

Safe Truck Mobility for North Dakota Winter Storms

December 2024

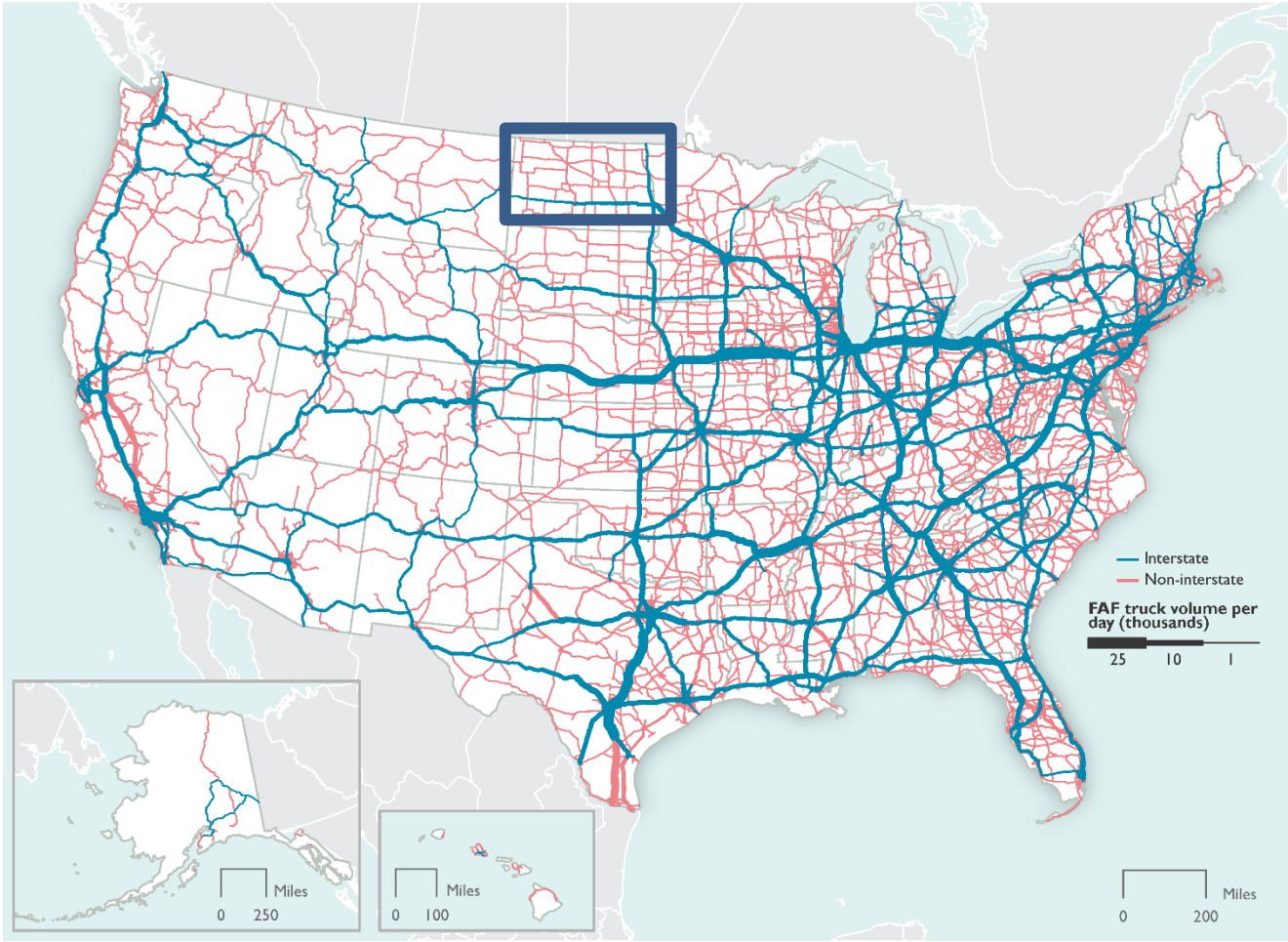
Upper Great Plains Transportation Institute
North Dakota State University
In cooperation with the
North Dakota Highway Patrol

