Federal Highway Freight Data

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U.S.Department of Transportation
Federal Highway Administration

Office of Freight Management and Operations
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Overview

- Freight Data in General
- Freight Analysis Framework
- Freight Performance Measures Program
- SHRP2 C20 Freight Demand Modeling and Data

Why Do You Need Freight Data?

To Highlight Passenger and Freight Differences

Freight requires different data because freight is different. How?

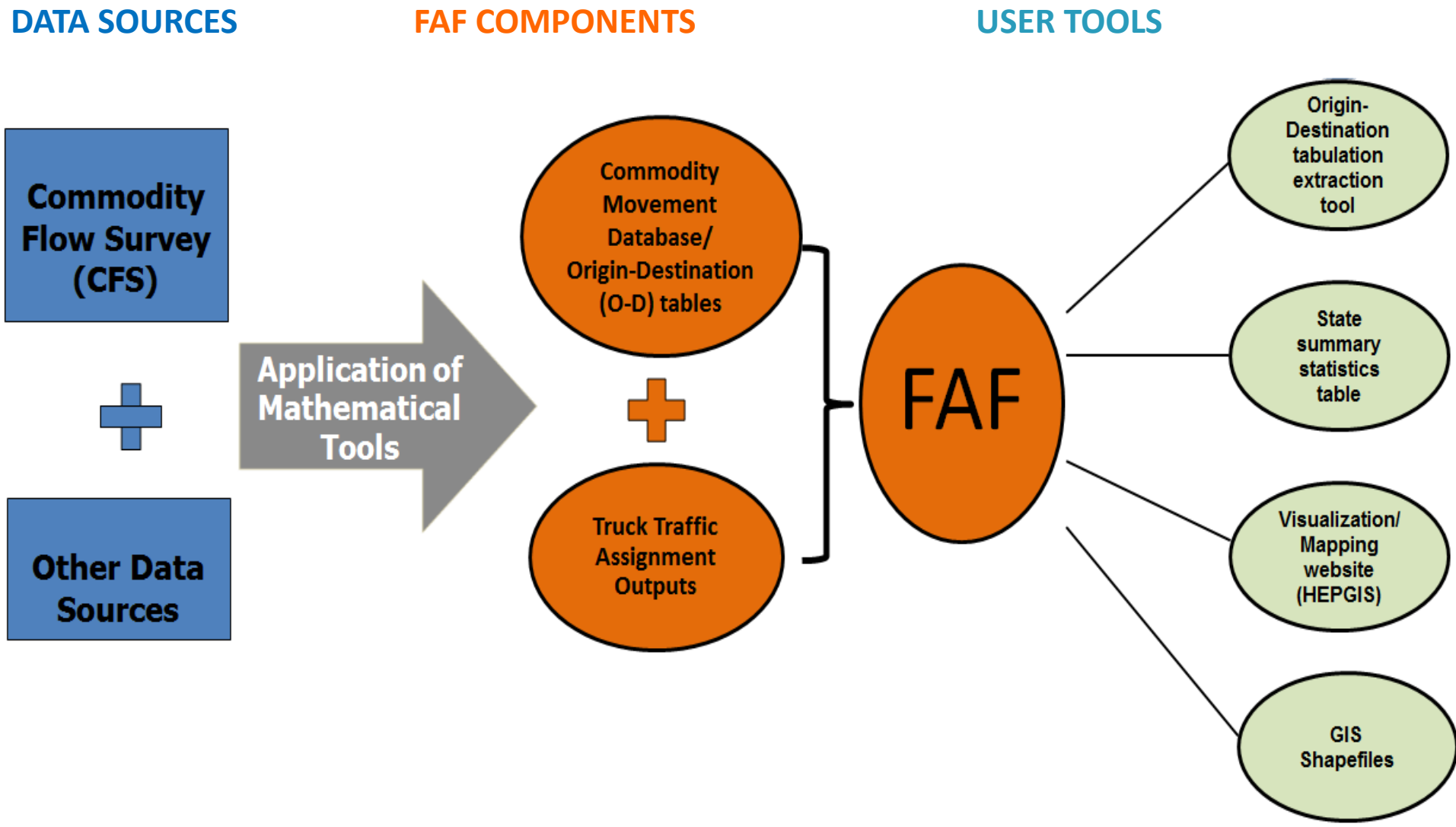
- Decision-makers not necessarily the equipment operator
- Private ownership of essential facilities
- No leisure freight transport
- More longer, slower, and intermodal trips
- Time of day, day of week variances
- Business cycles strongly influence volume
- Greater regulatory restrictions on operations

