

Iowa DOT Best Practices

2015 National Winter Maintenance Peer Exchange

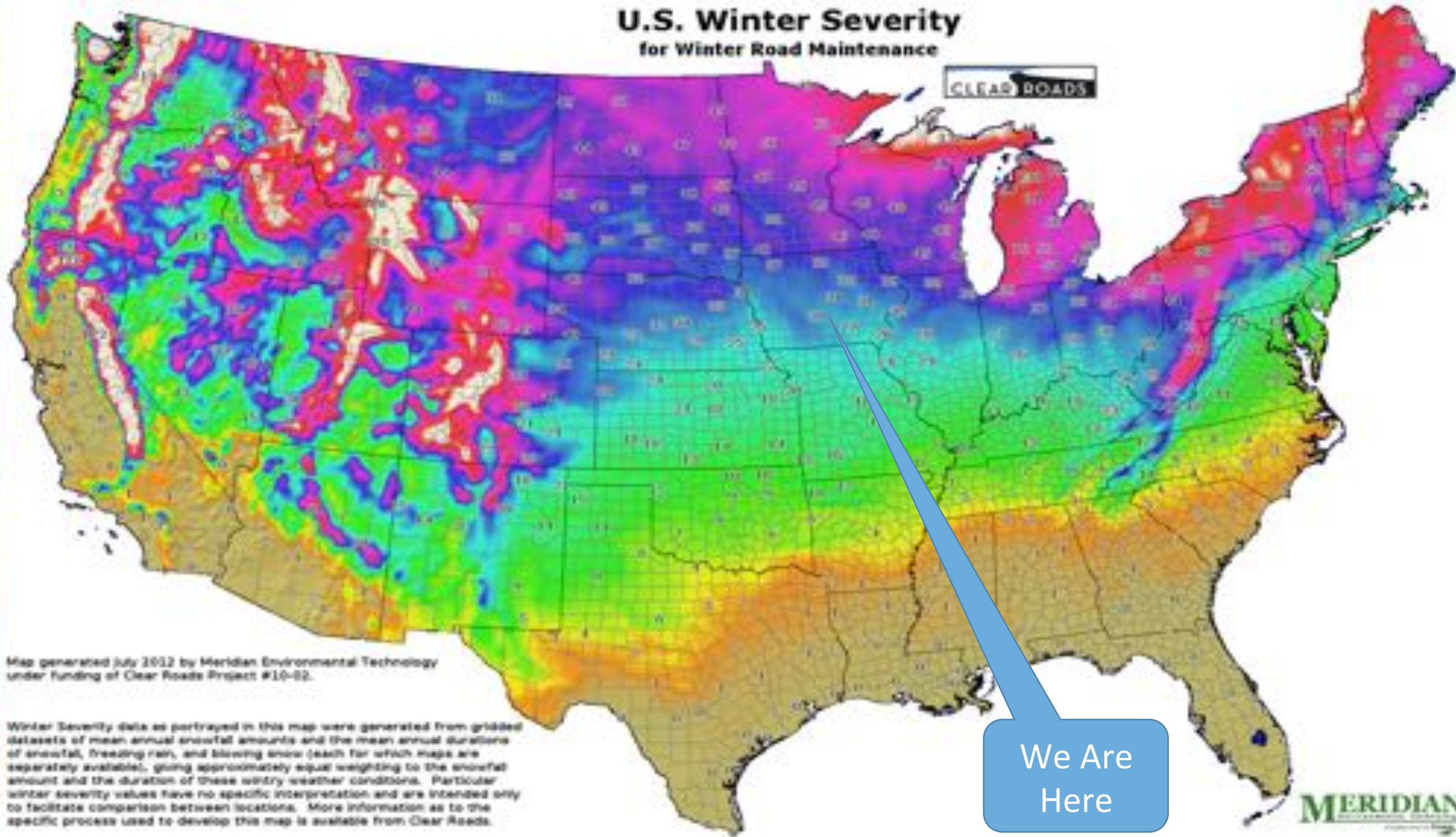
Tina Greenfield

A Bit About Us

- 109 Garages
- ~900 Snow plows
- 1,100 Winter Staff
- 9,480 centerline miles
- 24,200 lane miles
- 125,000 tons of salt/year
 - Some of which used as 18,600,000 Gal. Brine
- 20,000 tons sand/year

U.S. Winter Severity for Winter Road Maintenance

CLEAR ROADS



Map generated July 2012 by Meridian Environmental Technology
under funding of Clear Roads Project #10-02.

