

# **Loaded Log Trucks on Interstate Highways: Safety and Efficiency Benefits in NC**

Joe Conrad

Assistant Professor of Forest Operations

NCFA Board of Directors Meeting

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# Presentation Topics

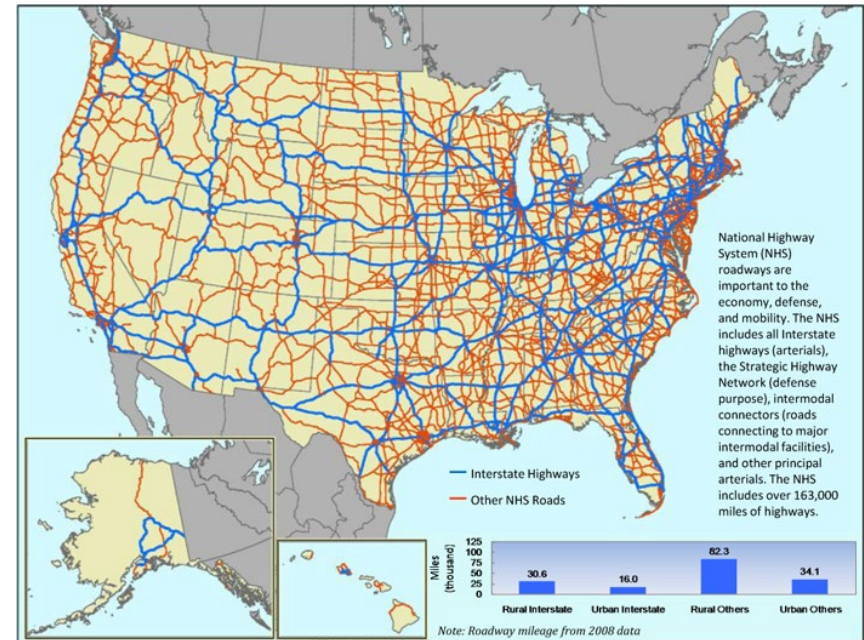
1. Rationale for log trucks on interstate highways
2. Safety and efficiency benefits of interstate access in NC
3. Bonus: log truck crashes before and after weight limit increases in NC and VA



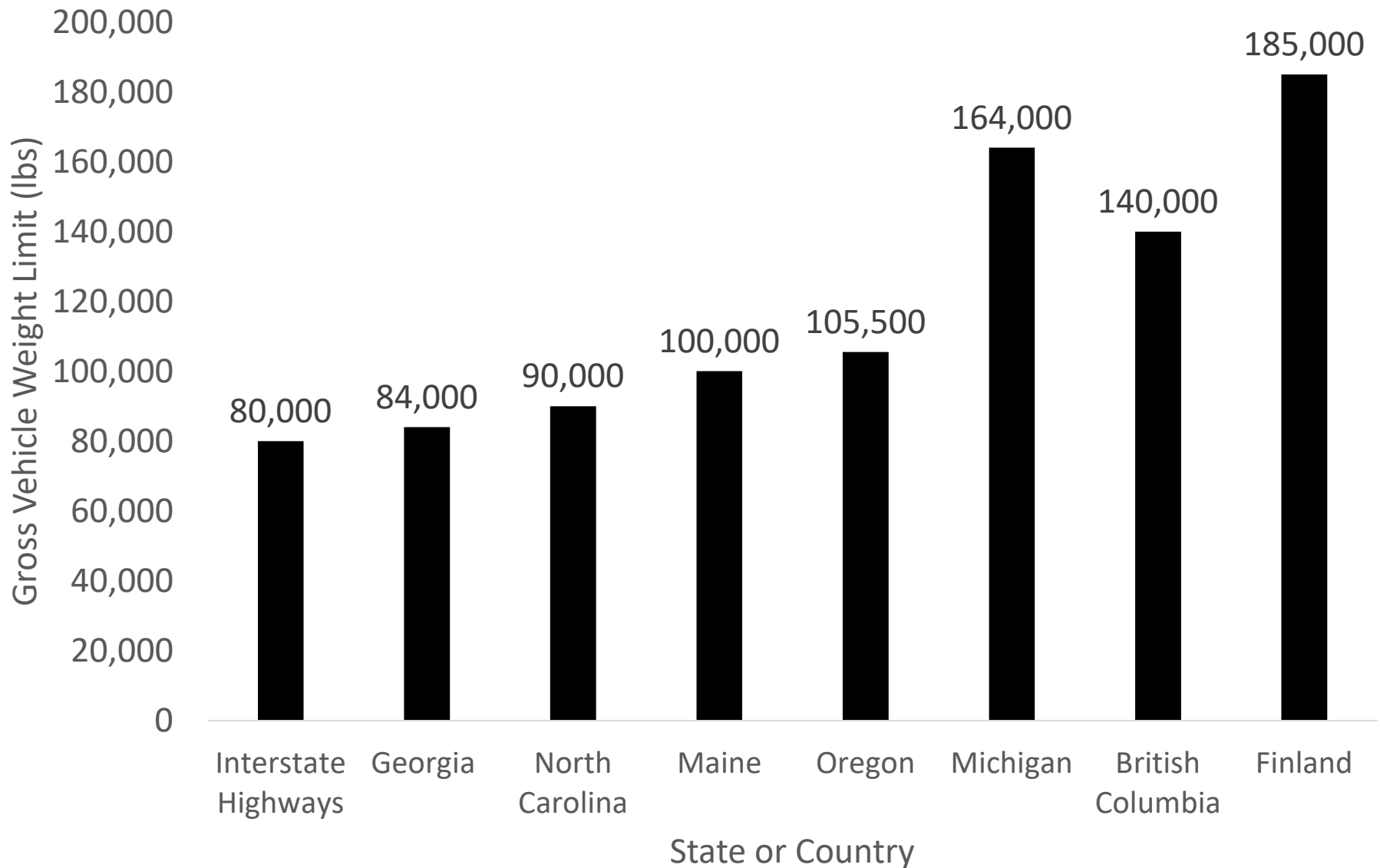
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# Why Interstate Highway Access?

