CONFERENCIA INTERNACIONAL SOBRE

VIALIDAD INVERNAL

Del 27 al 30 de junio de 2017

Mendoza - Argentina

"Winter Performance Measures (Metrics)"

Presented by:

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Department of Transportation

State of Minnesota

www.vialidadinvernal.org.ar

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dpv MENDOZA GOBIERNO

North and South America

Minnesota: east of the Mississippi river acquired from England…
west of the Mississippi was purchased from France

Minnesota: North Latitude, from 43˚ to 49˚ - equal to northern Italy

Minnesota Vikings

May be recognized by its professional football team – Minnesota Vikings… not soccer

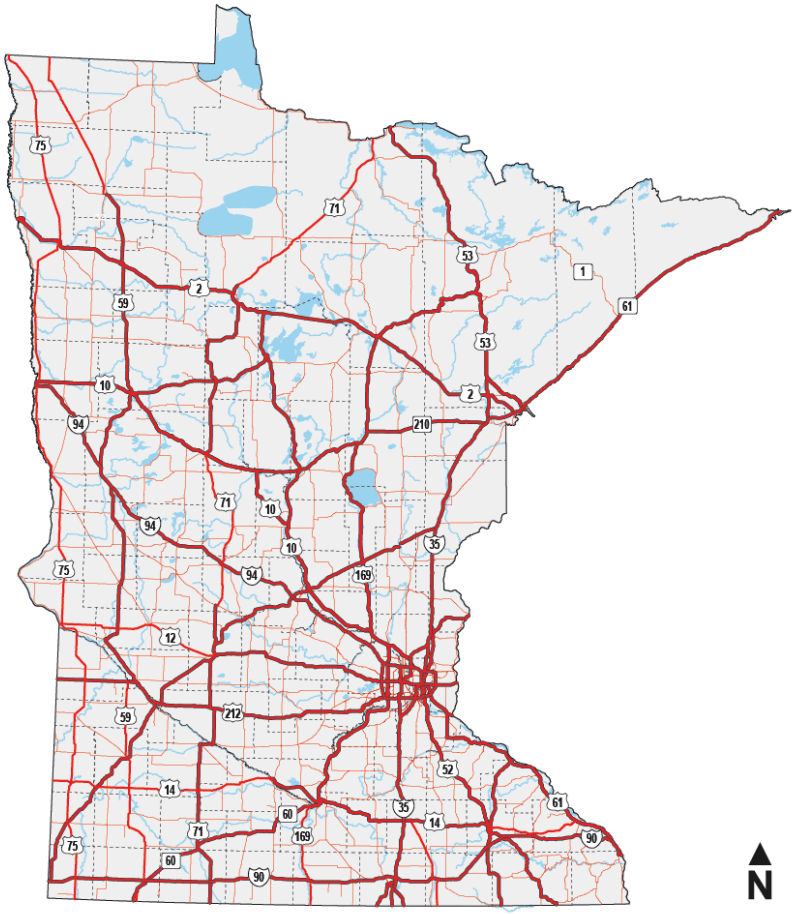
State of Minnesota Overview

- North Latitude, from 43° to 49°
- Area: 225,181 km² (643 km by 402 km)
- Minnesota is the 12th largest state in the USA
- Population: 5,500,000 (2015 est.)
- Minnesota is the 21st most populous state in the USA
- “Land of 10,000 Lakes” - 11,842 lakes over 4 hectares:
- 6,564 rivers and streams totaling 148,000 km

Minnesota - some fun factoids

- Home to the Mall of America – almost 900,000 sq. meters of shopping… and general winter relief
- Boasts 145,000 km of shoreline - more than California, Florida and Hawaii combined
- Minnesota has one recreational boat per every six people, more than any other state
- Home of the Mayo Clinic – a great place to get sick
- Birth place of Judy Garland, Bob Dylan and Prince Rogers Nelson – all singers
- And responsible for Jesse Ventura – wrestler, entertainer and elected governor

Minnesota:



Major highway layout

Minnesota Department of Transportation Overview

Three road agencies - State, County and City

State Roads: 19,312 centerline*km or 46,671 lane*km

State Bridges: over 4700 (state system)