Overview

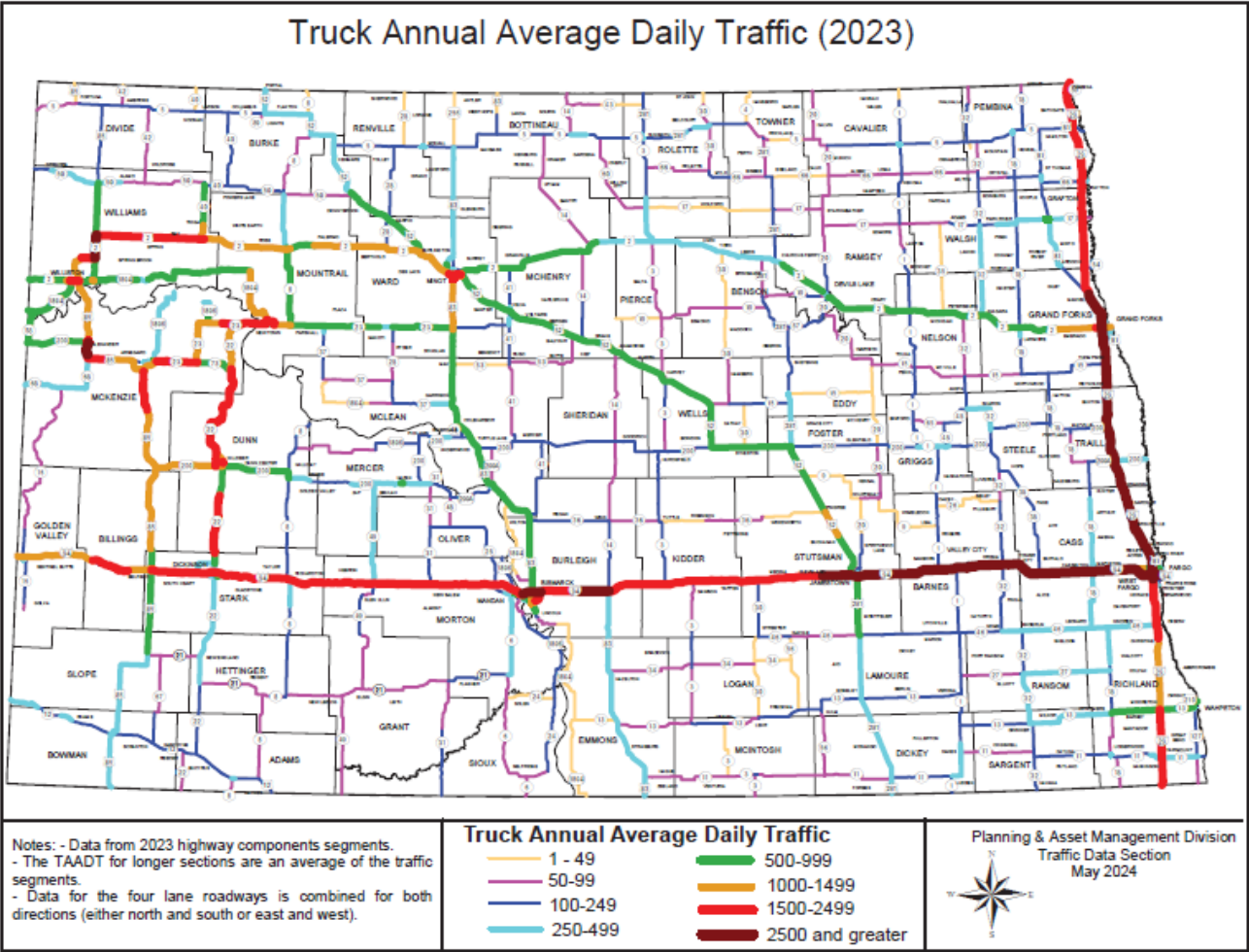
- Introduction
- Objectives
- Safe System Lens
- Methods and Data
- Findings