- Safety
  - Bypass cities and towns
  - One-way traffic
  - Avoid intersections and stop signs
- Transportation cost
  - Travel time
  - Travel distance
  - Fuel consumption
- Infrastructure
  - Pavement
  - Bridges



# Log Truck Weights: How does NC Compare?



# Research Objectives

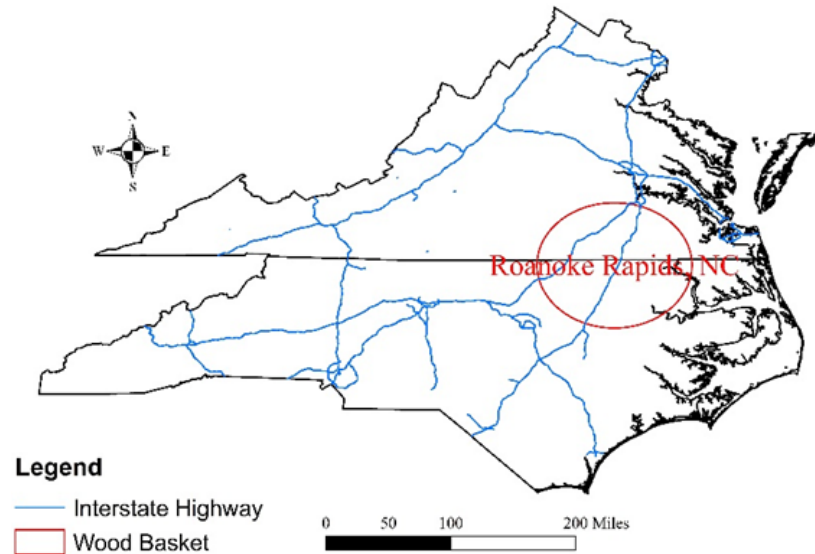
1. Estimate percent of timber deliveries that would benefit from interstate highway access
2. Quantify benefits of interstate access for state-legal log trucks
  - Safety
  - Hauling costs
  - Infrastructure
  - Fuel consumption & emissions



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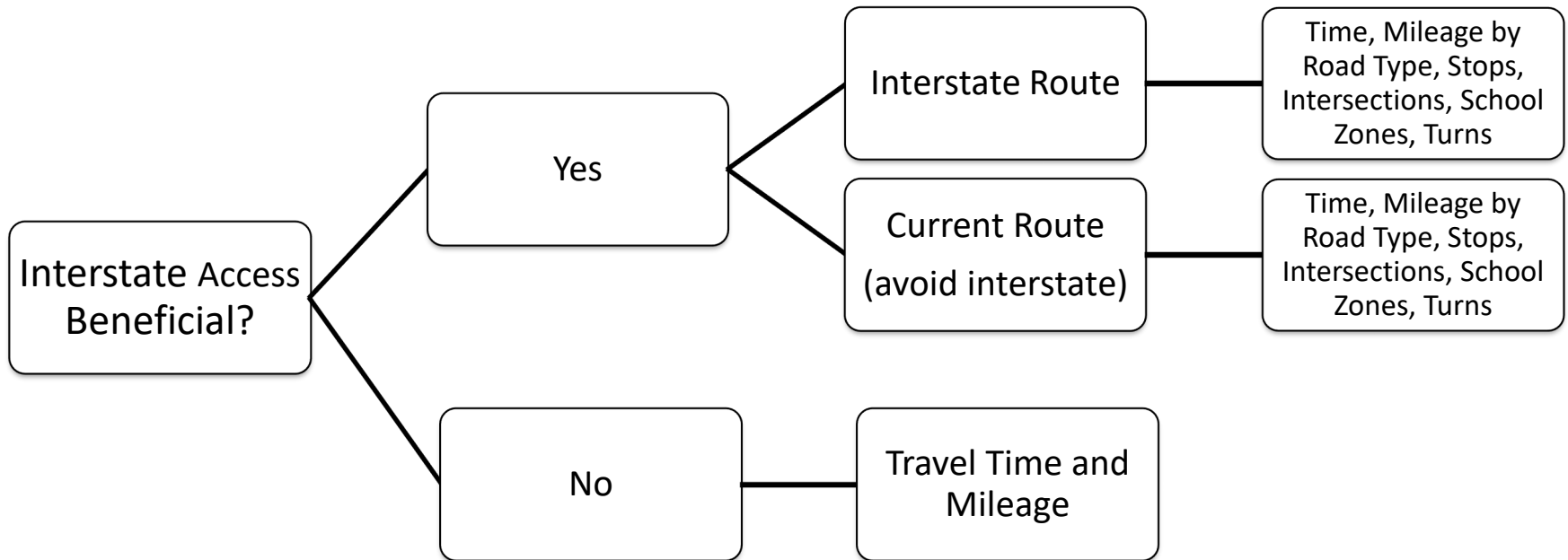
# Methods