Approximately 5000 State government employees

Overall Maintenance and Operations Spending (USD):

2012 – $240M
2013 – $327M
2014 – $309M
2015 – $313M
2016 – $292M
5 –year average = $300M

Minnesota Department of Transportation Overview
Winter Weather and Spending

- January in Minneapolis : -5° C average high; -14° C average low
- Average high temperature from December through February does not get above freezing (0 ° C)
- Snowfall Minneapolis: 60 to 230 cm
- Winter Spending (USD):
  2011/12 – $62M
  2012/13 – $112M
  2013/14 – $136M
  2014/15 – $88M
  2015/16 – $94M
  5 year average = $98M

Winter spending is about 33 percent of overall maintenance spending

Minnesota Department of Transportation Overview Labor, Equipment and Materials (Winter Resources)

1747 Snowfighters with a Certified Drivers License

800 Snow Plows – Singles and Tandems (50/50)

5 year average material usage:

Salt:	191,000 metric tons
Sand:	41,000 metric tons
Salt Brine:	10 million liters

Winter maintenance completely provided with internal staff – state government employee

Performance Reporting
Maintenance Performance Measures and Targets

Driven by Customer Survey Efforts:

1. Omnibus (annual department performance reporting)
2. Business Planning (overall maintenance performance)
3. Winter Service – (bare lane snow and performance)

Three distinct areas of market research/customer focus
Winter Service customer survey effort used to develop winter performance measure

Winter Performance Measure

Two key market research efforts developed our snow and ice performance measures and targets; and verified our direction:

1999 - established our measure and set targets levels

2007 - verified what we learned previously

Winter Performance Measure
Bare Pavement Survey – 1999

- Initiated in 1999 with market research
- 1100 participants – our customers
- Utilized videos depicting scenarios
- Measured how various levels of winter service impact the customer's willingness to drive.
- Identified perceived acceptability for various levels of service.

This market research effort lead to changing our goal from "bare pavement" to "bare lane"

Winter Performance Measure
Bare Lane Survey – 2007

Customers recruited at 12 locations across that state

Videos where again shown and customers were asked to complete a questionnaire – 780 total interviews

In addition, some people pre-selected to stay for a follow up focus group discussion

Verified previous market research/decisions – targets did not change

Bare Lane Customer Survey
(snow and ice focus)

How the Customer was involved - authentic views

Interstate
super commuter

4-Lane
urban/rural

2-lane non-town
rural, primary or
secondary

2-lane town
rural/primary

2-lane non-town
Snow covered &
compacted

4-Lane
1-2 Intermittent
wheel paths

Winter Maintenance Performance Measures and Targets

Measure: Regain Time

All driving lanes are 95% free of snow and ice between the outer edges of the wheel paths and have less than 1 inch of accumulation on the center of the roadway.