Winter Severity data as portrayed in this map were generated from gridded datasets of mean annual snowfall amounts and the mean annual durations of snowfall, freezing rain, and blowing snow (each for which maps are separately available), giving approximately equal weighting to the snowfall amount and the duration of these wintry weather conditions. Particular winter severity values have no specific interpretation and are intended only to facilitate comparison between locations. More information as to the specific process used to develop this map is available from Clear Roads.

We Are
Here

SICOP's Top 10 (11) Concepts for World-Class Winter Maintenance:

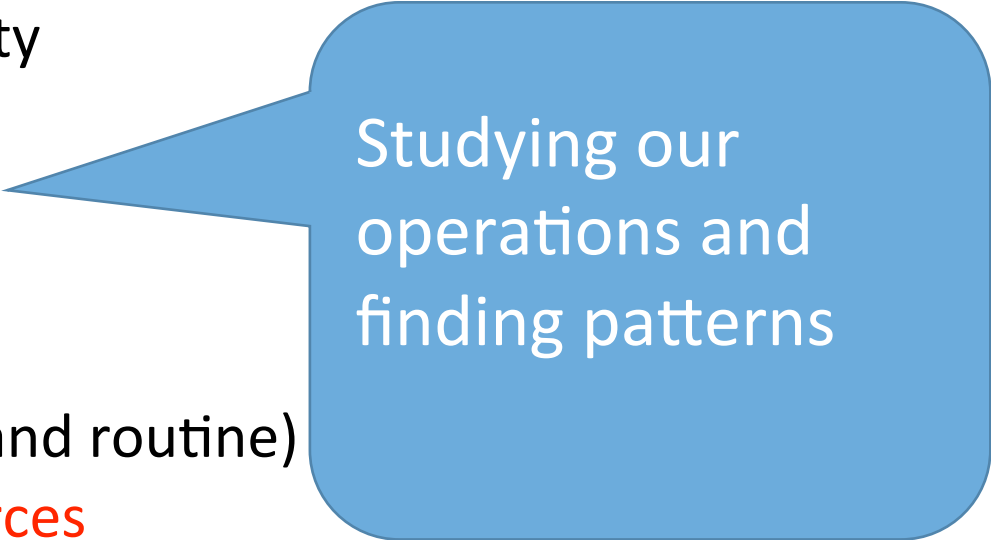
1. Adequate funding for operations and sustainability
2. Using sustainable winter maintenance practices
3. Accurate and timely weather forecasts
4. Optimal route planning
5. Equipment and equipment calibration
6. Equipment maintenance program (preventative and routine)
7. Efficiency in operations – intelligent use of resources
8. Communication between operation controllers and drivers
9. Snow plans
10. Standards in winter service
11. Defined levels of service

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Studying our operations and finding patterns

Finding the Patterns

- Winter maintenance is hard to study
 - Everybody has to respond to different weather
 - Each garage has different size, Level Of Service expectations
 - Various equipment and storm management styles
 - Opinions abound
- If we find the pattern, it might point towards the solution!

Our Winter Analysis System

Building Blocks

- RWIS data
- Labor, Equipment, Materials use databases
- Geocoded route LOS, AADT, area/road characteristics
- Truck GPS/AVL archives

Tools

- Plow pass summaries
- Weather index (4 for different purposes)
- LOS indices

Systems

- Salt use estimation
- Alternate models
- Manager's reports

Changes & Solutions

A Few Examples in Practice

Salt/labor management dashboard

What

- Produces 'expected' salt/labor use for each area for each day
- Compares 'expected' vs. 'use'

Why

- Shows how well we adhere to our use guidelines for each unique storm and location

How

- Uses detailed observed weather data
- Uses each garages' responsibility info. – lane miles and service level
- Computes expected use according to guidelines

- In use for 4 years
- Web-based
- Updates daily



How It's Made: Automating Our Rate Guidelines

Salt Application Rate Guidelines							
Assuming:	Prewetted salt & 12-foot lane	Hours: 2			Level: standard	100%	
	Surface Temperature (F):	33-30 F	29-27 F	26-24 F	23-21 F	20-18 F	17-15 F
Pounds of Salt*	Heavy Frost, Light Snow	50	75	95	120	140	170
	Medium snow (1/2 inch per hour)	75	100	120	145	165	200
	Heavy Snow (one inch per hour)	100	140	185	250	300	350***
	Freezing rain, drizzle, sleet	140	185	250	300	350***	400***

