

# Idaho Winter Performance Measures

National Winter Maintenance Peer Exchange  
Vancouver, Washington  
September 10<sup>th</sup> & 11<sup>th</sup>, 2013  
Steve Spoor  
Maintenance Services Manager



# Why Winter Performance Measures

## ∞ Idaho Transportation Department Strategic Plan Goals

- Commit to Providing the Safest Transportation System Possible
- Provide a Mobility-Focused Transportation System that Drive Economic Opportunity
- Become the Best Organization by Continually Developing Employees and Implementing Innovative Business Practices

## ∞ Development of Measures Associated to Each Goal

- Fatalities, Injuries, Seat Belt Use
- Idaho Domestic Product, Business Revenues
- Reduction in Travel Times
- Performance Measure Improvements, Customer Satisfaction



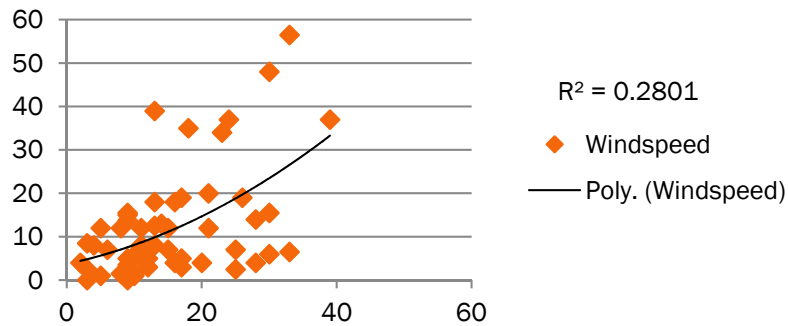
# Storm Severity Index

- ∞ Empirical Formula Developed by District 5 Engineer
- ∞ Larger Values Indicate Worse Storms
- ∞ Storm Severity Formula=  $W + S + (300/T)$ 
  - W = Maximum Wind Speed
  - S = Maximum Surface Precipitation water equivalent layer
  - T = Minimum Pavement Temperature
- ∞ Storm Severity (5=Mild Storm, 80=Severe Storm)