Target: A set time in hours

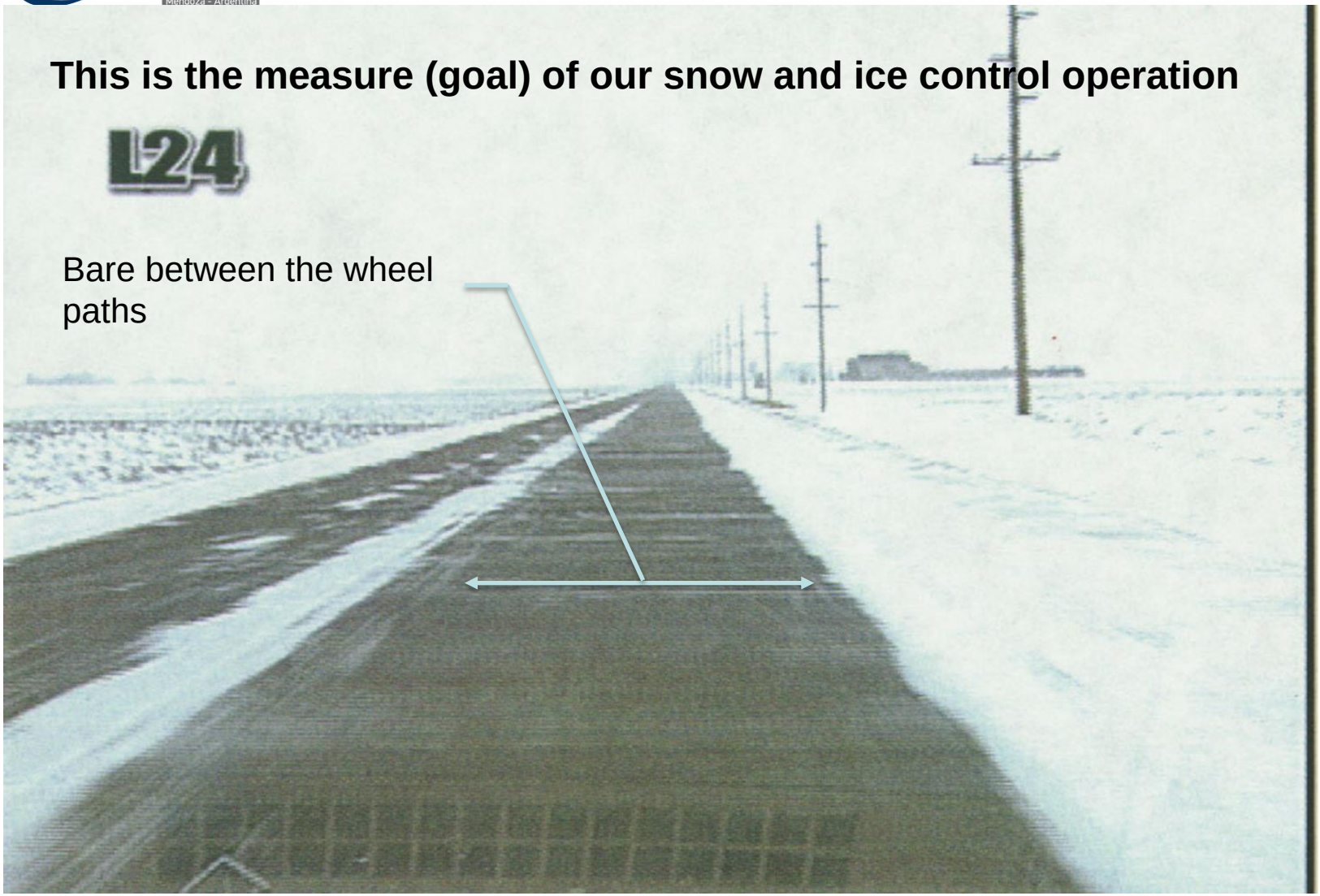
Measured from the end of the event to when the bare lane condition is gained

Five targets based traffic volumes (average daily traffic)

Recorded (performance) by the plow operators

Event: A winter weather occurrence, that consumes resources necessary to prevent, minimize or regain the loss of bare lanes

This is the measure (goal) of our snow and ice control operation



These are the targets for our measure

Average Daily Traffic	Regain Time (in hours)
30,000 < ADT	0 – 3
10,000 – 30,000	2 – 5
2,000 – 10,000	4 - 9
800 – 2,000	6 - 12
ADT < 800	9 - 36

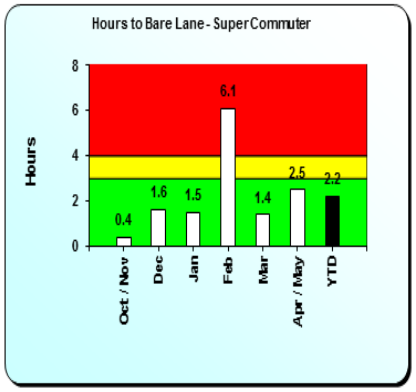
Five classes/categories based on average daily traffic (ADT)

http://www.dot.state.mn.us/maintenance/pdf/manual/Ch2.pdf

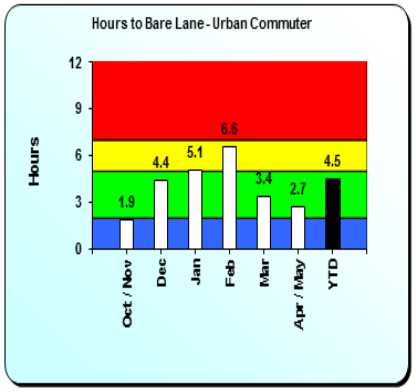
Maintenance: Snow & Ice
Hours to Bare Lane -Statewide
Winter 2013 - 2014