Primary Data Type	Freight DataType: Specific Categories	Examples
Economic	Economic	• Wages • Payroll • Taxes
	Industry/Relationship	• Relationships between Industries
	Demographic	• Industry density • Geographic coverage • Establishment information
	Land Use	• Zoning • Permitting • Density
	Stakeholder	• Shipments • Fleets • Usage/Operations
Shipment/Flow	Supply Chain	• Establishment specific flow of raw and finished goods
	Commodity Flow	• Commodity Flow • Truck Trips • Tonnage, ton-miles
	Vehicle/Equipment Flow	• Flows with somecommodity detail
Network/System Performance	Network	• Network location • Network condition
	Network Usage by Vehicles/Equipment	• Vehicle or equipment network usage , volumes, counts
	Performance Characteristics	• Travel times • Congestion • Throughput • Safety inspections/Enforcement data
Vehicle/Equipment	Inventory	• Age, composition, condition
	Registration	• Ownership • Age of vehicle • State of registration
	Utilization	• Permitting • Shipment load characteristics

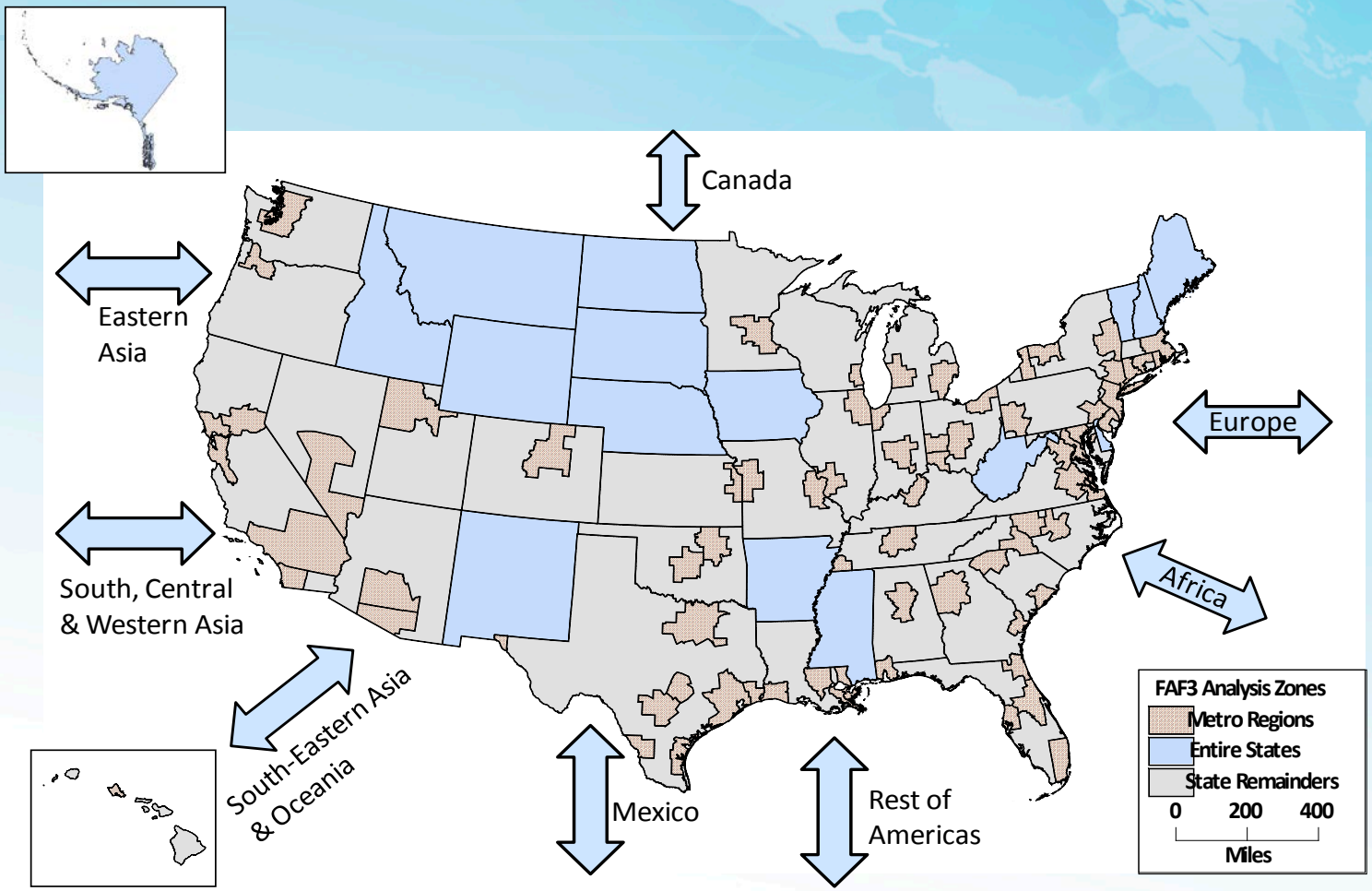
FAF - The Big Picture

- Freight Analysis Framework (FAF) integrates data from several sources to create:
  - A database of regional freight flows by tons and value for all modes, with 30-year forecasts, and annual provisional updates
  - An assignment of the average number of freight-hauling trucks to individual highway segments on the national network

Current FAF Structure & User Tools



FAF Regions


Canada
Eastern Asia
Europe
South, Central & Western Asia
Africa
South-Eastern Asia & Oceania
Mexico
Rest of Americas
FAF3 Analysis Zones
Metro Regions
Entire States
State Remainders
0 200 400
Miles

What FAF Does and Does Not Do

FAF does:

- Estimate current and future volumes of freight
- Assigns longer distance truck flows (typically greater than 50 miles) to corridors
- Forecast effects of future freight flows on the highway network

FAF does not:

- Estimate flows accurately for local regions/individual routes
- Estimate temporal variations in freight flows
- Include effects of capacity limitation or forecast future capacity expansion