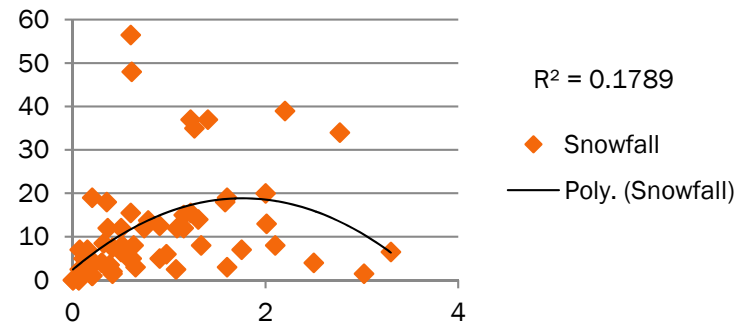


# Storm Index Statistical Fit

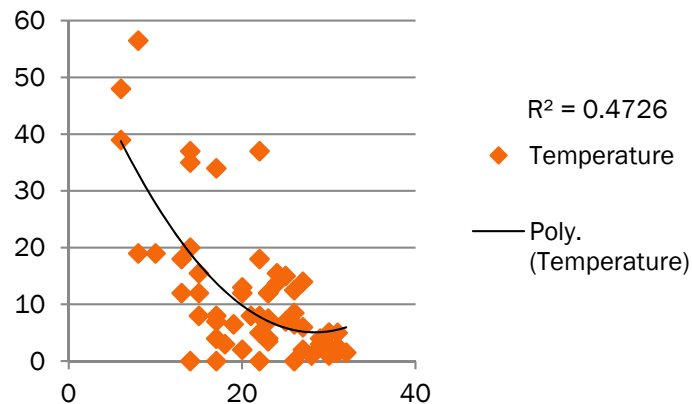
## Windspeed



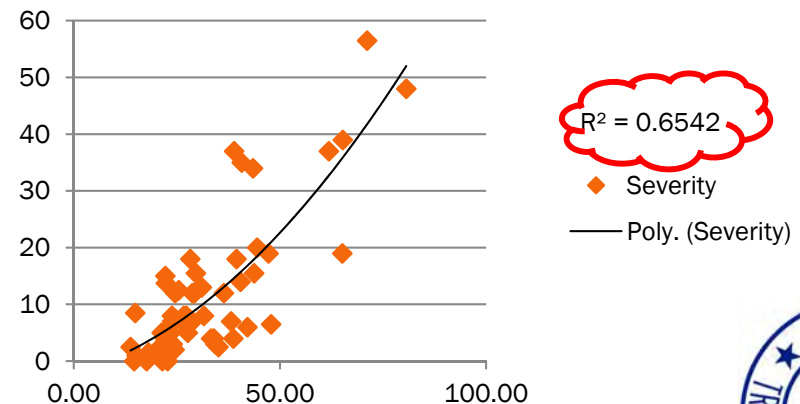
## Snowfall



## Temperature



## Severity



# Performance Measure RWIS Components

- ∞ DST and DSC Non-Invasive Sensors
- ∞ HMP –Air Humidity
- ∞ WMS-Wind Speed
- ∞ Two cameras with One Illuminator
- ∞ RPU Capable of Additional Sensors



