



Winter Road Safety

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Winter Road Safety

- Poor weather
- Increase in collision frequency
- Increase in collision related cost



An Accident occurred on Icy road

Winter Road Maintenance

- Improve safety and mobility
- Cost
 - \$ 1 billion/year in Canada
 - Environmental effect





Research Question

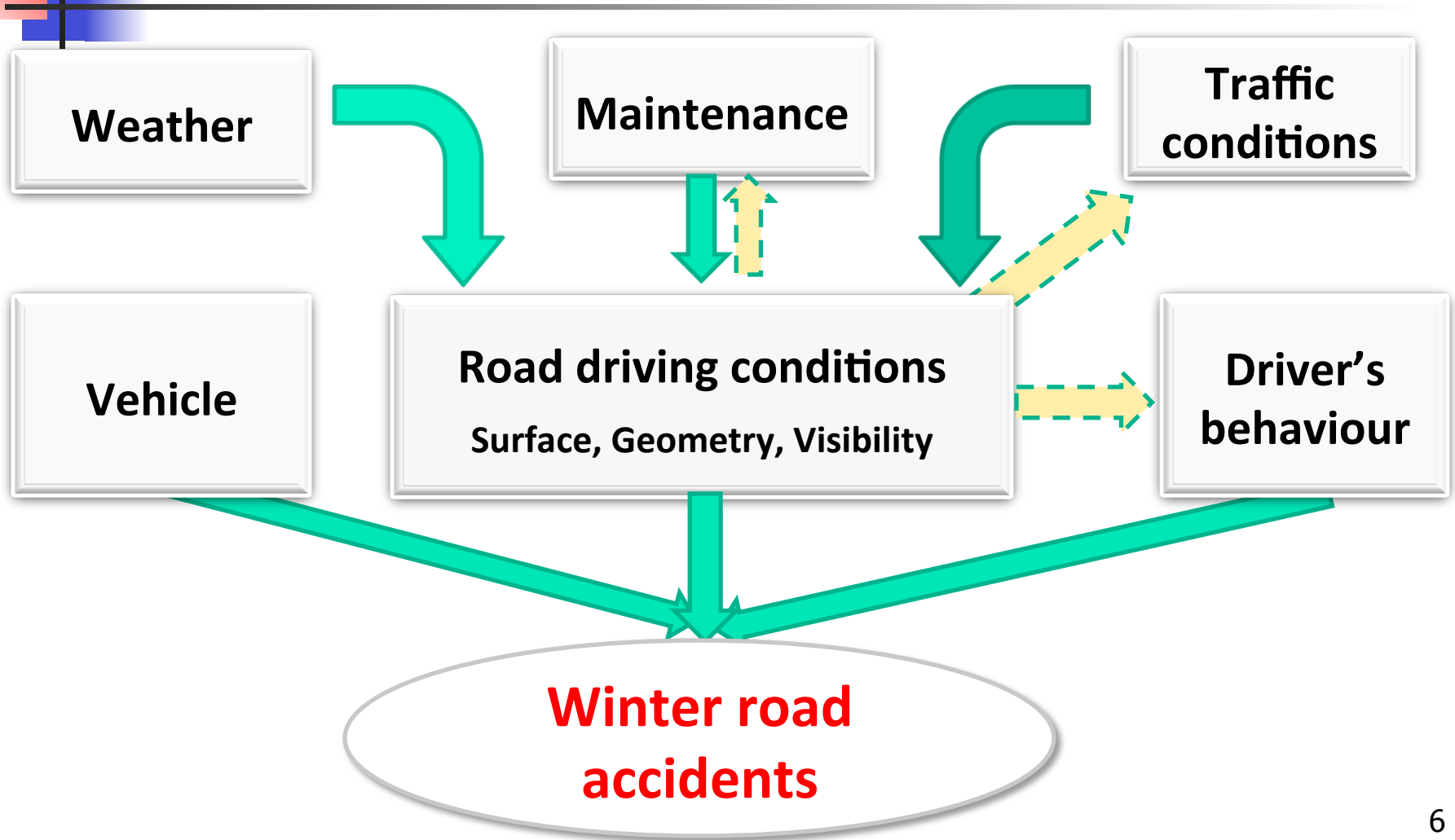
How much effect winter road maintenance have on road safety and how to capture this effect?