U.S. Truck Freight Flows

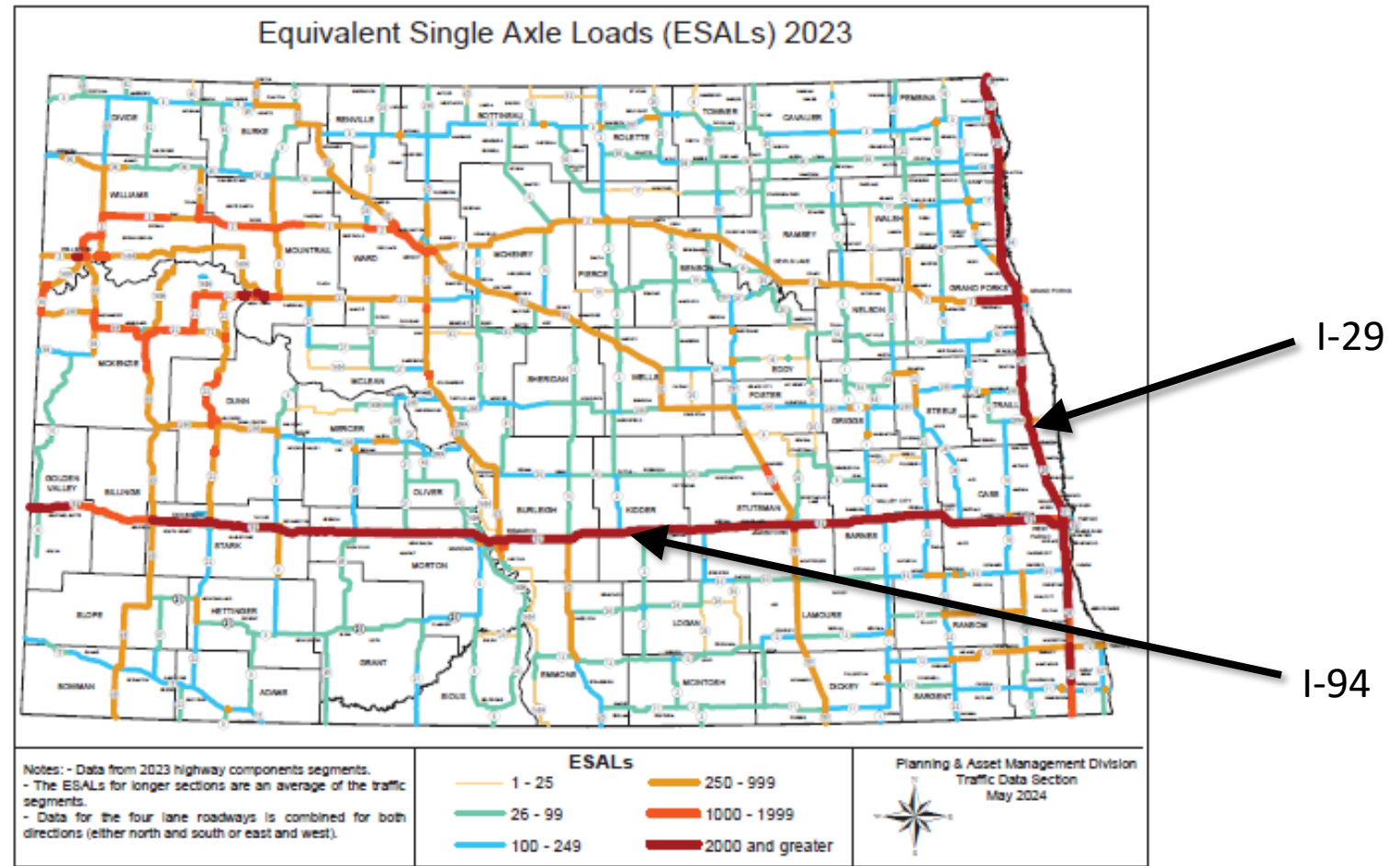


Road System, Annual Traffic Density



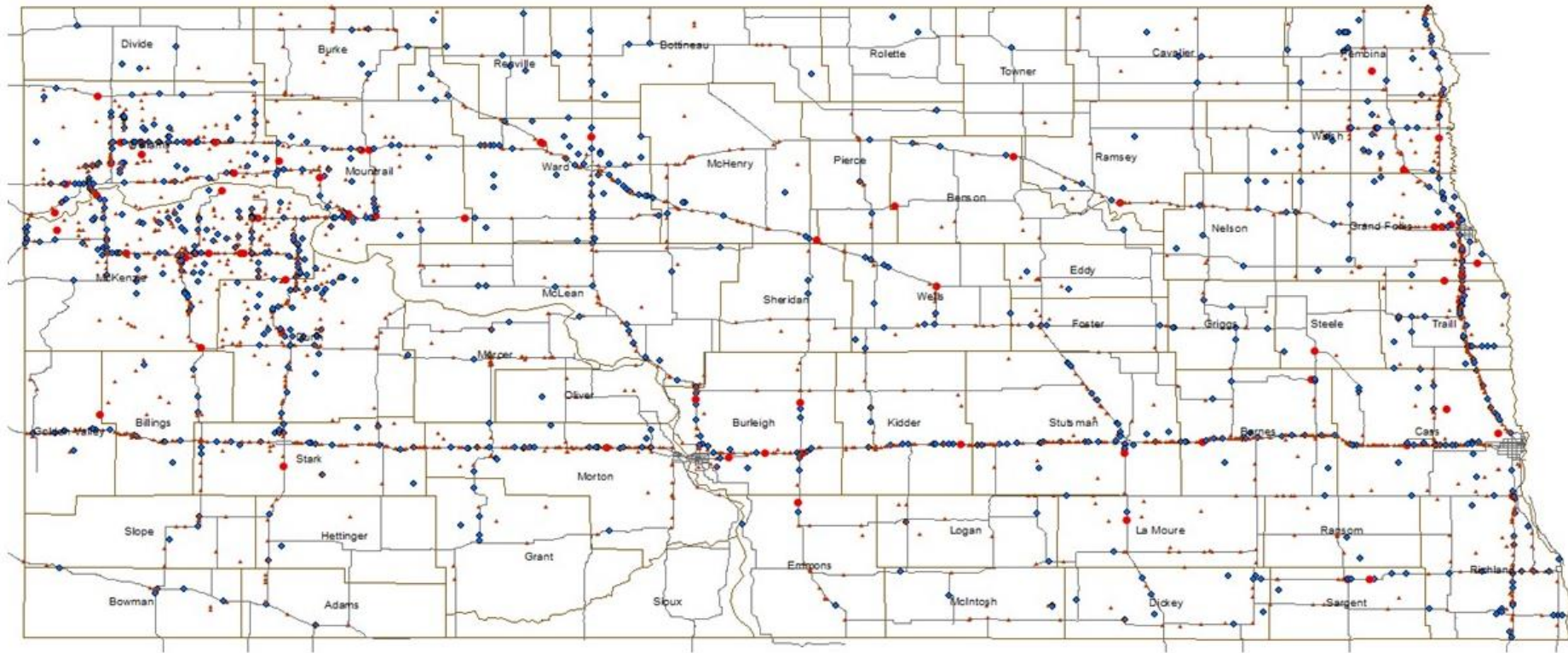
Road System, Annual Truck Traffic Density

- I-94 accounts for over 70% of the interstate highway truck traffic in North Dakota.
- I-94 services over 300 million truck miles each year. Representing 23% of Annual VMT on that interstate corridor.