July 1, 2013 to Apr 30, 2014

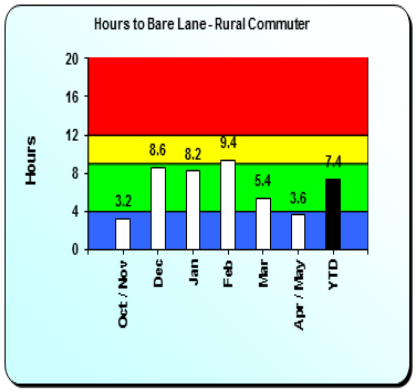
- Significantly Under Expectation
- Under Expectation
- Meets Expectation
- Over Expectation



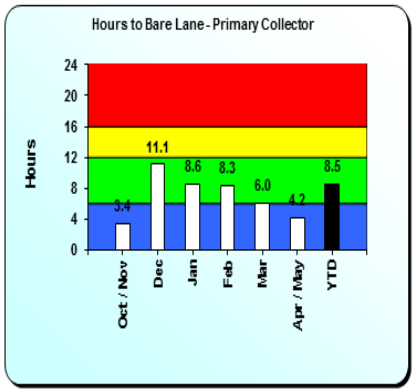
(4,743 Lane Miles)



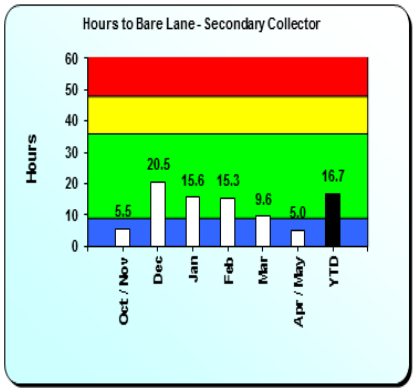
(5,621 Lane Miles)



(11,135 Lane Miles)

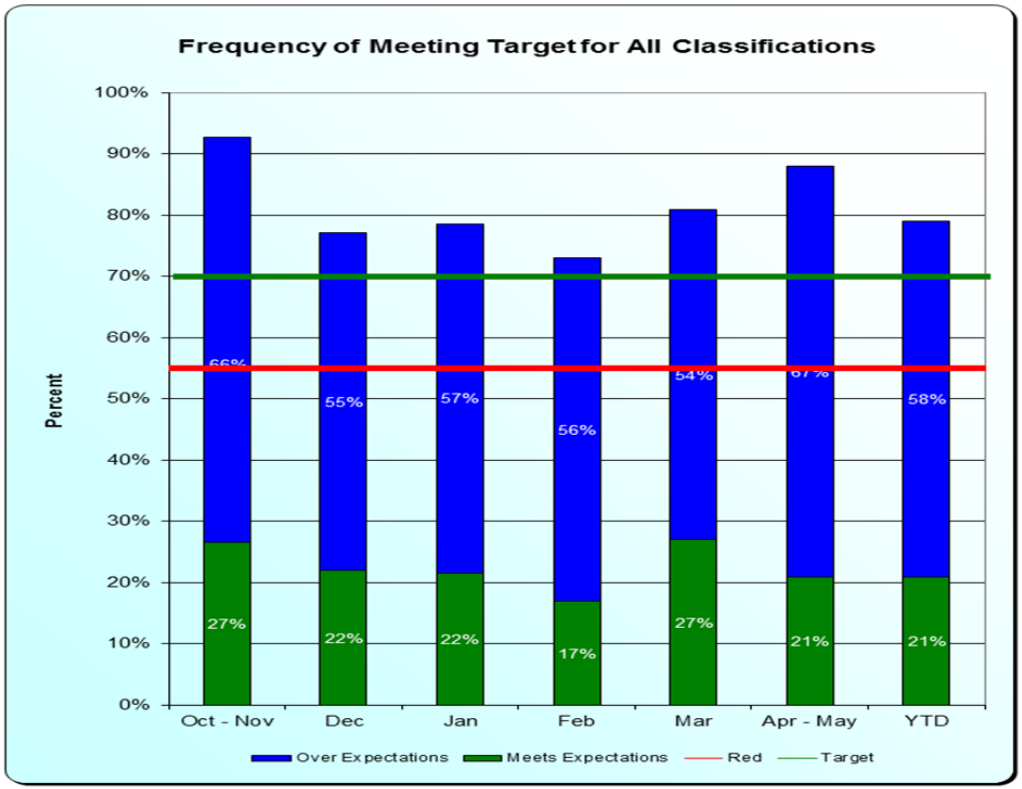


(6,756 Lane Miles)