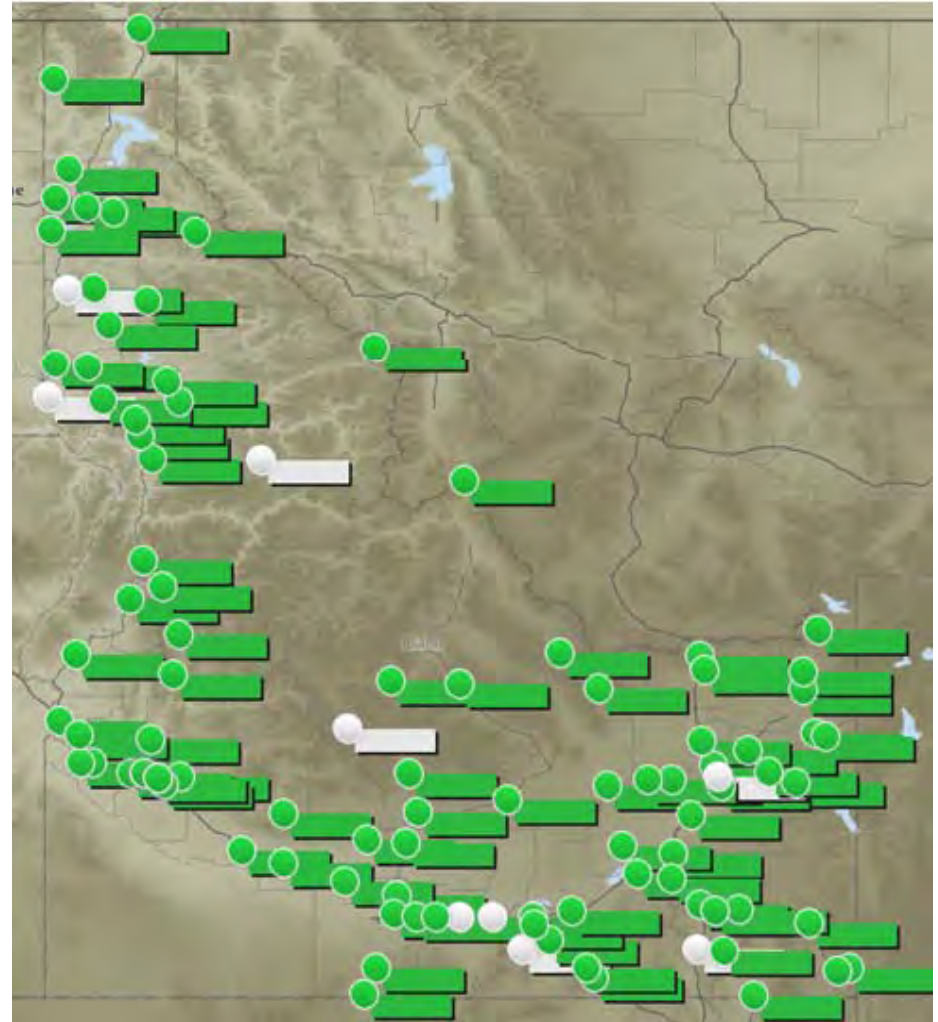
# RWIS Data Elements

- ☞ Grip Level\*
- ☞ Surface Temperature\*
- ☞ Air Temperature
- ☞ Dew Temperature
- ☞ Ice Layer\*
- ☞ Snow Layer\*
- ☞ Water Layer\*
- ☞ Rain State
- ☞ Relative Humidity
- ☞ Wind Speed
- ☞ Maximum Wind Speed\*



# Where We Measure

- ∞ 98 Total RWIS Locations
  - 93 Sites are Performance Measure Reporting (PMR) – Green
- ∞ 5 Sites Camera Only with Some Atmospheric Sensors – White
- ∞ Districts Have Requested an Additional 50 PMR Locations Identified



# Idaho has Developed 2 Performance Measures

- ∞ Winter Performance Index – Identifies How Successful We Were at Ice Reduction.
- ∞ Mobility Index – Identifies How Successful We Were at Ice Prevention





# The Winter Performance Index

- ☞ Requires a Storm Severity Formula and the Ability to Identify Surface State
- ☞ The Index is Initiated When Grip Falls Below .60



# Bench Mark Selection for Grip of .60

- ∞ 0.60 is the Point That Traffic Mobility is Affected
- ∞ Above 0.60 is Typically a Wet Surface
- ∞ General Ranges of Grip
  - .60-.82 Wet or Very Light Slush (Mobility Index Zone)
  - .50-.60 Slush or Ice Forming
  - .40-.50 Snow Pack or Icy
  - Below .40 Cars May Start Sliding Off
  - .30 and Lower Multiple Slide-offs Possible Mobility Greatly Affected



# Winter Performance Index

- ∞ Formula: Ice up time/storm severity
- ∞ Ice up time is the amount of time the grip is below .60
  - Must be minimum one half hour in duration
  - End duration two consistent hours above .60 grip
- ∞ The Value of the Performance Index Indicates the Success of the Treatment. The Lower the Value, the More Effective the Treatment.

Performance Index Legend	
0.00	Successfully Treated
0.00-0.30	Significantly Accelerated Grip Recovery
0.31-0.49	Some Success at Grip Recovery
0.50-0.69	Very Little Success at Deicing
0.70+	Limited Maintenance or No Deicer Success
	Observation Data Missing or Temp. Below Threshold.



# Winter Level of Service

## Interstate & Statewide Corridors

- Deploy Maintenance Forces to Achieve Storm Index of 0.25.

## Regional Corridors

- Deploy Maintenance Forces to Achieve Storm Index of 0.45

## District Corridors

- Provide Passable Roadway.



# The Mobility Index

- ☞ Identifies Ice Prevention
- ☞ Formula – Percentage of Time the Grip is Above .60 While Precipitation is on the Surface Below Freezing



# Sensor Observations

- ☞ Water evident at beginning event with surface temps below freezing.
- ☞ Loss of grip for short durations and recovery above the .60 occurs during event.
- ☞ Water evident at conclusion of event with surface temps below freezing.
- ☞ Water only durations with freezing surface temps.
- ☞ Consistent low values on the performance index



# Sample Automated Report-Effective Treatment



## Storm Performance Index Report

05.01.2013 23:59 → 12.01.2013 23:59

Generation date 18.06.2013 13:23

### Storm Performance Index Legend

0	Successfully treated
0.00 - 0.30	Significantly accelerated grip recovery
0.31 - 0.49	Some success at grip recovery
0.50 - 0.69	Very little success at deicing
0.70 -	Limited maintenance or no deicer success
	Observation data / parameter missing or temp is below threshold