ND Truck Crash Map

ND Rural Truck Crash Locations, 2018-2022



23 USC § 409 Documents
NDDOT Reserves All Objections

Crash Severity

- Fatal
- Injury
- ▲ PDO

Data Source: NDDOT State Crash Records

PREPARED BY THE
NDSU-Upper Great Plains Transportation
Institute
January 2024

Objectives

Goal: Safe System Analysis for ND Truck Mobility during Winter Storms

- Highlight winter storm truck crash risk and traffic management,
- Investigate contributing factors, policies, decision processes, and strategies for safe truck mobility during winter storms,
- Explore peer state procedures, decisions, and communications related to proactive winter storm truck traffic management and incident response,
- Query local truck experts about winter storm policies and driver guidance, &
- Highlight Safe System mobility strategies for trucks and surrounding traffic to minimize travel disruption and crash risk during winter storm events.

Safe System Approach

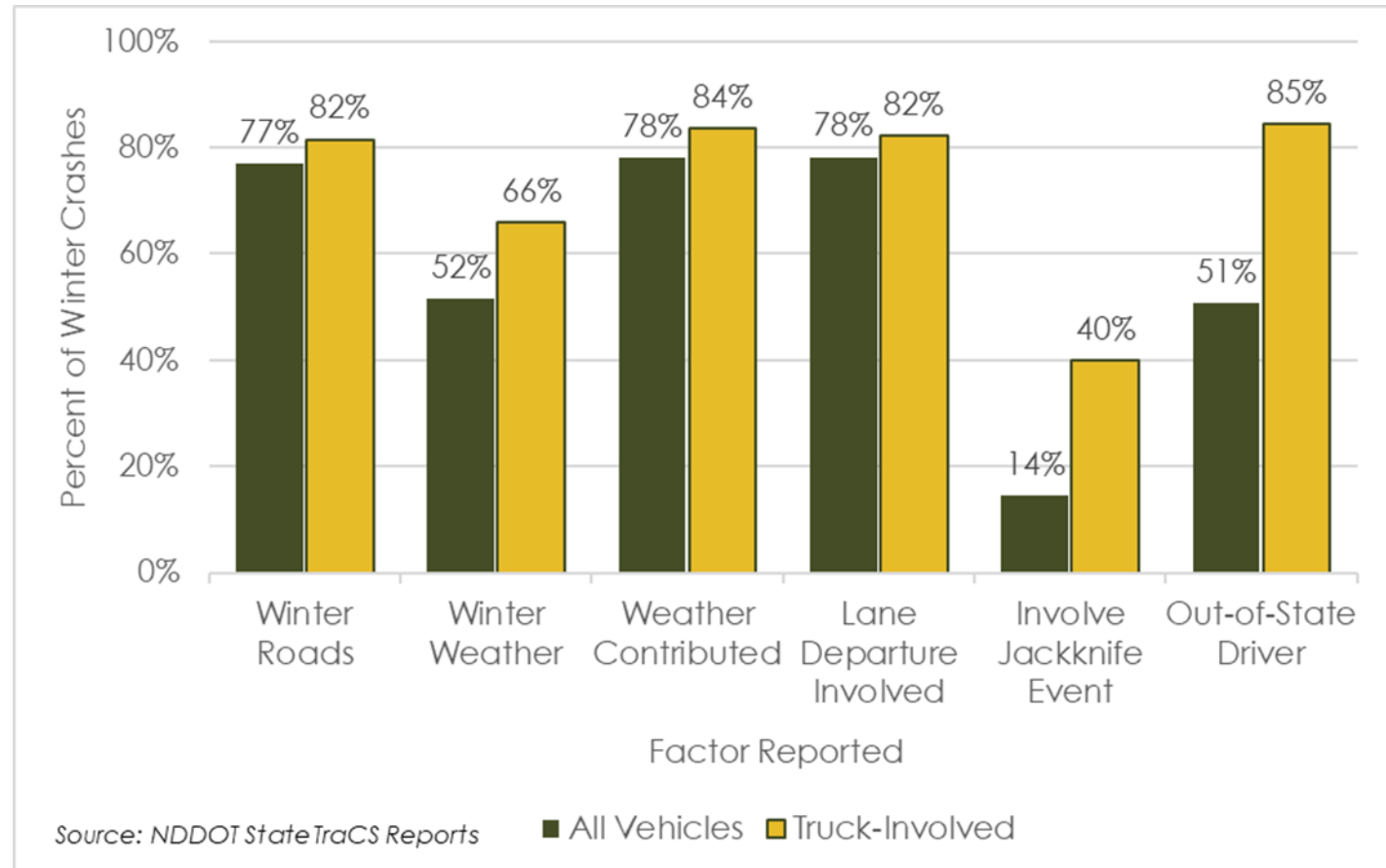
- Safer People
- Safer Roads
- Safer Vehicle
- Safer Speeds
- Post-Crash Care



The Safe System Approach aims to eliminate all fatalities and serious injuries for all road users by accommodating human mistakes and keeping impacts on the human body at tolerable levels.

I-94 Winter Crash Factors, 2019-2023

- 2019 to 2023, winter months of January, February, March, November, and December to profile I-94 winter crashes.
- Overall, 594 or 28.2% of the 2,105 crashes reported to law enforcement involved a truck for the I-94 corridor during the 25-month winter study period.



I-94 Winter Truck-Involved Crash Types

Number of total vehicles in Truck-Involved Crashes



Single-Truck Crashes 59%
(350 out of 594)



**One Truck and One Other
Type Vehicle Crashes 29.6%**
(176 out of 594)



Two-Truck Crashes 7.2%
(43 out of 594)



Driver Factors

Law enforcement reportedly issued 1,152 citations for I-94 crashes during the winter study period.