- Timber harvest and delivery locations from loggers, landowners, log truck owners
- Used mapping software to estimate travel time and distance



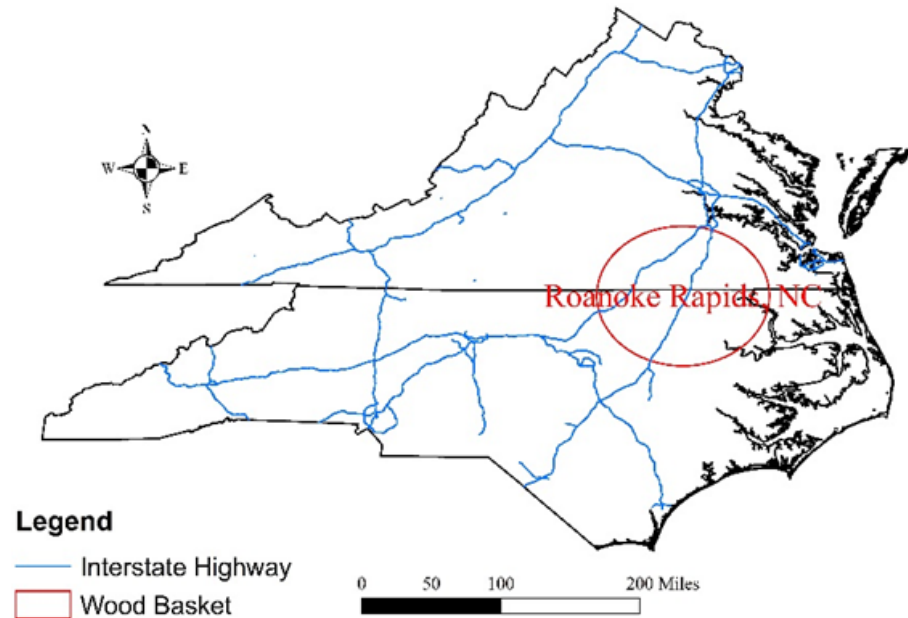
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# Route Analysis



# Sample

- 32 harvest sites
- 102 routes analyzed
- 7,027 loads represented
- 34-mile average haul distance
- 237,995 loaded miles



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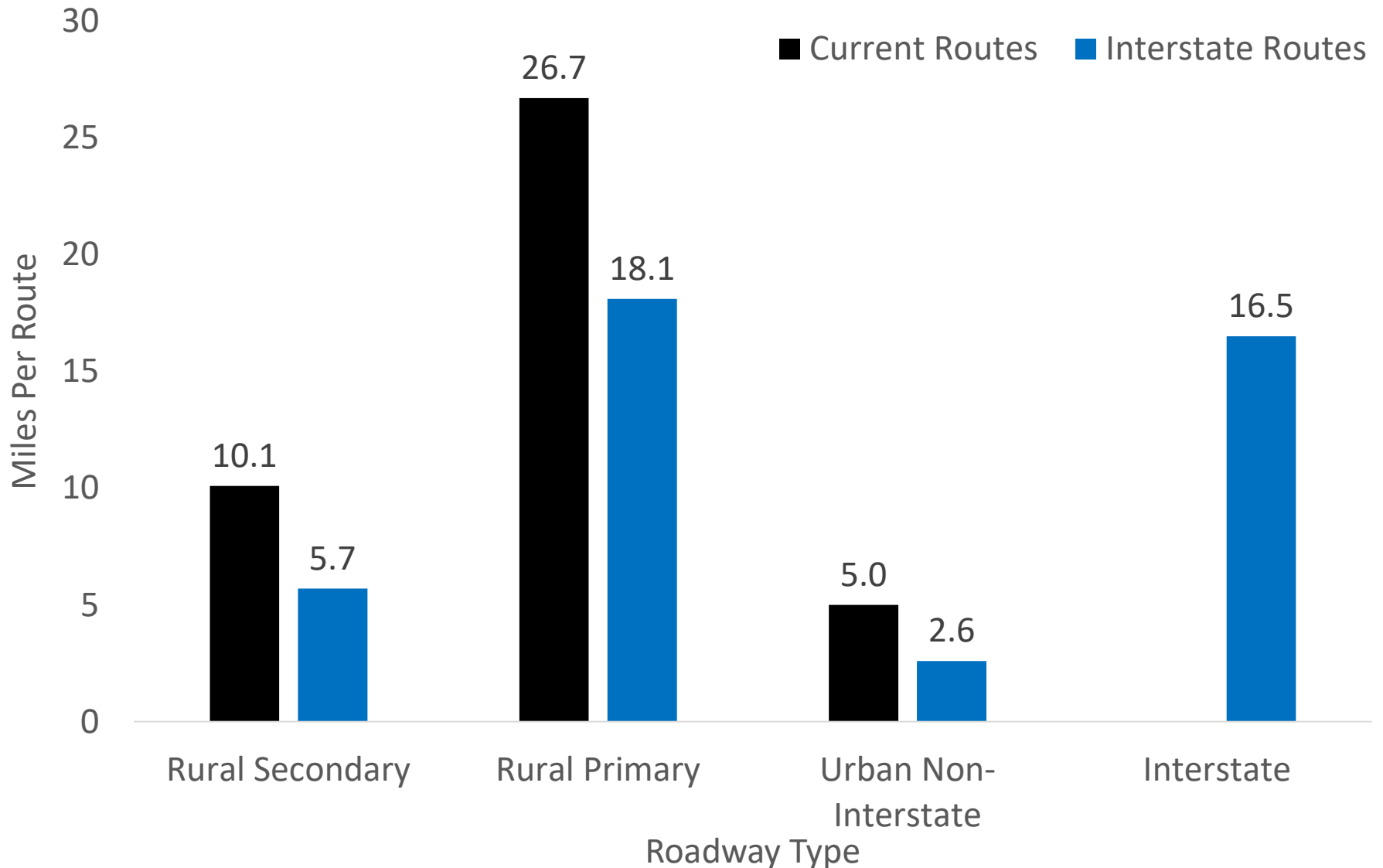
# Results