- Adjust for changes in costs of transportation

How FAF can support freight planning:

- What commodities are moving into, out of, and through my State or region? What modes are being used? How do these flows compare to other States/regions?
- What are the transportation impacts of these flows (e.g., what roads see the heaviest flows)?
- How have these flows changed over time (historic analysis)?

Updates on FHWA FAF Activities

- **FAF3.5 update with 2013 provisional data** (early 2015)
  - 2012 provisional data on FAF website - www.ops.fhwa.dot.gov/freight/freight_analysis/faf/

- **FAF4 Development-** Partnership between FHWA (forecasting and network flow modeling) and BTS (base O/D table)

- **FAF3 related data quality issues and out of scope improvements**– documenting quality issues and identify feasible resolutions and improve the estimation of CFS-based flows for FAF4.

- **FAF4 highway network -** being transparent, transferable and reproducible, without any proprietary or non-disclosure issues.

FAF Information

- **Frequently Asked Questions** – coming soon to FAF website - www.ops.fhwa.dot.gov/freight/freight_analysis/faf/
- **FAF data update on HEPGIS (**FHWA Office of Planning, Environment and & Realty's Geographic Information Systems website **– uses FAF data to generate maps)**
- **FAF Quarterly Webinars series**
  - Local FAF applications
  - Leveraging other data sources with the FAF

More information:

FAF website: www.ops.fhwa.dot.gov/freight/freight_analysis/faf/

FAF email address: FAF@dot.gov

FHWA's Freight Measurement Programs

- FPM Access to Truck Probe Data for the following:
  - Support the Freight Performance Measurement (FPM) Program
    - Support FHWA and USDOT freight performance monitoring and analysis of freight significant corridors and locations
    - Provide analysis of origins and destinations, incidents, weather impacts, congestion
  - Support supply chain/key freight corridor analyses for North America
- NPMRDS Travel Time Data: Actual observed travel times from passenger and freight probes