- Drivers in single-vehicle truck crashes were cited in 38% of events.
- Among drivers in multiple-vehicle truck-involved crashes, truck drivers accounted for 21% of citations compared to 32% among the other drivers.

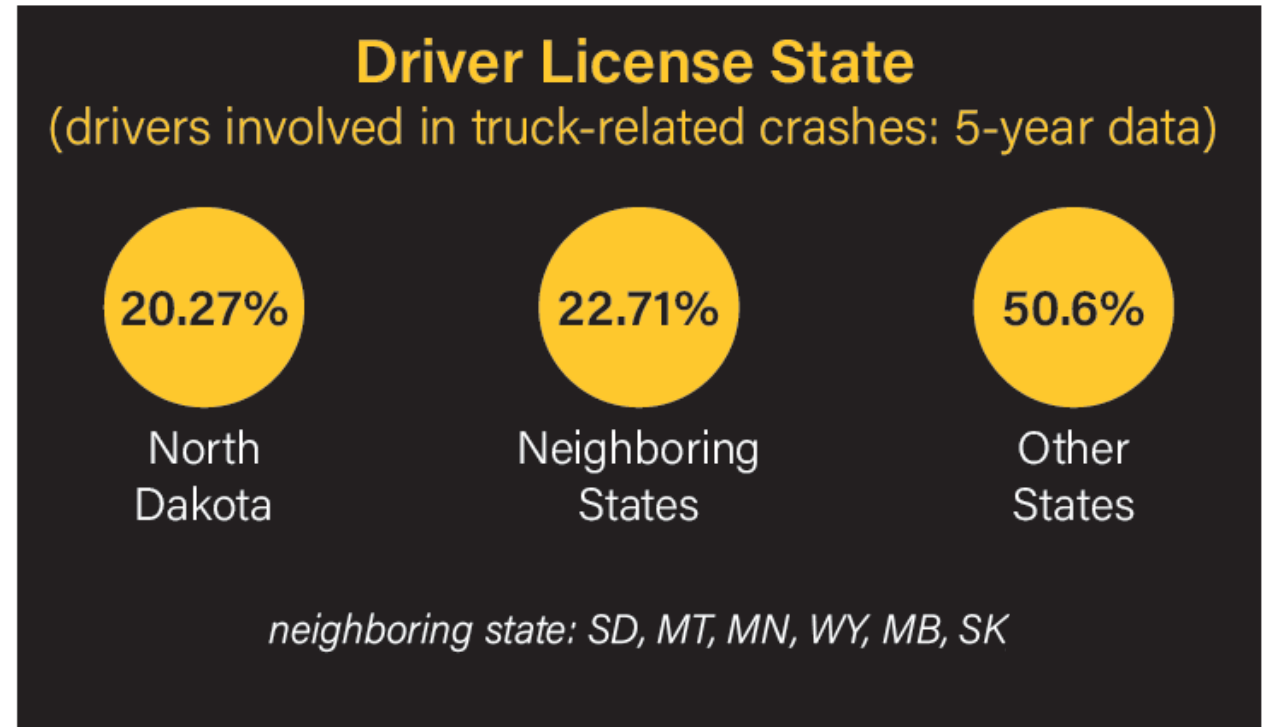


I-94 Winter Crash Citations, Most Common

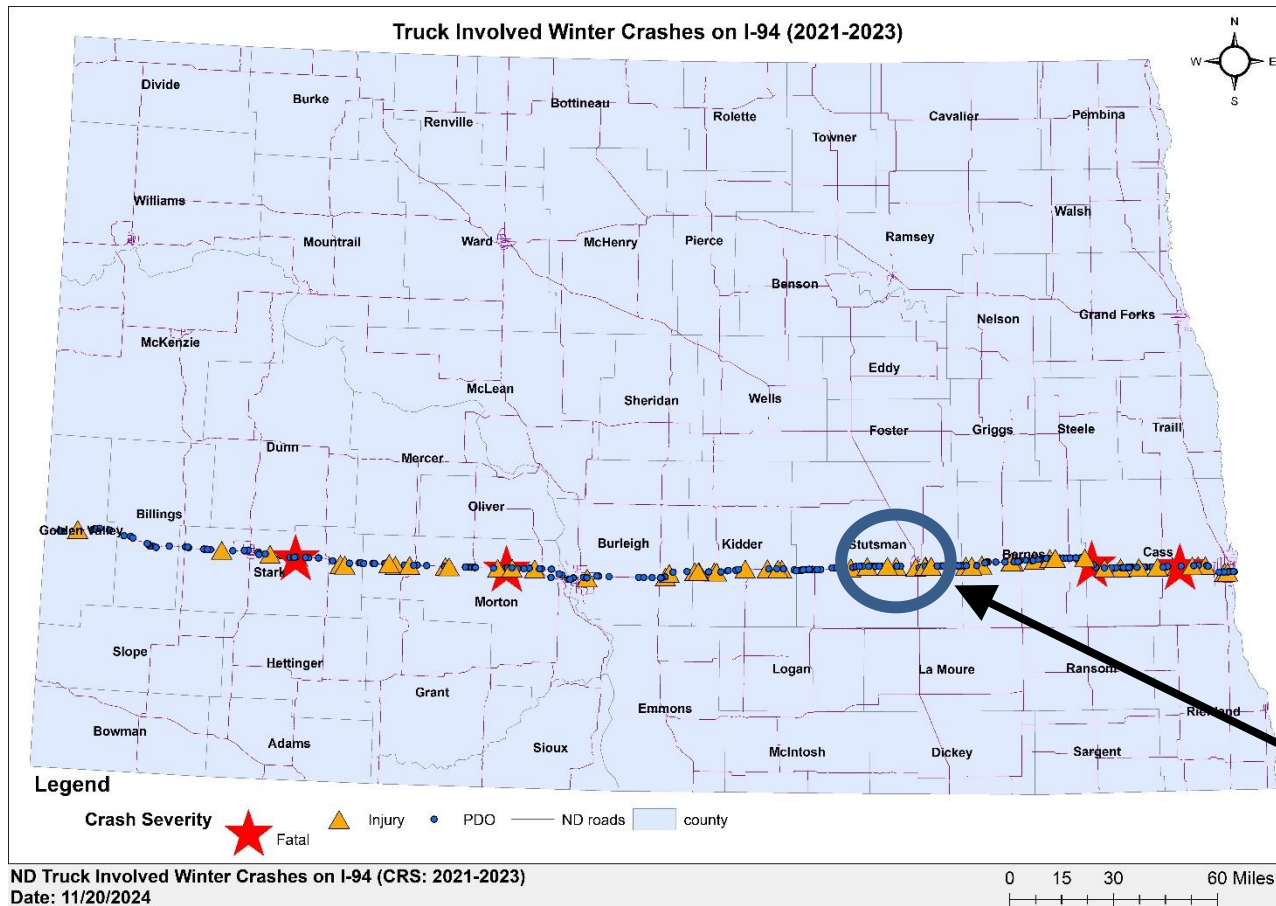
	Single- Truck	Multi-Vehicle	
		Truck	Other
<i>No Citation</i>	62%	79%	68%
Among Citations Issued, Offense			
Care Required	66%	39%	41%
Following-too-Close	0%	15%	17%
No Insurance	5%	0%	4%
Careless Driving	1%	6%	3%
Driver's License, NCC	5%	1%	4%
Left Crash Scene, NCC	4%	1%	2%

Truck Driver Involvement and License State

Compared to 113 truck drivers involved in I-94 winter crashes during 2019, truck drivers increased by nearly 80% to 204 in 2023.