Station	Date	Time Range	Event	Duration (hours)	Max Wind Speed (mph)	Max Ice Layer (mm)	Max Snow Layer (mm)	Max Water Layer (mm)	Min Surface Temp (°F)	Severity Index	Performance Index	Mobility Index	Comments
D1 - 4th of July Pass													
	06.01.2013	00:00 - 01:30	FROST treated	1.50	5.14	0.00	0.00	0.03	27.50	16.08	0	76%	
	06.01.2013	01:30 - 04:45	TREATED	3.25	4.47	0.00	0.00	0.12	27.14	15.65	0		
	06.01.2013	04:45 - 08:00	GRIP<.6	3.25	2.46	0.04	1.66	0.14	26.60	15.40	0.21		
	06.01.2013	08:00 - 17:30	TREATED	9.50	2.68	0.09	0.21	0.45	27.32	14.12	0		
	06.01.2013	17:30 - 18:00	FROST treated	0.50	1.34	0.00	0.00	0.03	30.02	11.37	0		
	06.01.2013	18:00 - 18:45	TREATED	0.75	1.57	0.00	0.00	0.04	29.48	11.78	0		
	06.01.2013	18:45 - 20:30	FROST treated	1.75	1.79	0.00	0.00	0.03	29.12	12.12	0		
	06.01.2013	20:45 - 22:00	FROST treated	1.25	1.57	0.00	0.00	0.03	28.58	12.09	0		
	06.01.2013	22:00 - 00:00	TREATED	2.00	2.46	0.08	0.11	0.18	28.04	13.34	0		
	07.01.2013	00:00 - 06:15	GRIP<.6	6.25	1.12	0.07	1.80	0.36	27.86	13.69	0.46		
	07.01.2013	06:15 - 15:45	TREATED	9.50	6.71	0.08	0.60	0.40	27.14	18.36	0		
	08.01.2013	01:15 - 04:15	TREATED	3.00	6.49	0.08	0.03	0.11	27.50	17.51	0	74%	
	08.01.2013	04:15 - 06:30	GRIP<.6	2.25	2.24	0.16	0.05	0.03	27.32	13.38	0.17		
	08.01.2013	06:30 - 08:45	TREATED	2.25	2.46	0.08	0.02	0.14	27.86	13.37	0		

# Less Effective Treatment

**VAISALA**

## Storm Performance Index Report

05.01.2013 23:59 → 12.01.2013 23:59

Generation date 18.06.2013 13:28

### Storm Performance Index Legend

0	Successfully treated
0.00 - 0.30	Significantly accelerated grip recovery
0.31 - 0.49	Some success at grip recovery
0.50 - 0.69	Very little success at deicing
0.70 -	Limited maintenance or no deicer success
	Observation data / parameter missing or temp is below threshold

Station	Date	Time Range	Event	Duration (hours)	Max Wind Speed (mph)	Max Ice Layer (mm)	Max Snow Layer (mm)	Max Water Layer (mm)	Min Surface Temp (°F)	Severity Index	Performance Index	Mobility Index	Comments
<b>D2 - Lolo Pass</b>													
	06.01.2013	01:50 - 15:05	GRIP<.6	37.25	8.05	0.11	1.57	0.07	21.74	23.42	1.59	0%	
	09.01.2013	09:05 - 23:49	GRIP<.6	86.73	4.92	0.03	1.96	0.20	1.58	196.75	0.44	0%	