- 46% of haul routes would be more efficient with interstate access
- 82% of harvest sites had at least one load that would benefit from interstate access
- 38% of miles could be traveled on interstate highways on routes benefitting from interstate access

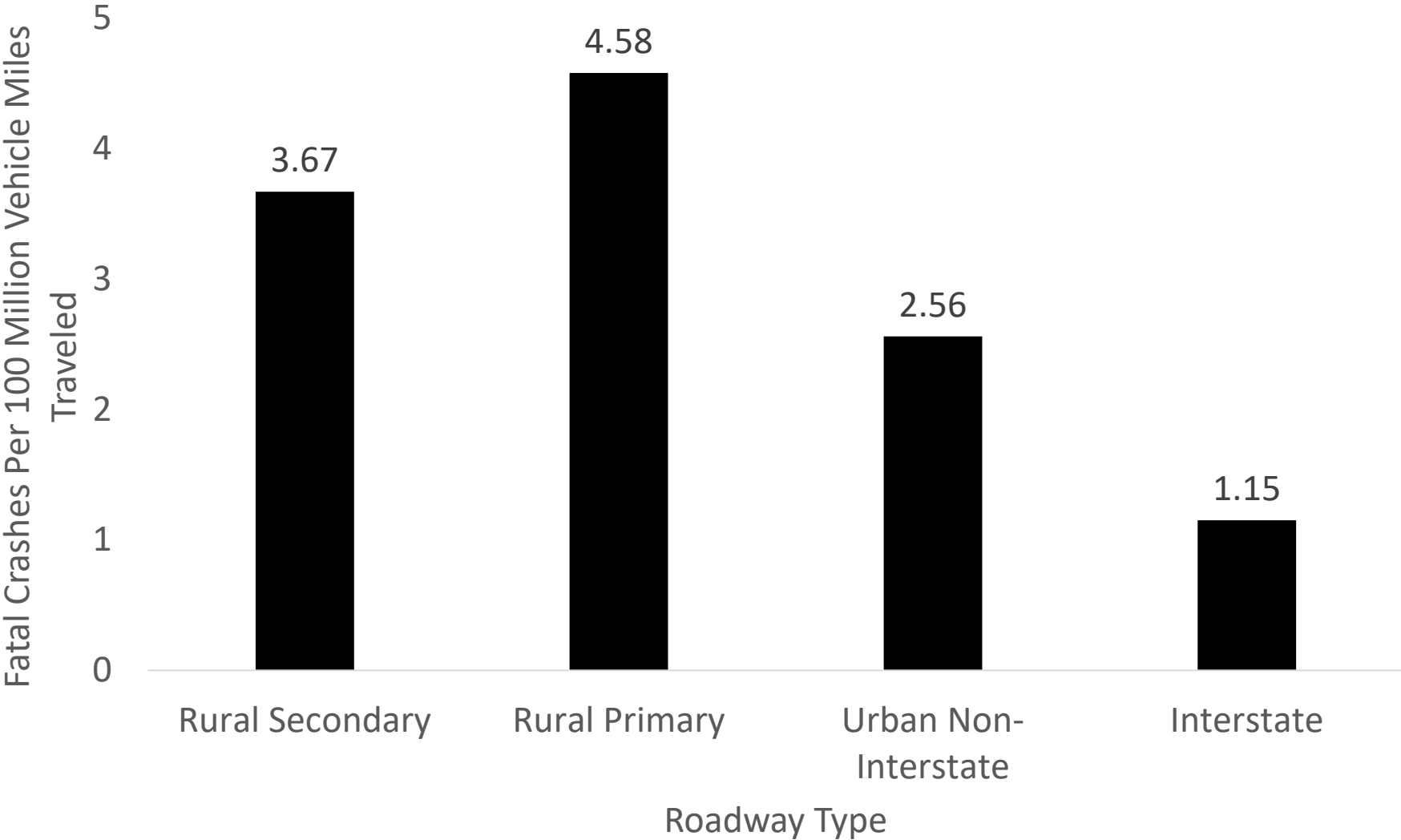


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# Route Mileage by Roadway Type