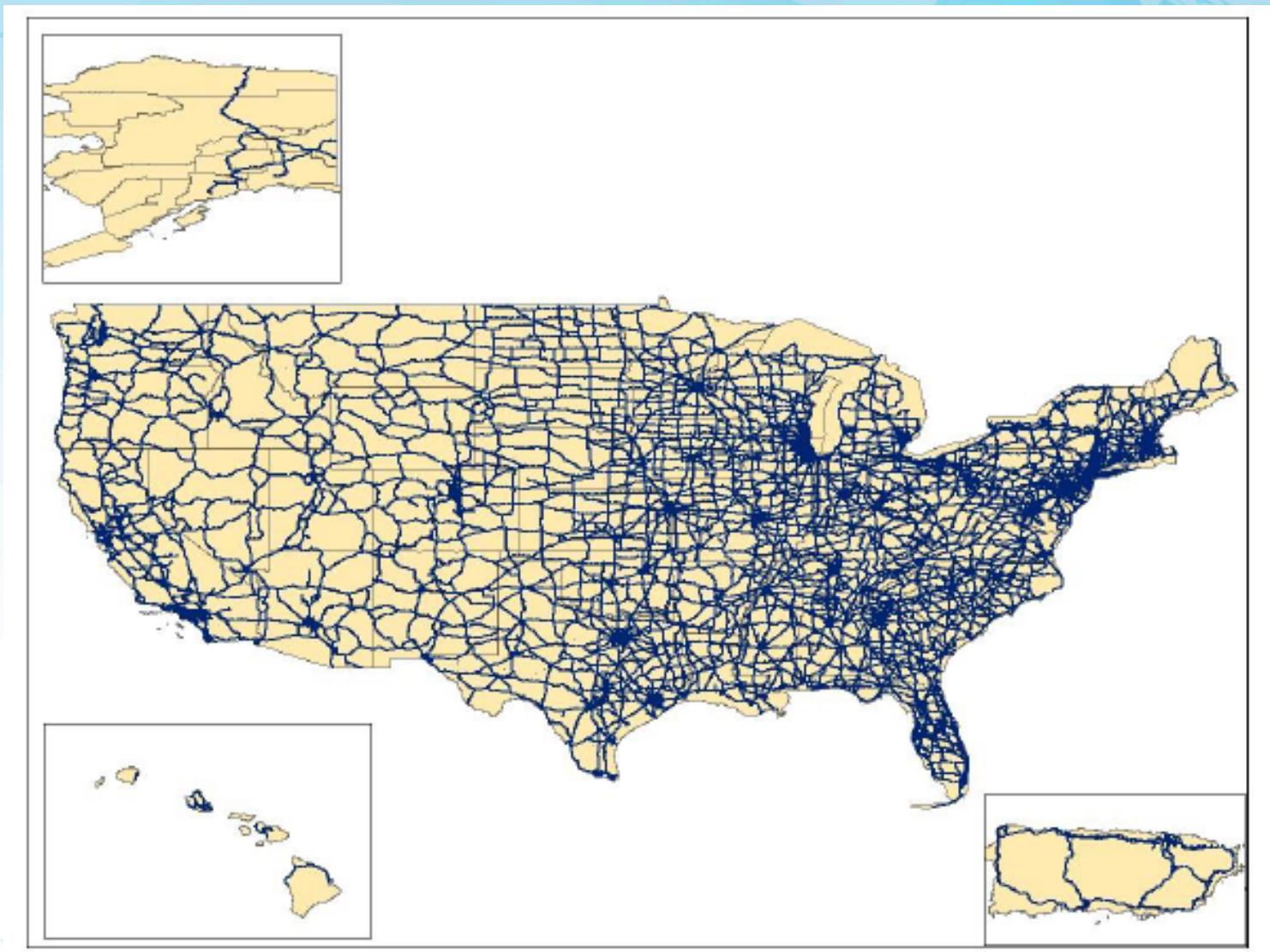
FPM Data

- Access for FHWA and internal and external partners to support FPM
- Data collected by the second from approximately 600,000 trucks with embedded technology
- Nationwide coverage
- Multiple industry data sources
- Continuous data since 2002
- Billions of unique truck positions received & processed annually