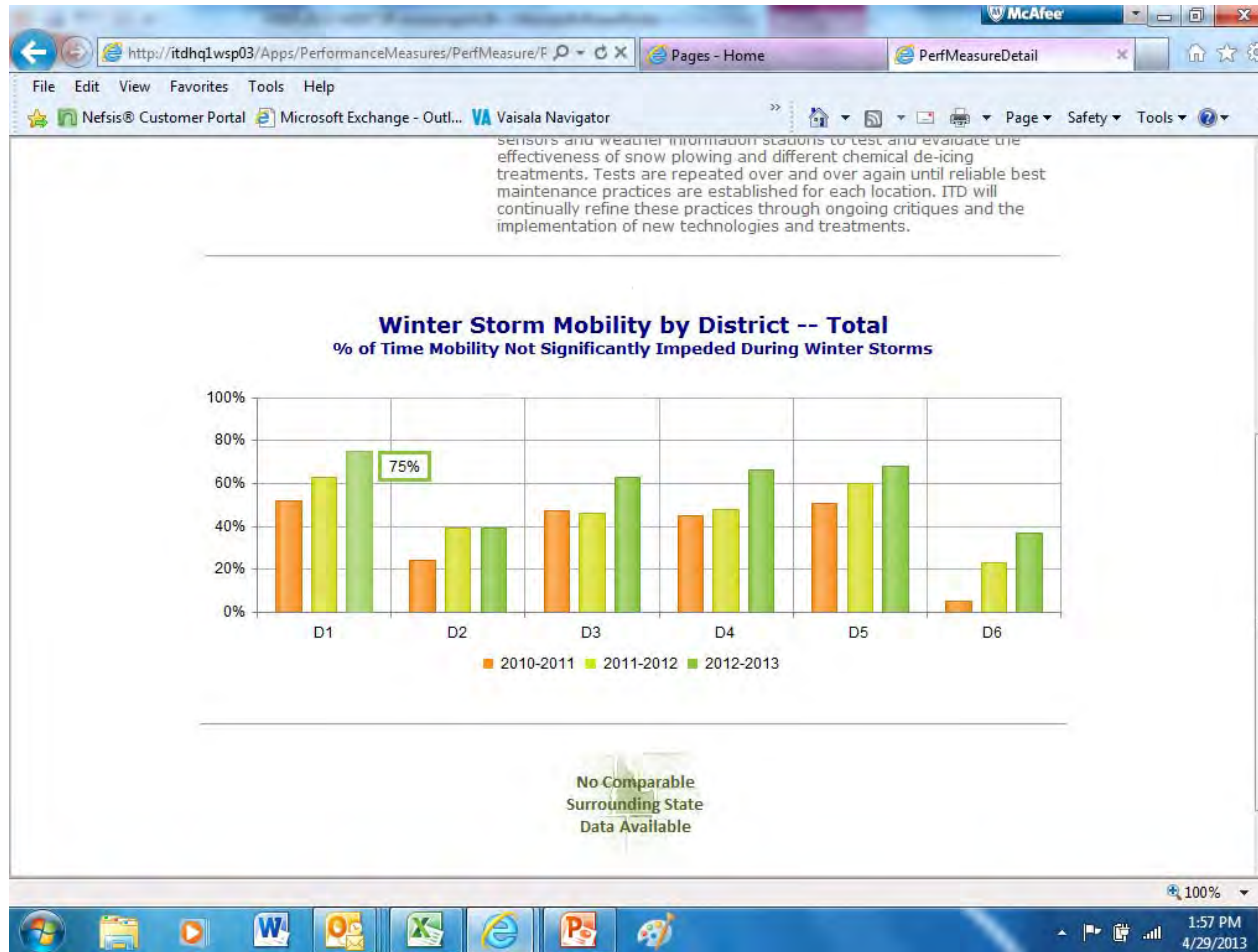


# How the Winter Performance Measures Influenced ITD Operations

- ∞ Better Understanding of Chlorides
- ∞ Improved Timing (Lap Times)
- ∞ Scheduling Proactively, Moving Away from Reactive Treatments
- ∞ Taking ITD to the Next Level
- ∞ Supervisors and Operators are Buying into System as a Valuable Tool