Pavement temperature from RWIS stations

Precip type and duration from crew records

FYI

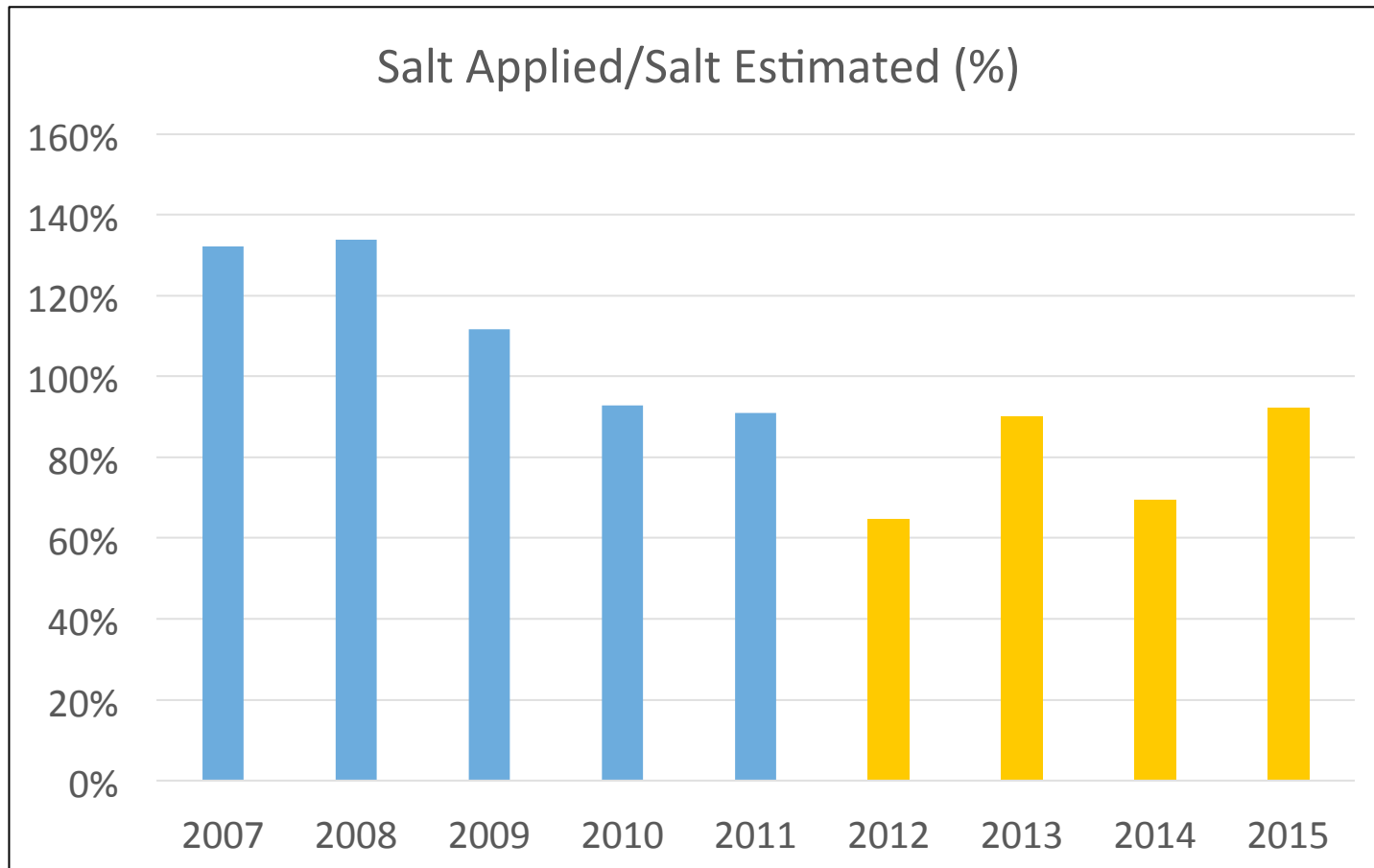
Our spreaders are capped at 300 lbs/LM

What Does This Mean For people?