Case Study Analysis



Descriptive Crash Sequence Case Study for March 2023 Storm Event:

- Law enforcement reported 8 crashes on I-94 during a severe winter storm March 15-17, 2023.
- All crashes are weather-related.
- Three crashes resulted in serious injuries.
- A statewide road closure began on March 17. It lasted more than 15 hours.

*Jamestown, Winter Storm
Truck-Involved Crash
Cluster Area*

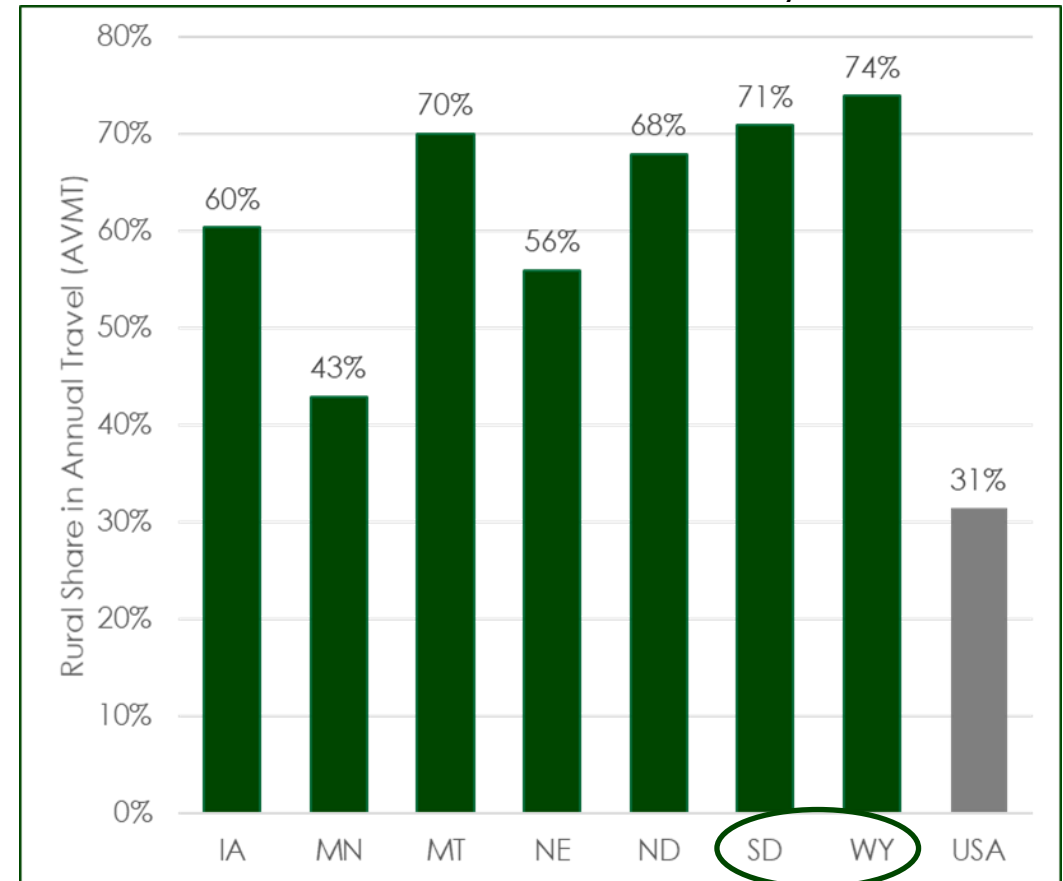
Peer State Interviews

Safety/Mobility Balance During Severe Winter Storms

- Current winter storm practices, any specific to truck traffic
- Strategies to improve safety and minimize mobility impacts and
- Open-ended questions for exploratory analysis.