Research Objectives

- Investigate factors influencing road safety in winter seasons
- Develop methodology and models for quantifying the safety benefit of winter road maintenance
- Use the models to evaluate alternative maintenance decisions

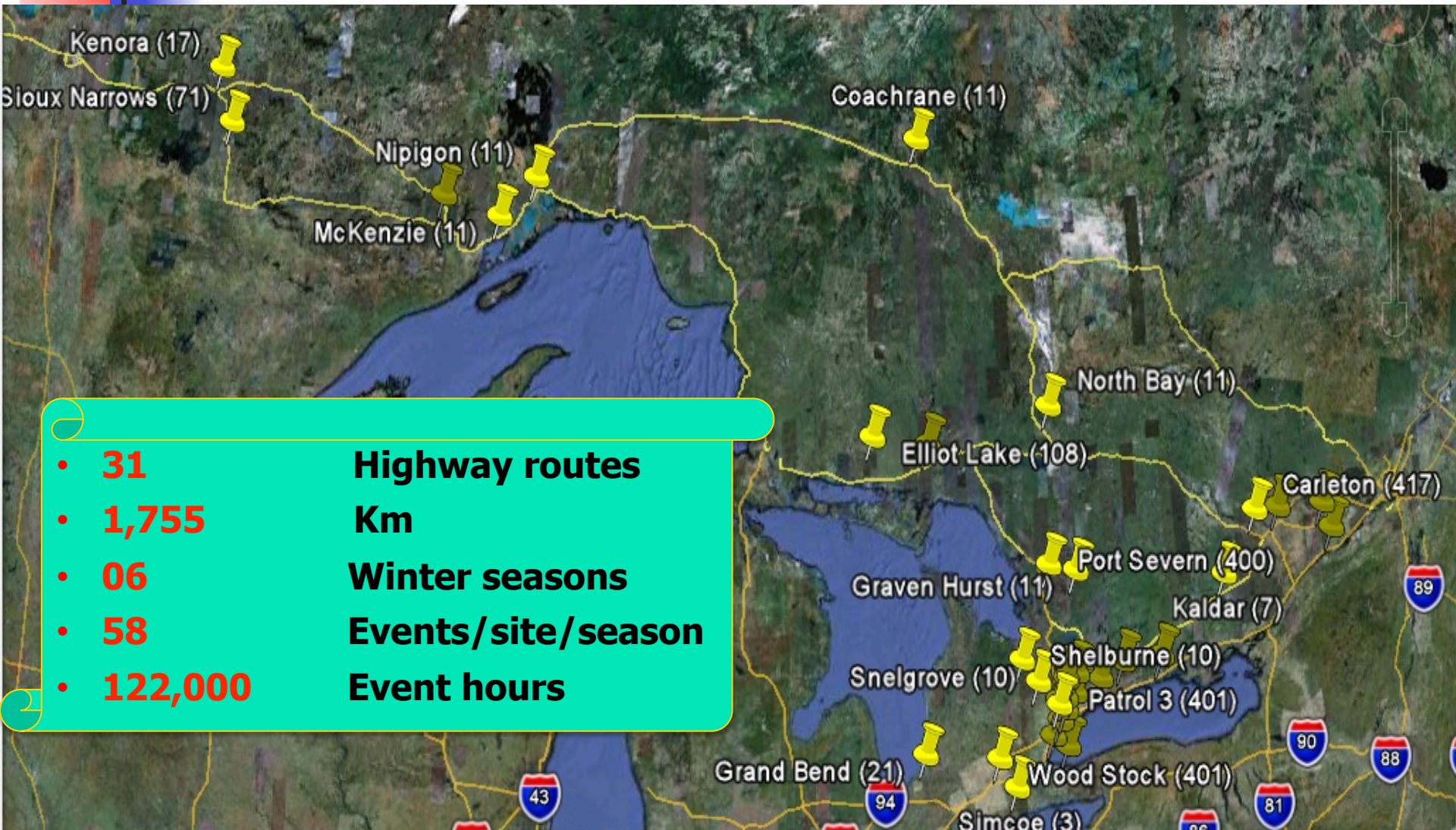
Factors Influencing Winter Road Safety



Selection of Study Sites



Selected Study Sites

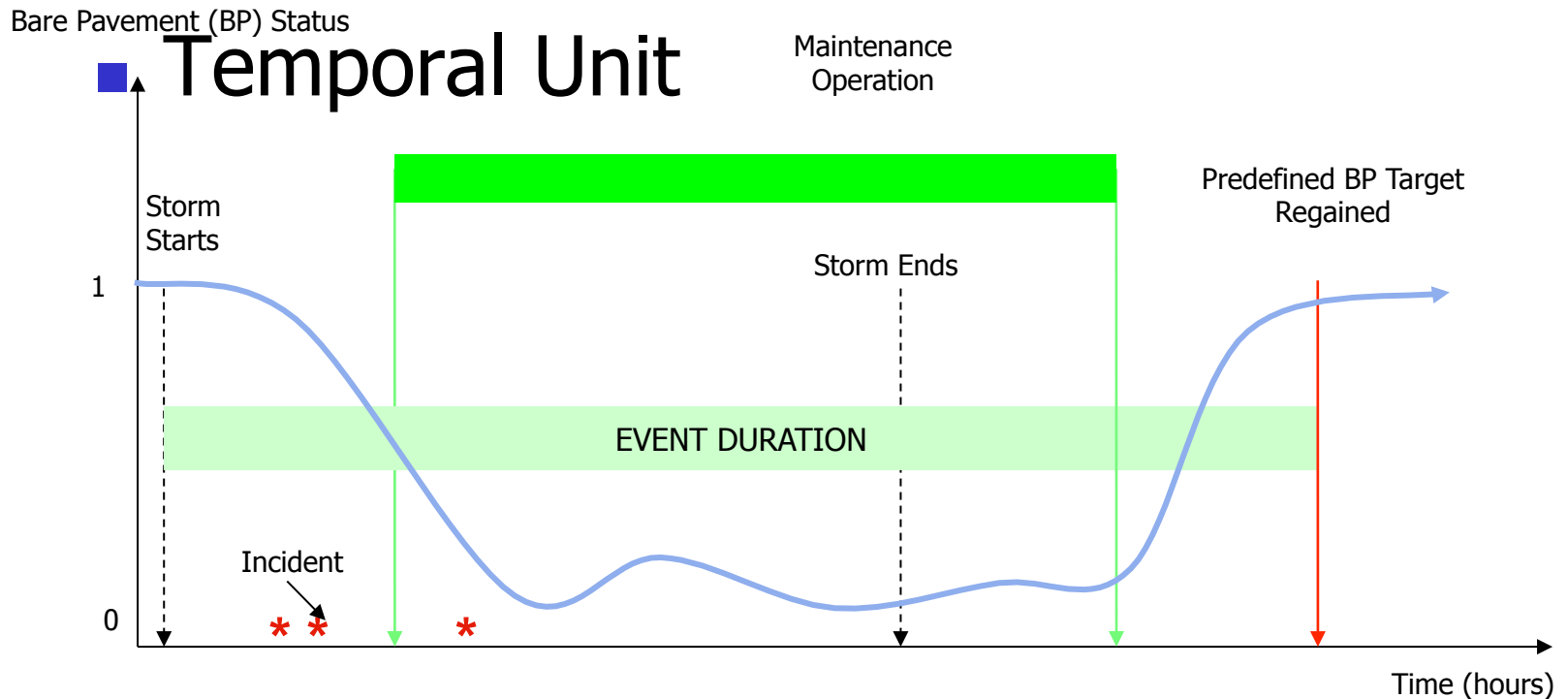


- **31** Highway routes
- **1,755** Km
- **06** Winter seasons
- **58** Events/site/season
- **122,000** Event hours

Units of Analysis

- Spatial Unit

- Temporal Unit



- Aggregate and disaggregate analysis



Event Based Model

■ Model

- $$\mu = E^{10.648} e^{(-3.912 - 0.018T + 0.009WS - 0.044V + 0.014P - 4.42RSI + M + S)}$$

■ where

- E = Exposure (in Million Vehicle km traveled)
- T = Temperature
- WS = Wind Speed (Km/hr)
- V = Visibility (km)
- P = Total Precipitation (cm)
- RSI = Road Surface Condition Index
- M = Month Indicator
- S = Site Indicator