NPMRDS

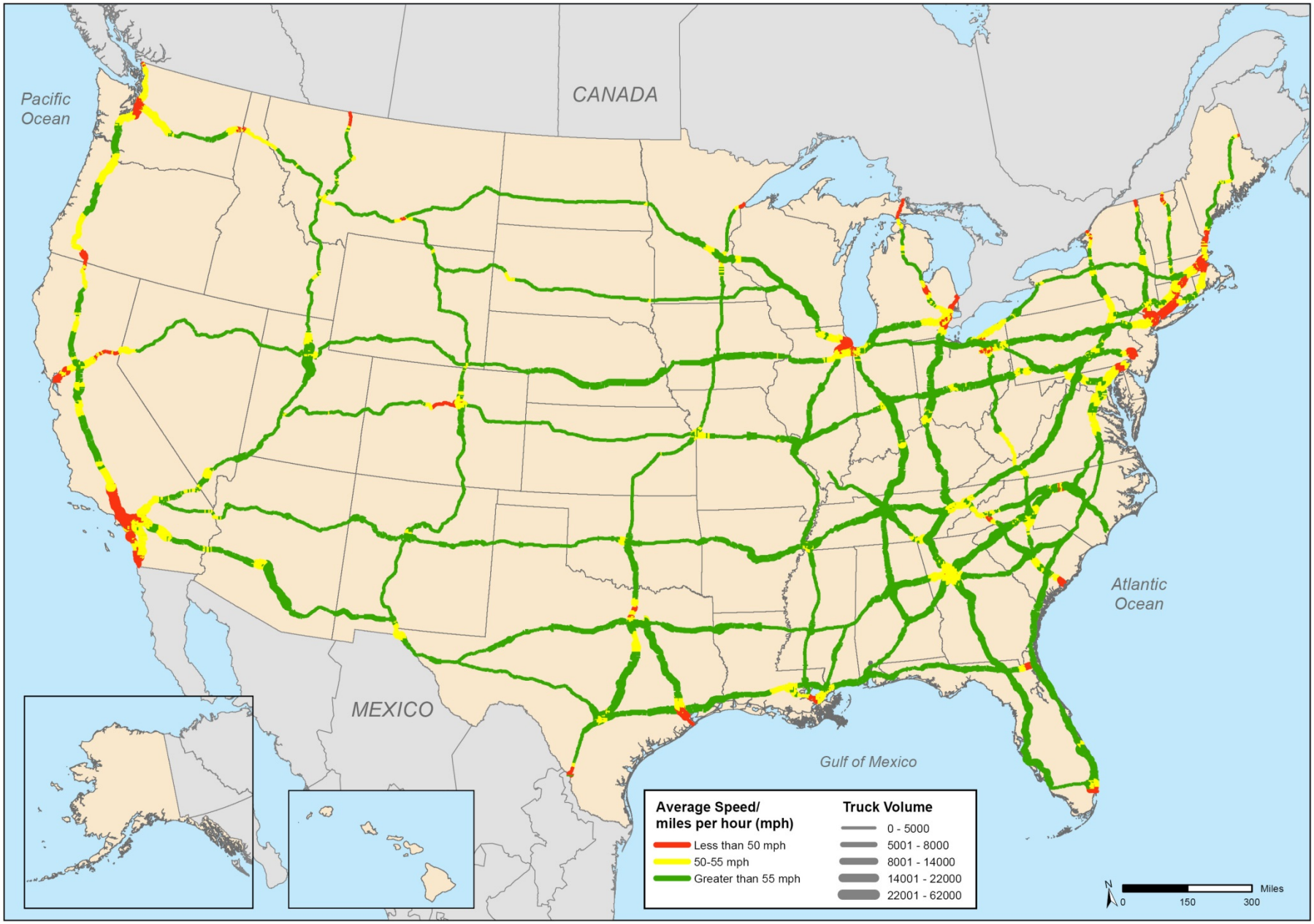
- Available primarily to FHWA, federal partners, States and MPOs
- Archived travel time database provided monthly
- The data set includes three distinct average travel times for each 5-minute “bin”
  - Freight
  - Passenger
  - All Traffic
- HERE Data Sources
  - Passenger probe data is obtained from a number of sources including mobile phones, vehicles, and portable navigation devices
  - Freight probe data is obtained from the American Transportation Research Institute leveraging embedded fleet systems
- **TECHNICAL ASSISTANCE IS AVAILABLE FOR USERS – E-MAIL:**
  - **NPMRDSHELP@dot.gov**

NPMRDS Coverage



FPM Analysis Examples

Intensity of Truck Freight Congestion on Selected Interstate Highways: 2012



Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Performance Measurement Program, 2013.

INTERSTATE 24 - NASHVILLE

EASTBOUND

Mile	12AM	1	2	3	4	5	6	7	8	9	10	11	12P	1	2	3	4	5	6	7	8	9	10	11
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41	63	63	64	64	64	64	63	62	60	59	60	64	64	64	64	64	64	64	64	63	62	64	64	63
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60	61	63	64	64	64	65	64	63	63	63	64	63	64	64	63	59	59	55	59	63	62	60	60	62