# Fatal Crash Risk By Roadway Type



# Safety Benefits of Interstate Access

- 40% fewer intersections per trip
  - 61 vs. 101
- 1 school zone avoided per trip
- 1 city or town bypassed per trip
- 19% lower estimated fatal crash risk on each trip



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# Hauling Cost Savings on Interstate

- 9 minutes per trip shorter travel time
- \$9,700 annual savings for typical logger
- \$935,000 cumulative annual savings for all loggers in the Roanoke Rapids wood basket



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# Annual Infrastructure & Emissions Benefits

- \$1.6 million pavement damage reduction
- 37,000 gallons fuel savings
- 416 tons CO<sub>2</sub> emissions reduction
  - Equivalent of 83 passenger vehicles



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## Roanoke Rapids, NC

- No through trucks in Emporia, VA
- Exemption for forest products
- Interstate access solves multiple problems



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# Roanoke Rapids, NC

I-95



US 301



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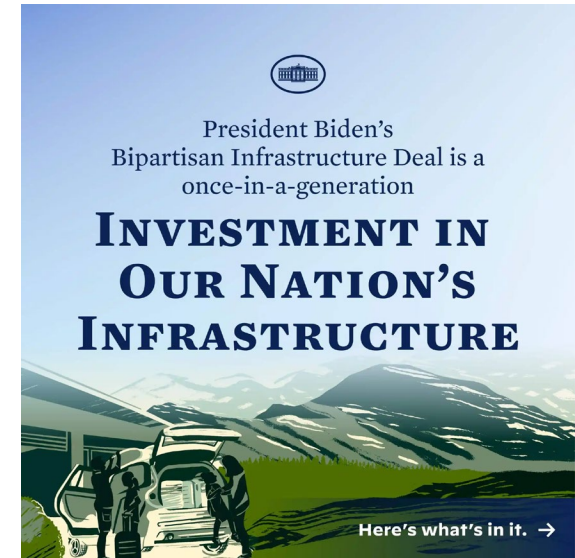
# Interstate Benefits – Roanoke Rapids Case Study

Variable	I-95	US Hwy 301	Interstate Benefit
Travel Time	36 min	50 min	28%
Distance	31 miles	33 miles	5%
Average Travel Speed	52 mph	39 mph	32%
Number of Intersections	31	85	64%
Stop signs and stop lights	3	9	67%
Towns/Cities	3	4	25%
School Zones	1	2	50%
Fatal Crash Risk (per 100 million miles)	1.94 crashes	4.06 crashes	52%
Travel Cost (One-Way)	\$49	\$65	25%
Pavement Cost	\$11	\$14	21%
Fuel Consumption	5.9 gal	7.2 gal	17%
Carbon Dioxide Emissions	133 lbs	161 lbs	17%



# Conclusions

- Weight parity on interstate highways would improve safety and efficiency
  - 40% reduction in intersections
  - Avoid school zones & bypass downtowns
  - 9 minutes of travel savings per trip
  - \$935,000 estimated annual travel cost savings
- Grandfather clauses – a huge deal
  - Future I-74 may affect 20% of deliveries to some mills



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# Bonus: Log Truck Crashes Before and After Weight Limit Increase in NC and VA



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# Log Truck Gross Vehicle Weight (GVW) Limit Increases

- North Carolina (2012): 84,000 to 90,000 lbs
- Virginia (2015): 84,000 to 90,000 lbs
- Louisiana (2020): 88,000 to 92,000 lbs
- Safety implications?



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# Study Objectives

1. Evaluate log truck crash characteristics
2. Compare log truck crash rates before and after changes in GVW limits
3. Identify variables that influenced log truck crash rates



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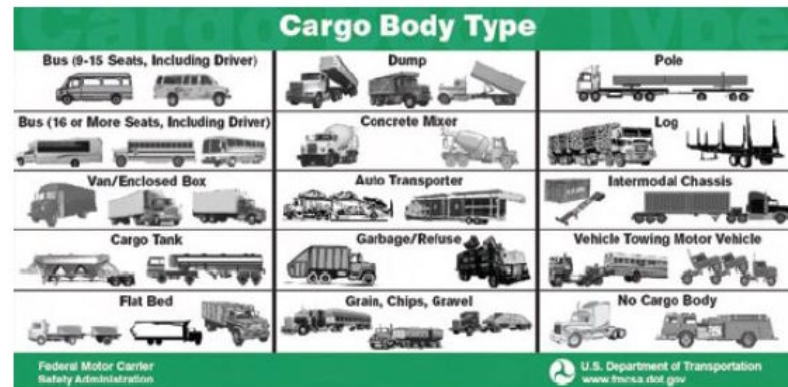
# Methods