(2,342 Lane Miles)

Maintenance: Snow & Ice Removal
Statewide
Winter 2013 - 2014
July 1, 2013 to Apr 30, 2014



Roll up Performance Measure – for Governor Scorecard

Our performance goal will be achieved if we meet or exceed the target of 70%

Lessons learned in developing the measure

Combination of art and science

"Get professional help" – set the context ("can not get enough safety")

Look at what others are doing

Subject matter experts (us) - sets the measure

Customer (them) - sets the target (within context - safety)

How are you going to use the measure:

- Managing… Lead Measure
- Reporting… Lag Measure

Measuring takes effort… needs to be sustainable

"If you are not measuring, you are not managing"

Lessons learned in using the measure

Senior Staff reporting

Legislative reporting

Public interest/reporting

Lean against our Target in difficult times - “customer developed”

Difficult to manage if it is a Lag Measure - ultimately it is more informational

Governor’s Scorecard

Lead Measures versus Lag Measures

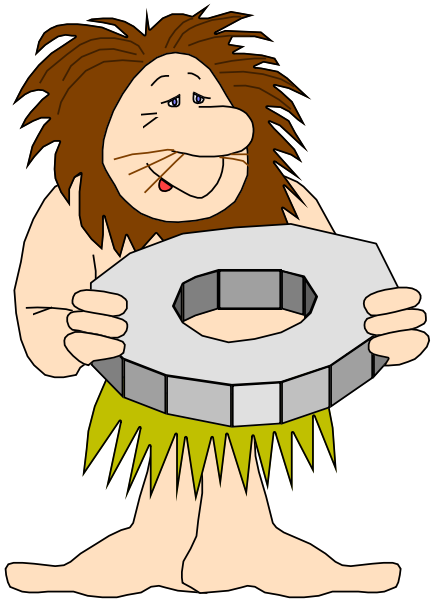
What's on the scale (lag) vs What's in your mouth (lead)
Outcomes = tend to be lag measures
Inputs/Outputs = tend to be lead measures

Examples:
Input = number of plows on the road - lead
Output = miles of road plowed
Outcome = "bare lanes" - lag

Lag Measure - gets attention
Lead Measure - gets action

While outcome is the purpose or goal, it is too late to manage at that point

So what is next?



Snow Fighter Simulator Training

One mobile training simulator (trailer) and one fixed training simulator (office)

Tow Plow

Road Weather information System (RWIS)

Road Weather information System (RWIS)

- RWIS is an automated information system that collects, processes and distributes current and forecasted weather and road surface information.
- This system allows field and office maintenance staff to use weather information for timely and cost-effective operations.
- RWIS data is used throughout the year in support of traveler information system, herbicide applications, pavement marking, incident management, and timing of maintenance and construction activities.
- But it is about the winter… RWIS data is utilized by maintenance staff to support and make winter service decisions such as weather forecasting and winter chemical application recommendations.

Current Road Weather information System Sites

Maintenance Decision Support System (MDSS)

MDSS brings in data on current road and weather conditions obtained using RWIS and other weather collection sources

Data is ingested into various road weather forecasting models

The models then supply data to a Road Condition and Treatment Module:

- Road Temperature prediction Model
- Chemical Concentration algorithms
- Rules of Practice for anti-icing and Deicing, operation practices

This results in road weather predictions and ultimately plow route specific treatment recommendations

MDSS – on the snow plow truck dashboard

In-cab display screen of Mobile Data Computer – MDSS/AVL

MDSS – a closer look at the screen

Main screen on Mobile Data Computer – MDSS/AVL


Thank you,
Steve Lund