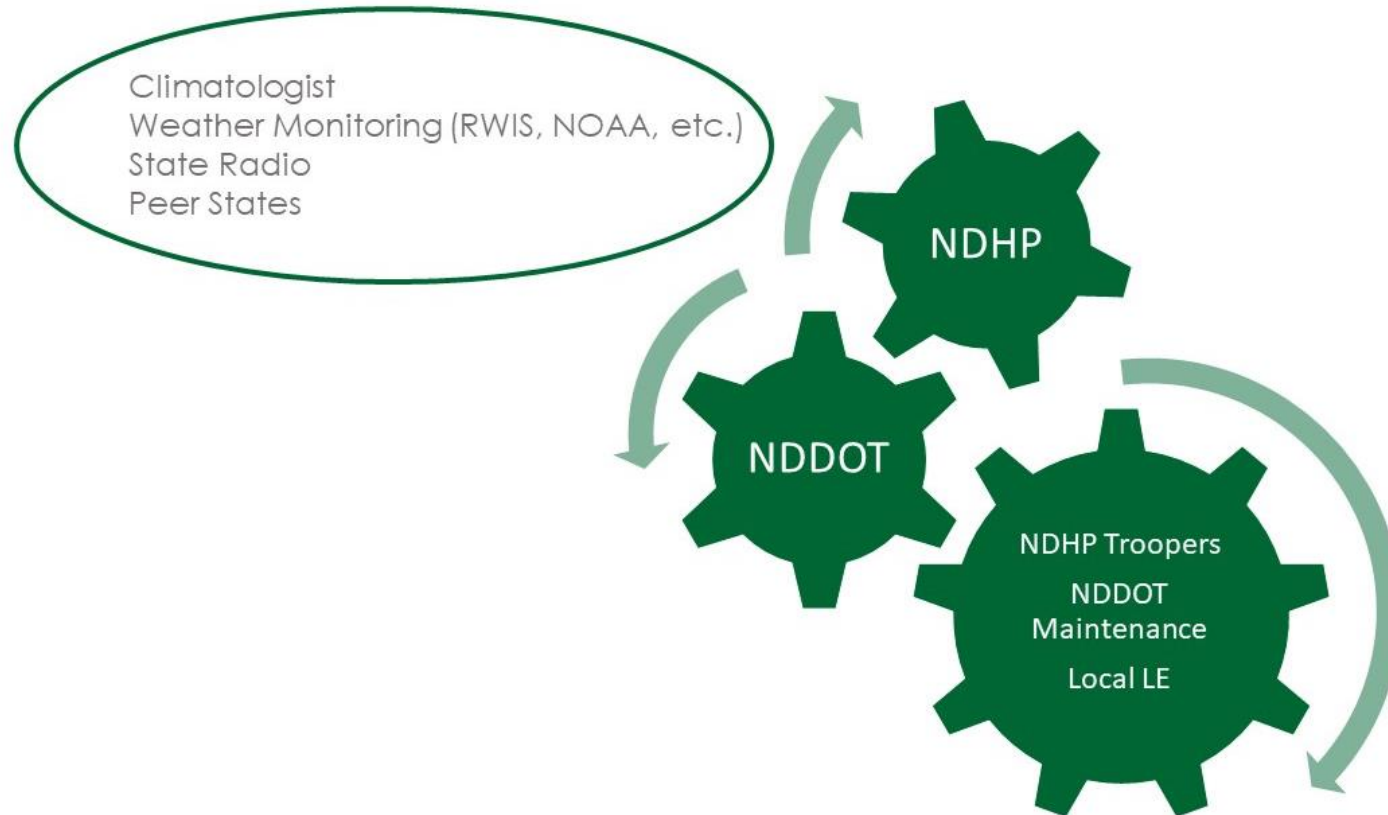


Rural Share in Total Traffic by State

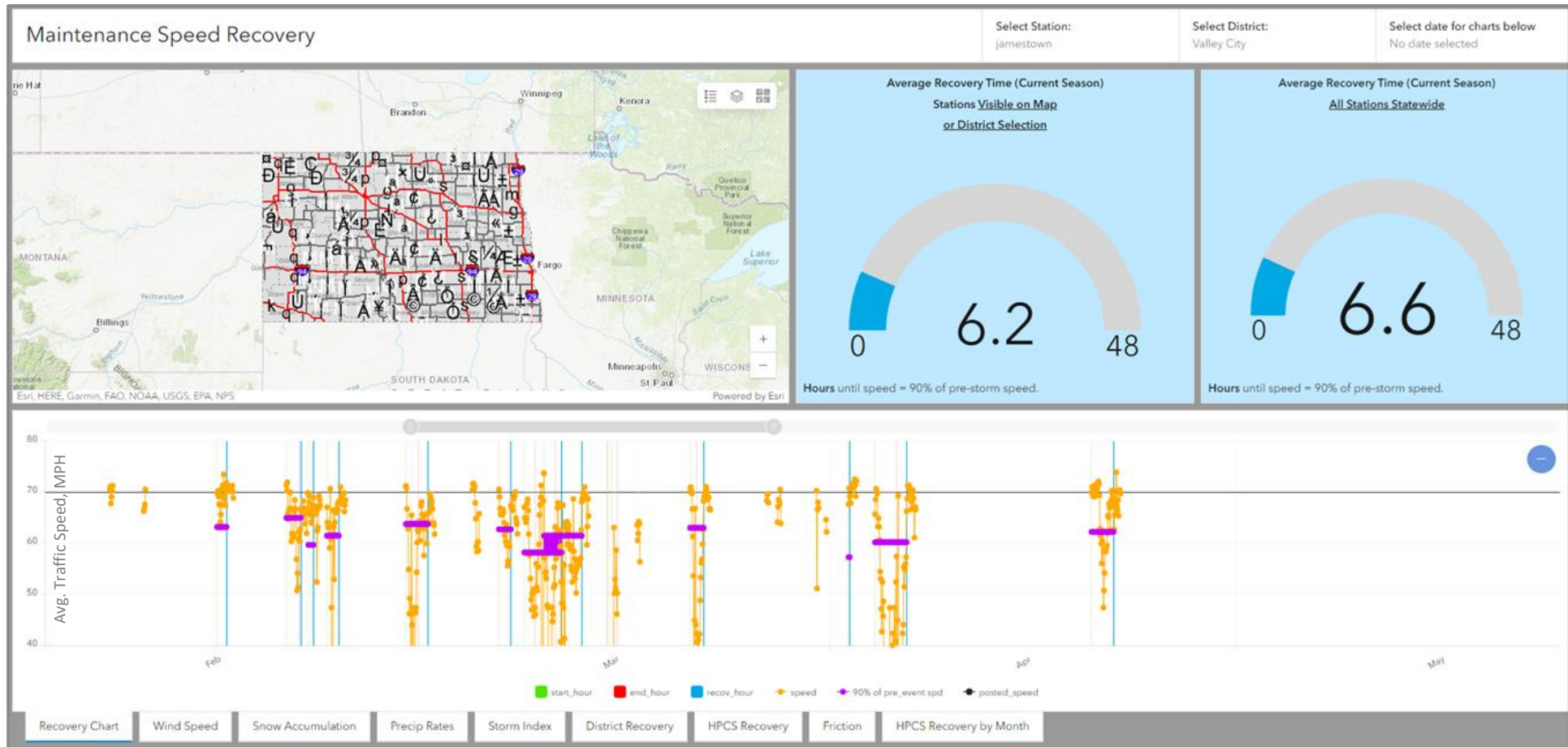


Northern Tier States

Winter Storm Safety Mobility Decisions



NDDOT NDSU-DOTSC Winter Storm Recovery



Truck Storm Safe Mobility Proactive Opportunities

Balancing Mobility and Safety

Safe Users

- Winter driving information safe mobility campaign – public, businesses
- Out-of-state truck driver/company education
- Local resources for truck driver storm diversion communities beyond the urban centers
- Truck parking inventory/information
- Driver trip planning, driving applications, and/or dispatch centers prevent secondary road re-routing (e.g. SDDOT Google Map)
- Tiered penalty approach for drivers with winter storm-related violations

Truck Storm Safe Mobility Proactive Opportunities

Balancing Mobility and Safety

Safe Speeds

- Coordination with neighboring states in communications, technology, and policies
- Planning closures with lead time for truck parking
- Blow off/blow over vehicle type policy, consider speed and weight
- Greater storm event visibility in real-time and geographic coverage
 - Weather stations
 - Cameras
 - Road sensors
 - Traffic recorders
- Variable speed limit corridors



Truck Storm Safe Mobility Proactive Opportunities

Balancing Mobility and Safety

Safe Roads

- Periodic desktop planning exercise as an emergency response to severe winter storms in terms of intensity and/or duration
- Communication road closures with the general public and the truck industry
 - Real-time information at rest stop kiosks
 - General updates and plan to reopen roadways
- Living snow fences, timely road clearing/coordinated operation, winter plowing techniques, DMS
- High friction surfaces, rumble strips, cable median barrier, guardrail, improved road closure gates, reliable equipment

Truck Storm Safe Mobility Proactive Opportunities

Balancing Mobility and Safety

Safe Vehicles

- Truck permit system for travel alerts
- Policy for tiered penalty approach for companies with winter storm-related violations

Post-Crash Care

- Law enforcement crash response challenges beyond major travel corridors
- Access to EMS and hospital care during winter storm events



Questions/Comments

Lieutenant Luke Hendrickson
North Dakota Highway Patrol
Motor Carrier Operations Commander
(701) 730-3722
www.nd.gov/ndhp/

kimberly.vachal@ndsu.edu
Program Director, PhD
North Dakota State University
Upper Great Plains Transportation Institute
(701) 231-6425
www.ugpti.org