Hourly Based Model

■ Model

- $$\mu = E^{10.235} e^{(-1.249 - 0.011T + 0.005WS - 0.039V + 0.097P - 2.594RSI + M + FH + S)}$$

■ where

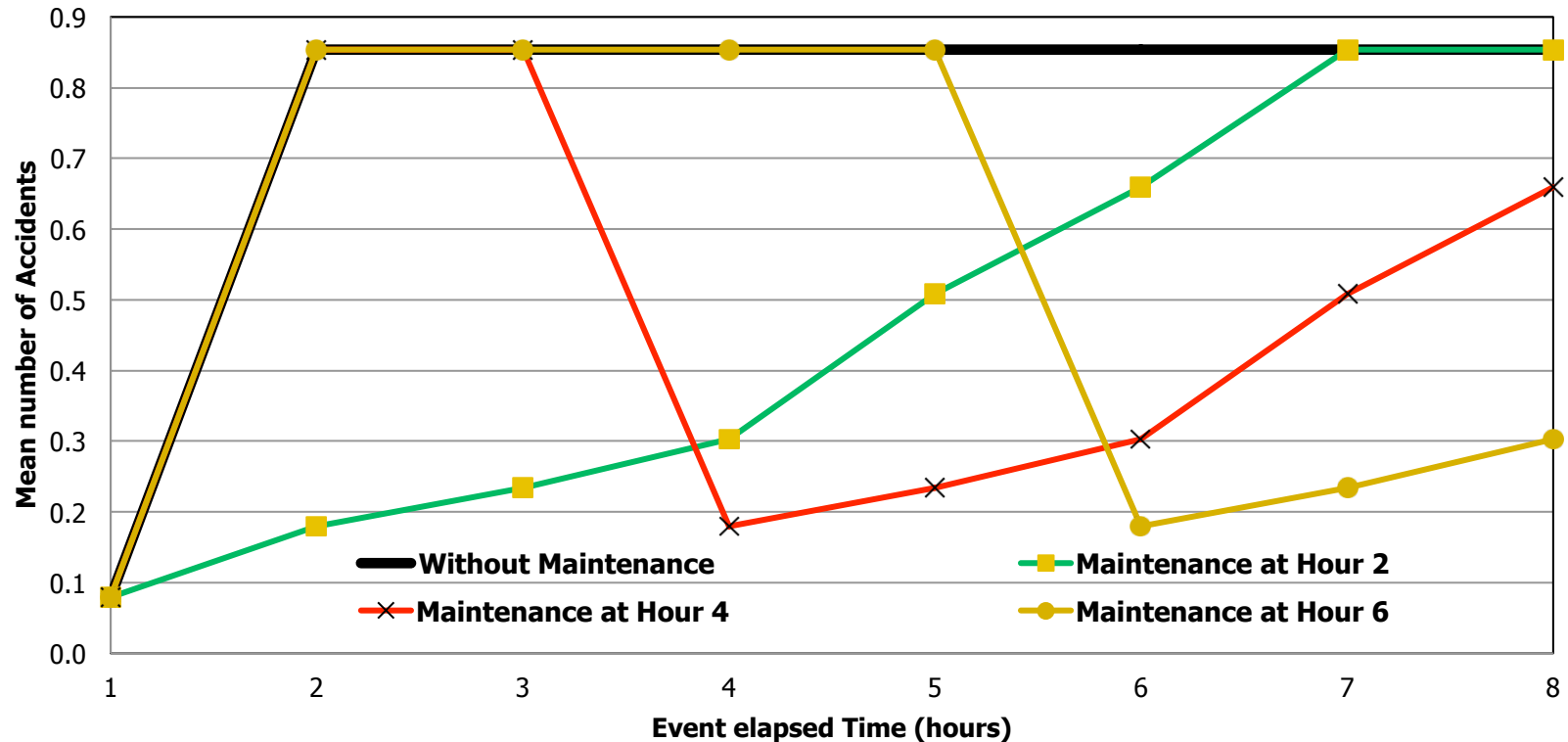
- E = Exposure (in Million Vehicle km traveled)

- RSI = Road Surface Condition Index
- T = Temperature
- WS = Wind Speed (Km/hr)

- V = Visibility (km)
- P = Hourly Precipitation (cm) 11

Hourly Based Model Application

Accident variation with Maintenance time





Thanks