- Targets provide a benchmark
- Visual way to compare
 - Across time or location
 - Outliers become obvious
 - Simple reporting errors
 - Unusual use
- New data daily
 - Catch potential problems early



How We Have Changed



2007-2011
(pre dashboard) cost of
tons over estimated:

\$1,595,151 per year

2012-2015
(after dashboard) cost of
tons under estimated:

\$2,706,920 per year

How We Might Change

- Time to retire our 3 “Levels of Service”?
 - About 70% of garage-to-garage salt use variation explained by the target’s 3-tiered LOS assumptions
 - About 86% of variation explained by new 6-tier “Lane Density- based” LOS assumptions
- Brine use linked to lower overall salt use/target comparisons?
- More to temperature-rate relationship than just “melting effectiveness”?

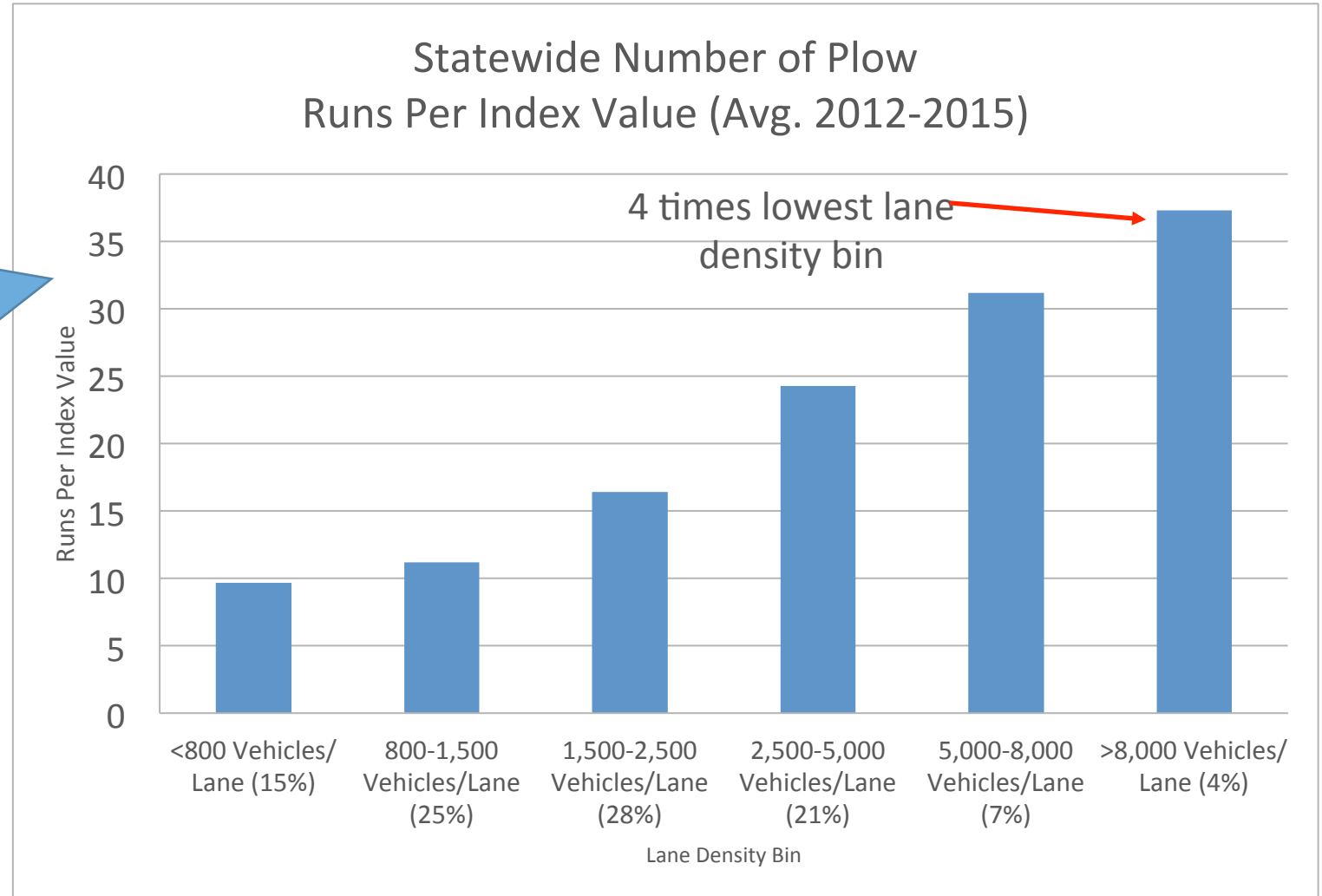
GPS/AVL Analytics

- Where do we spend our resources?
- How is that linked to road classification?
 - Is that balance appropriate?
 - Does that meet agency goals?
- If funding/expectations changed, how could that impact plow presence?

