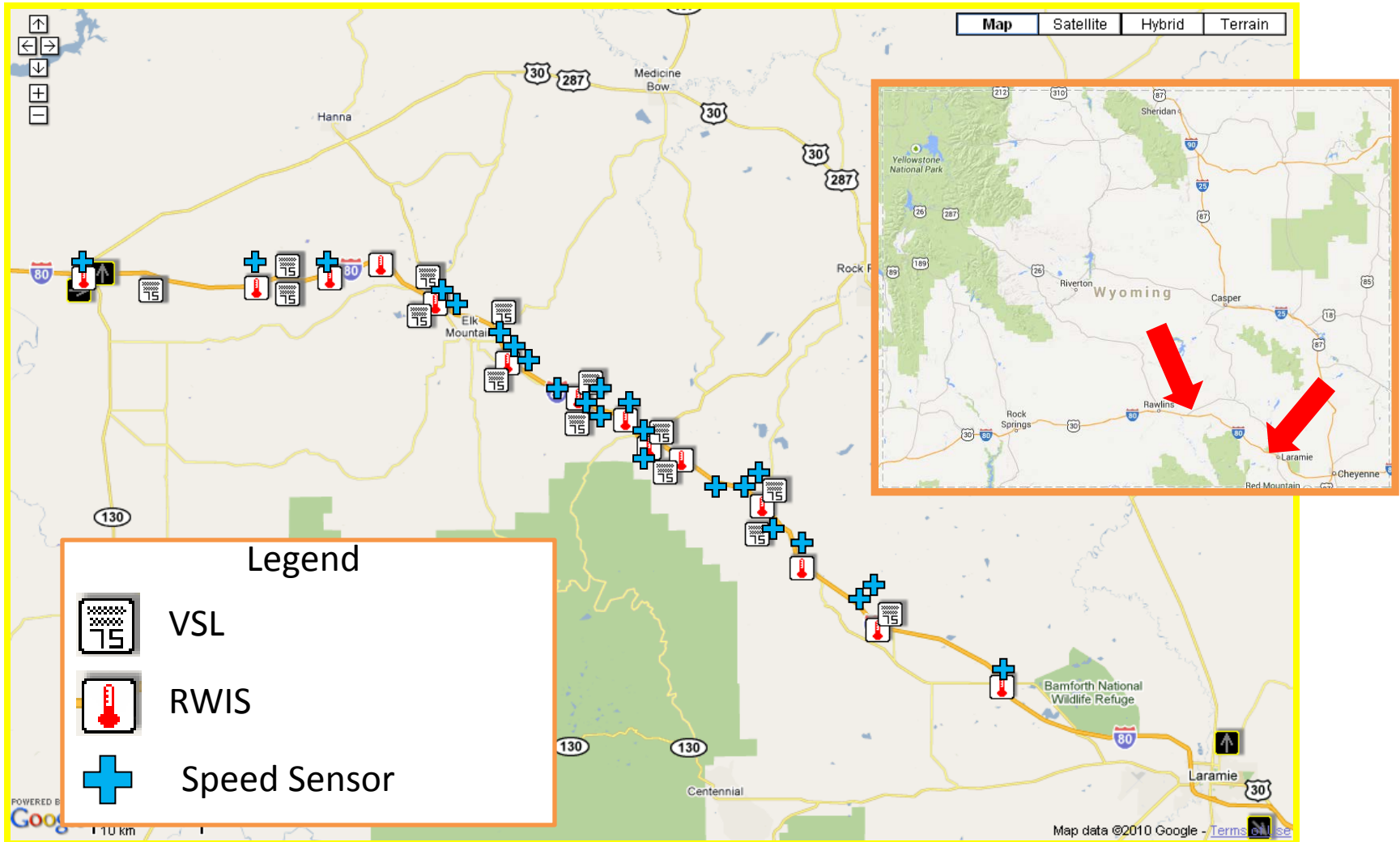


Figure 10: Extended VSL histogram MP 256.25 December 1-2, 2009

# I-80 VSL System



# I-80 Variable Speed Limit

- Results:
  - Variable speed limit signs reduced observed speeds by 3.4 to 6.4 mph for every 10 mph of speed reduction on the VSL signs beyond the slowing attributed to weather conditions.
  - The winter after variable speed limit system implementation had the lowest reported crash frequency and crash rates compared with the 10 prior winters.
  - Higher speed compliance was observed during winter periods when the variable speed limit system was used when compared to the seasonal speed limit reduction from 75 to 65 mph.



# I-80 Variable Speed Limit

- **Elk Mountain Corridor Crash Data from Feb 18, 2004 - Feb 17, 2010**

	Total Crashes	Total Injury	Total Fatal
	Crashes	Crashes	Crashes
Feb 18, 2004- Feb 17, 2005	237	67	6
Feb 18, 2005- Feb 17, 2006	292	72	2
Feb 18, 2006- Feb 17, 2007	329	87	4
Feb 18, 2007- Feb 17, 2008	353	84	2
Feb 18, 2008- Feb 17, 2009	284	72	1
Feb 18, 2009- Feb 17, 2010	197	38	3