- Law enforcement officers collect crash data when:
  - Fatality
  - Injury
  - Property damage
    - NC = \$1,000
    - VA = \$1,500
- Crash reports analyzed:
  - “Log” cargo body type
  - Years 2009–2019
  - North Carolina and Virginia



## Legend

- North Carolina
- Virginia
- States
- Neighboring Countries



# Data from Crash Reports

- Number of log truck crashes
- Crashes per million tons of timber harvested (FIA data)
- Driver characteristics and errors
- Crash locations and contributing factors
- Log truck age and condition

DMV-346 (Rev. 1/2009) THIS REPORT IS FOR THE USE OF THE DIVISION OF MOTOR VEHICLES. THE DATA IS COLLECTED FOR STATISTICAL ANALYSIS AND SUBSEQUENT HIGHWAY SAFETY PROGRAMMING. DETERMINATIONS OF "FAULT" ARE THE RESPONSIBILITY OF INSURERS OR OF THE STATE'S COURTS.

Do not write in these spaces

No. of Units Involved \_\_\_\_\_ Form \_\_\_\_\_ of \_\_\_\_\_ Supplemental Report \_\_\_\_\_ Non-Reportable \_\_\_\_\_

Crash Date \_\_\_\_\_ County \_\_\_\_\_ Time \_\_\_\_\_ Local Use/Patrol Area \_\_\_\_\_ Date Received by DMV \_\_\_\_\_

mm/dd/yyyy (24 Hour Clock)

33 Relation to Roadway Surface \_\_\_\_\_ Crash \_\_\_\_\_ occurred \_\_\_\_\_ in \_\_\_\_\_ Municipality \_\_\_\_\_ or \_\_\_\_\_ outside municipality \_\_\_\_\_

on \_\_\_\_\_ Highway Number, or Highway, Street, (If ramp or service road, indicate on line) \_\_\_\_\_ Ramp or Service Road \_\_\_\_\_ (R.R. Crossing # \_\_\_\_\_) \_\_\_\_\_ Miles \_\_\_\_\_ (If I-Intersection) \_\_\_\_\_ (If available) \_\_\_\_\_

at or from \_\_\_\_\_ Use Highway Number, Street Name or Adjacent County or State Line \_\_\_\_\_ N S E W toward \_\_\_\_\_ Use Highway Number, Street Name or Adjacent County or State Line \_\_\_\_\_ Longitude \_\_\_\_\_ Latitude \_\_\_\_\_ Altitude \_\_\_\_\_