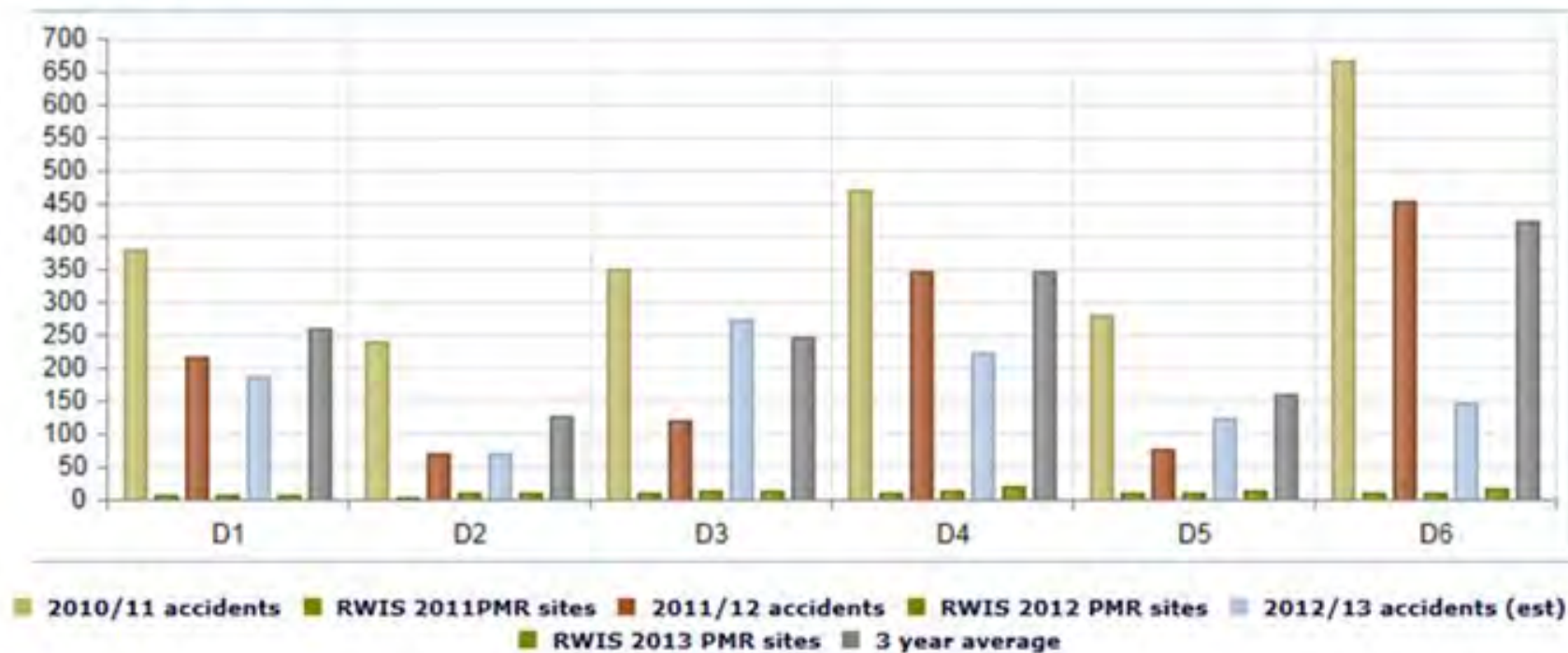
# Results!



# Results!

## Statewide accident tracking during winter conditions September 1st- May 31st

Number of accidents



The 2012/13 season we only have the fall 2012 information. The spring 2013 is projected accidents to reflect an increase of 10% above the fall 2012 data. The actual spring 2013 data will not be available until late winter of this year.

# Contact Info

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# Equipment Buy-Back Program

	Backhoe	3 CY Loader	4 CY Loader	Grader w/V & Wing
Make & Model	Cat 420E	John Deere 544K	Cat 950K	John Deere 772GP
Term	18 Months	18 Months	18 Months	12 Months
Purchase Price	\$79,953	\$118,305	\$188,533	\$273,994
Buy-Back Amount	\$98,580	\$143,150	\$235,500	\$311,351

# Questions?