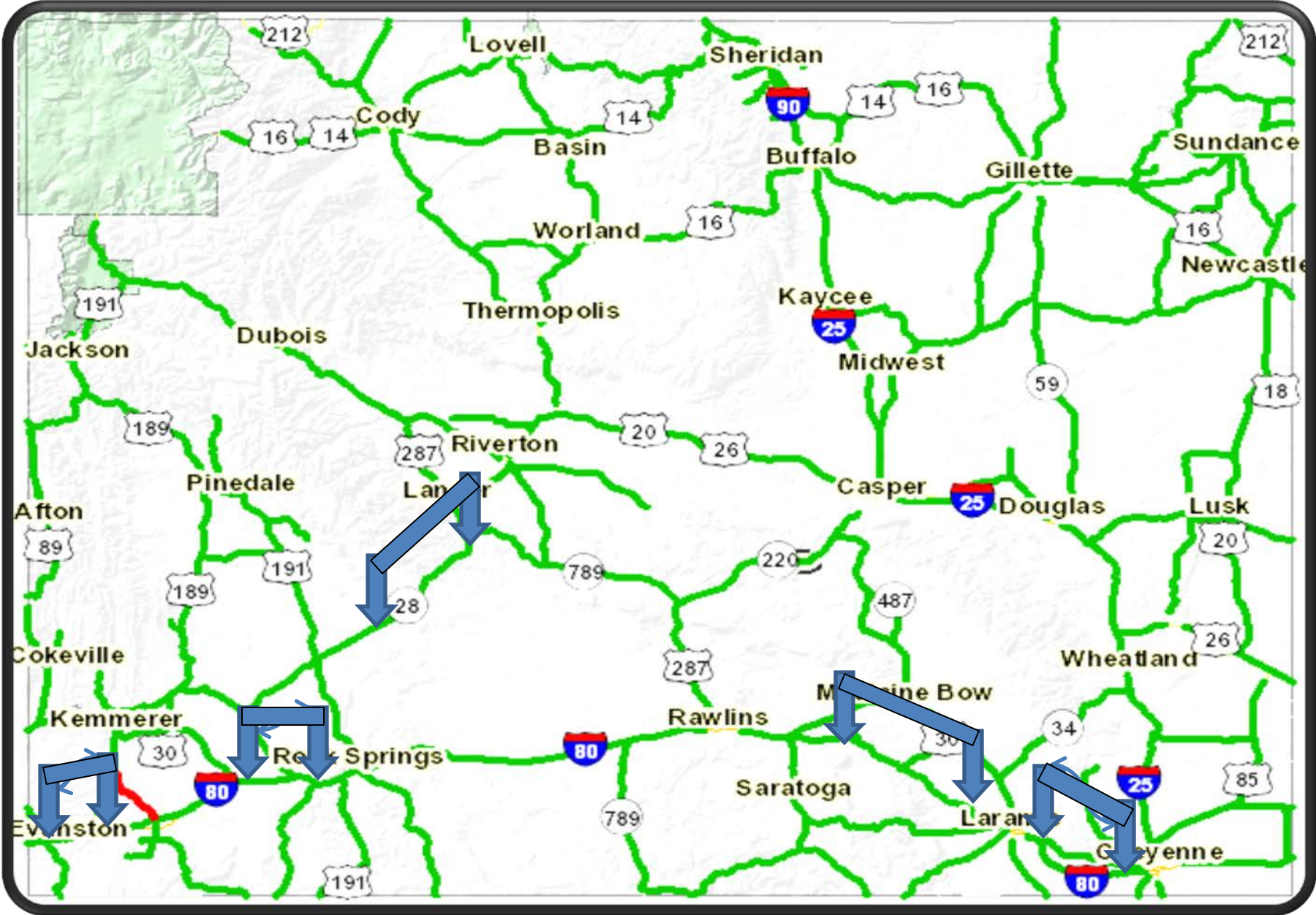


# Variable Speed Limits

- **Updates:**

- **Four new** VSL corridors have been implemented. Three on I-80 and one on WYO 28.
- A before and after model of crash frequency on the VSL corridors was created that accounted for the weather severity of the different years.
- The model found that crashes were reduced by 0.67 crashes per week per 100 miles of VSL corridors, which given the 143 miles of VSL corridors on I-80 equates to **50.1 crashes per year avoided** through use of the VSL system.
  - The Wyo28 VSL corridor was installed late Fall of 2012. The low volume of this roadway may require three full winters of crash history so that statistically sound conclusions can be made on this corridor.
- Using *Highway Safety Manual* values for crash costs and crash severity distributions, it is estimated that the VSL systems generates \$4.7 million dollars in safety benefits per year on high volume routes.
- Given the average cost of \$1 million per VSL corridor to install sensing and sign technology, the four VSL corridor safety benefits exceeded the capital costs after just one year.
- The monetary impacts due to road closures, **from research in 2007**, found that the expected delay costs for weather events was \$370 per hour per truck, which on I-80 was \$222,000 to \$333,000 per hour. With the average closure on I-80 being 8 hours this came to \$8 to \$12 million in delay costs. These estimates are on the conservative side and could range from \$222,000 to \$1,000,000 per hour.

# Current Variable Speed Limit Corridors



# I-80 Variable Speed Limit

- To get a copy of the report go to:
  - [http://www.dot.state.wy.us/files/live/sites/wydot/files/shared/Planning/Research/WYDOT\\_ElkMtn\\_VSL\\_FinalReport.pdf](http://www.dot.state.wy.us/files/live/sites/wydot/files/shared/Planning/Research/WYDOT_ElkMtn_VSL_FinalReport.pdf)
- For more information:
  - R. Vince Garcia, P.E.
  - GIS/ITS Program Manager
  - [Vince.Garcia@wyo.gov](mailto:Vince.Garcia@wyo.gov)
  - 307-777-4231