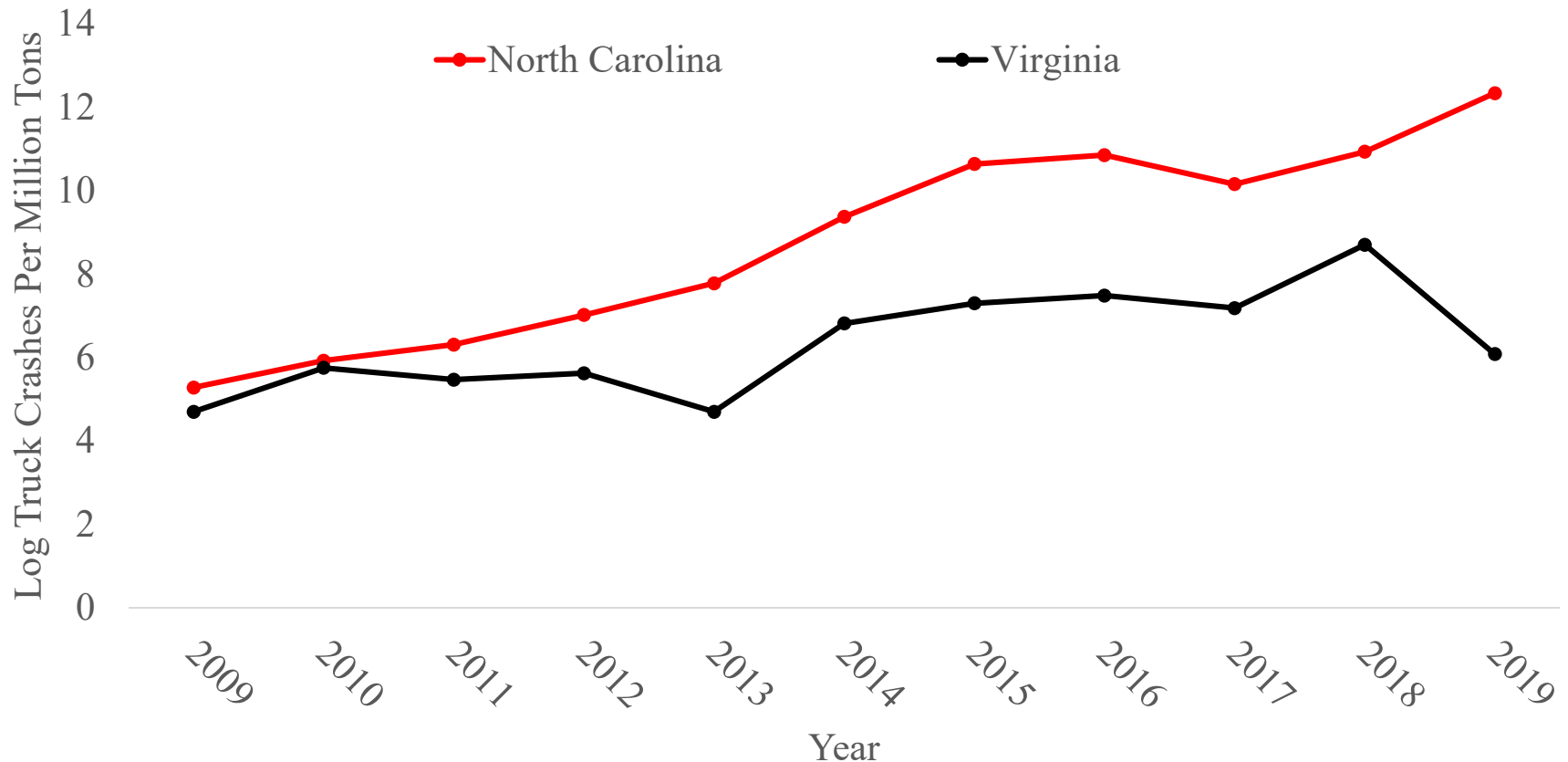
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Driver _____	First _____	Middle _____	Last _____	Suffix _____	Driver _____	First _____	Middle _____	Last _____	Suffix _____
Address _____					Address _____				
City _____	State _____	Zip _____			City _____	State _____	Zip _____		
Same Address on Driver's License? <input type="checkbox"/> Yes <input type="checkbox"/> No	Driver's Phone Numbers H ( _____ ) W ( _____ )				Same Address on Driver's License? <input type="checkbox"/> Yes <input type="checkbox"/> No	Driver's Phone Numbers H ( _____ ) W ( _____ )			
D.L. # _____	CDL License <input type="checkbox"/>	34 Vision Obstruction _____	35 Physical Condition _____	36 D.L. Restrictions _____	D.L. # _____	CDL License <input type="checkbox"/>	34 Vision Obstruction _____	35 Physical Condition _____	36 D.L. Restrictions _____
mm/dd/yyyy					mm/dd/yyyy				
37 Alcohol/Drugs Suspected _____	38 Alcohol/Drugs Test _____	39 Results (If known) _____	40 Vehicle Seizure (DWR) <input type="checkbox"/>		37 Alcohol/Drugs Suspected _____	38 Alcohol/Drugs Test _____	39 Results (If known) _____	40 Vehicle Seizure (DWR) <input type="checkbox"/>	
Owner _____	Same as Driver? <input type="checkbox"/>				Owner _____	Same as Driver? <input type="checkbox"/>			
Address _____	Same Address as Driver? <input type="checkbox"/>				Address _____	Same Address as Driver? <input type="checkbox"/>			
City _____	State _____	Zip _____			City _____	State _____	Zip _____		
Plate # _____	Plate State _____	Plate Year _____			Plate # _____	Plate State _____	Plate Year _____		
VIN _____					VIN _____				
Vehicle Make _____	Vehicle Year _____	41 Vehicle Style (Type) _____	42 Vehicle Drivable <input type="checkbox"/> Yes <input type="checkbox"/> No		Vehicle Make _____	Vehicle Year _____	41 Vehicle Style (Type) _____	42 Vehicle Drivable <input type="checkbox"/> Yes <input type="checkbox"/> No	
43 TAD _____	44 Estimated Damage _____				43 TAD _____	44 Estimated Damage _____			
Insurance Company _____	Policy # _____				Insurance Company _____	Policy # _____			
45 COMMERCIAL VEHICLE: Cargo, Carrier Name, Address, Source					Carrier Identification Numbers, GVWR, Axles				
Unit _____	45 cargo body type _____	Same Address as Owner? <input type="checkbox"/>			Source: <input type="checkbox"/> Truck	US DOT# _____	ICC# _____	Axles on Vehicle including Trailers _____	
					<input type="checkbox"/> Shipping papers	State _____	State # _____	IFTA# _____	
					<input type="checkbox"/> Driver	FE# _____	FE# _____	Gross Vehicle Weight Rating _____	