Example

Tools relate current practice to road types and personnel required to accomplish it

Run "What-Ifs" just by changing one of the values

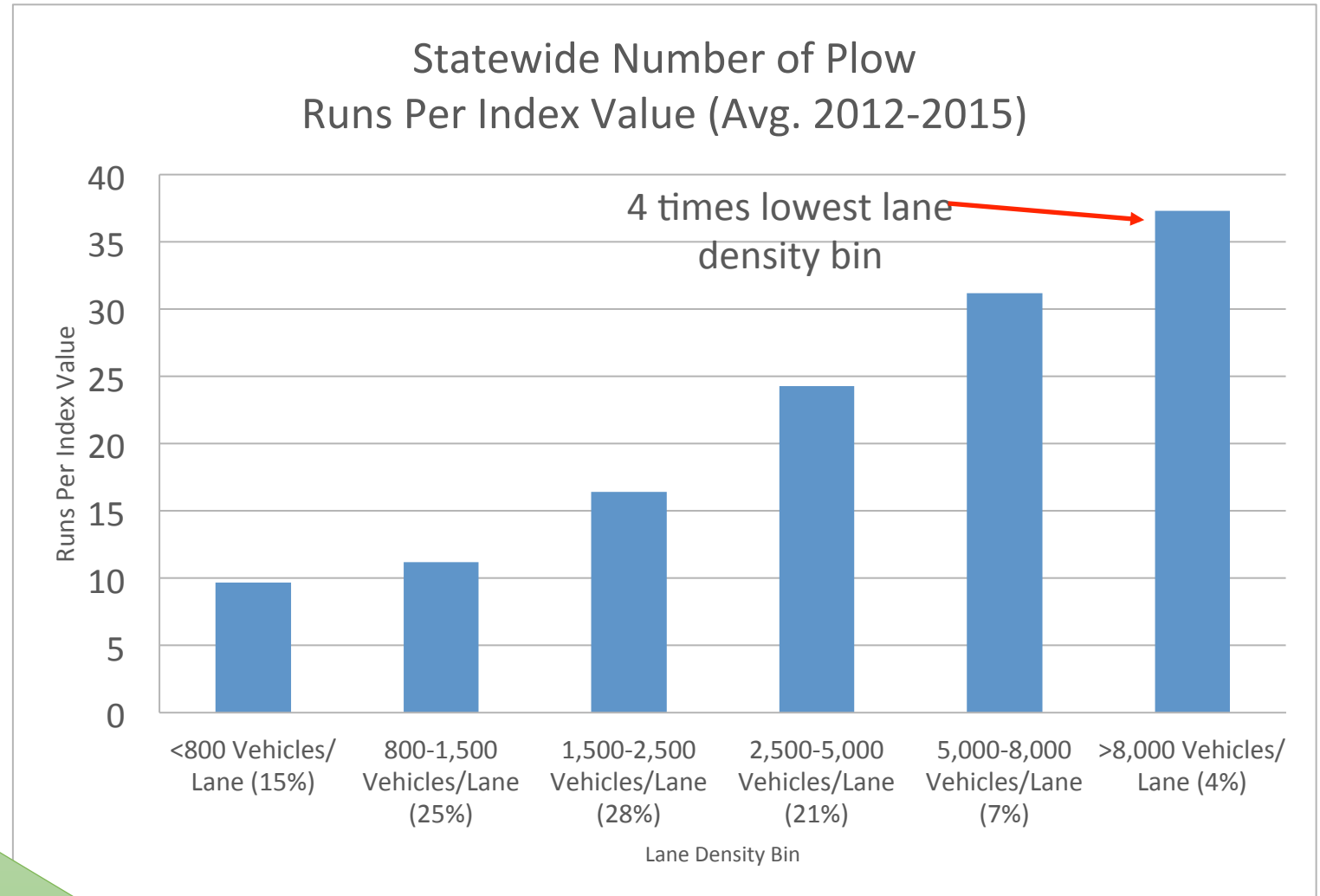


Example

Currently we are staffed with 877 plow drivers and can provide this frequency.

What if this needed to be 5 times a day as well?

We'd need 18 more plow drivers.



4/day

5/day

7/day

9/day

10/day

12/day

Barriers

- Not enough Data!
- Too much data!!!
- Sometimes what you find isn't what you want to see
- Keeping it understandable/explainable/real

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