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# Results

- Crash rates increased by 134% (NC) and 29% (VA) 2009–2019

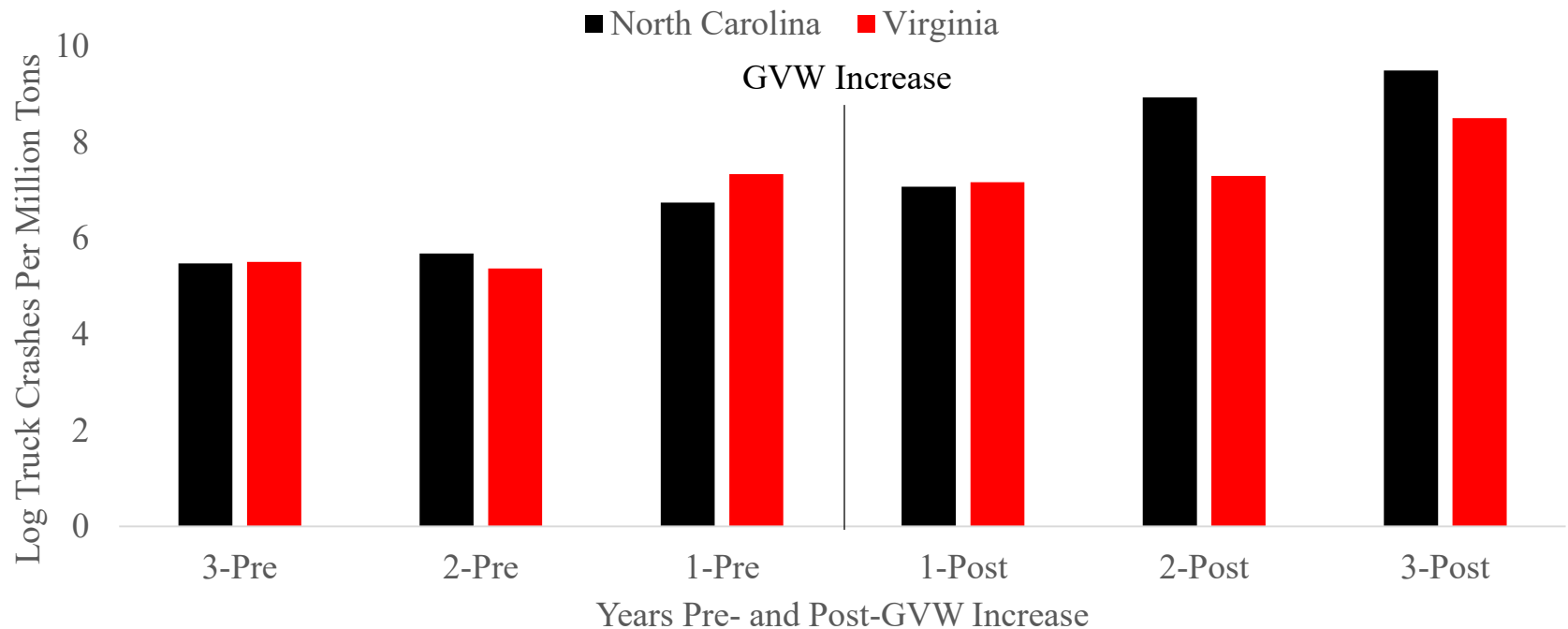


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# Crashes per Million Tons: 3 Years Before and After

- NC: 6.0 before, 8.5 after ( $p = 0.05$ )
- VA: 6.1 before, 7.7 after ( $p = 0.12$ )



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# Explaining Increasing Log Truck Crash Rates

- North Carolina
  - Strong relationship between log truck crash rate and miles traveled by all vehicles ( $r = 0.93$ )
- Virginia
  - Moderately strong relationship between all vehicle crashes and log truck crash rate ( $r = 0.77$ )
- Bottom line
  - $\uparrow$  Population +  $\uparrow$  traffic +  $\uparrow$  distracted driving =  $\uparrow$  log truck crashes



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# Drivers

- >95% men (both states)
- Average age 47 years (NC)
- Rarely under the influence of drugs or alcohol
  - <2% of crashes, both states
- >40% of log truck drivers were issued a summons (VA)
- No significant differences after weight limit increases



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# Trucks

- Average age = 14.1 yrs (VA)
- ~10% had mechanical defects (both states)
  - Tires, brakes, “other” most common
- Average cost of damage to log truck:
  - \$6,400 (NC)
  - \$9,600 (VA)
- Log trucks disabled by crashes
  - 34% (NC)
  - 47% (VA)
- No significant differences after weight limit increases

Driver charged in Highway 11 log truck accident



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# Crash Locations (Both States)

- Most crashes occurred:
  - On dry roads (>80%)
  - During daylight hours (>75%)
  - Straight road sections (>60%)
  - Two-way traffic (>95%)
  - No median (>60%)
- <25% of crashes in urban areas
- <10% of crashes on interstate highways
  - NC: 7.9% before GVW increase, 2.5% afterwards ( $p = 0.03$ )
  - VA: 9.3% before, 7.9% afterwards ( $p > 0.25$ )



Photo Credit: WXIA-TV



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# Did GVW Limit Increases Reduce Timber Transportation Safety?

1. Crash rates were rising before the GVW increase and continued to rise afterwards
2. Crash rates increased for other vehicles that were not affected by GVW increase
  - Heavy trucks nationwide
  - All vehicles in NC and VA
3. Crash severity did not change after GVW increase



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# Conclusion: Opportunities for Improvement?

1. Driver education
2. Log truck age and condition
  - Brakes, tires
  - Pre-trip inspections
3. Efficiency and profitability
4. Safer routes



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# Acknowledgements

- Georgia Forestry Foundation Center for Forest Competitiveness
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- Logging businesses, log truck owners, landowners that shared data for the study



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