Time of Day

WESTBOUND

Mile	12AM	1	2	3	4	5	6	7	8	9	10	11	12P	1	2	3	4	5	6	7	8	9	10	11
40	65	66	65	65	65	65	66	65	65	65	65	63	64	63	64	65	63	61	64	63	64	64	61	61
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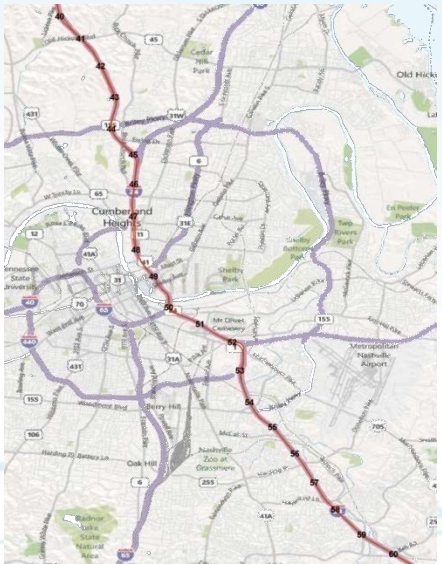
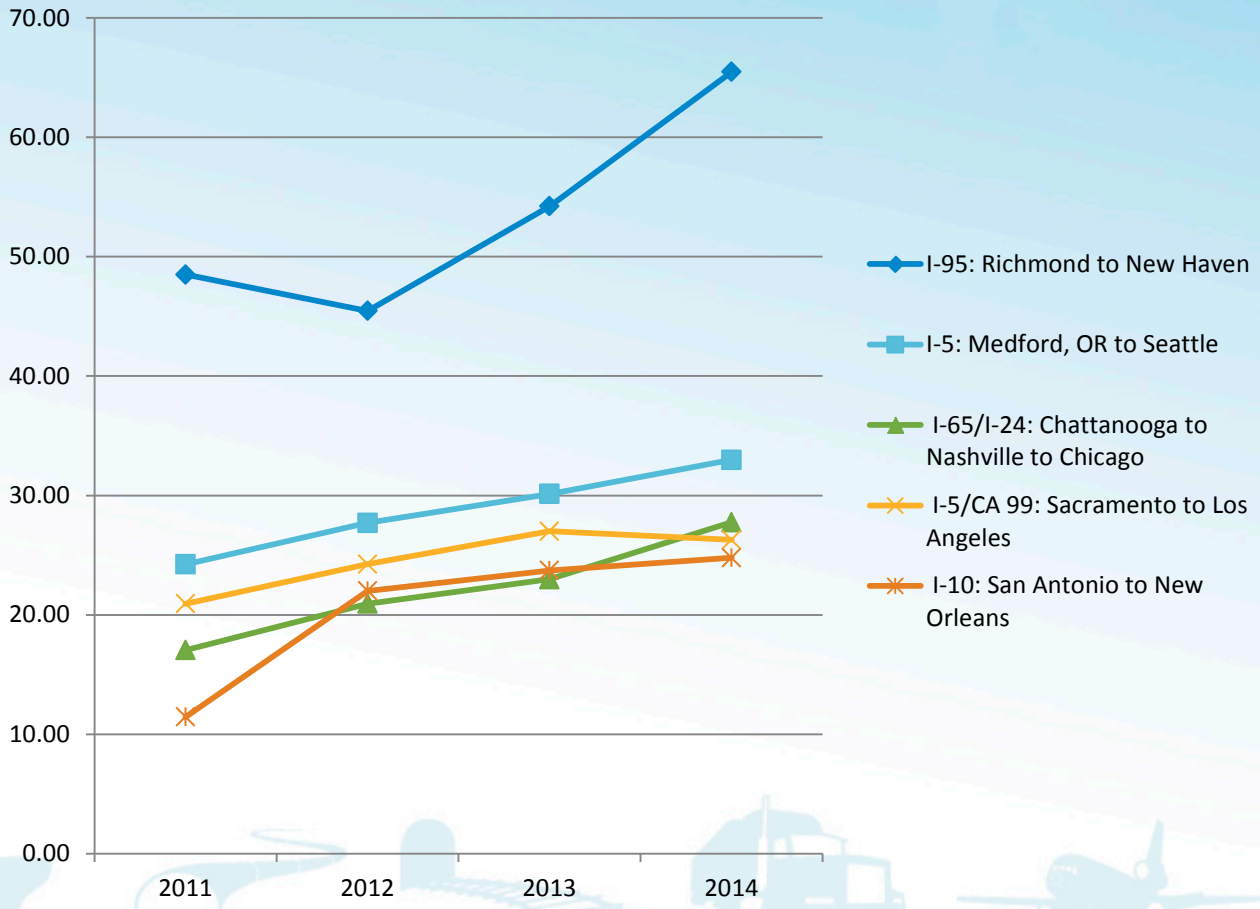
Time of Day



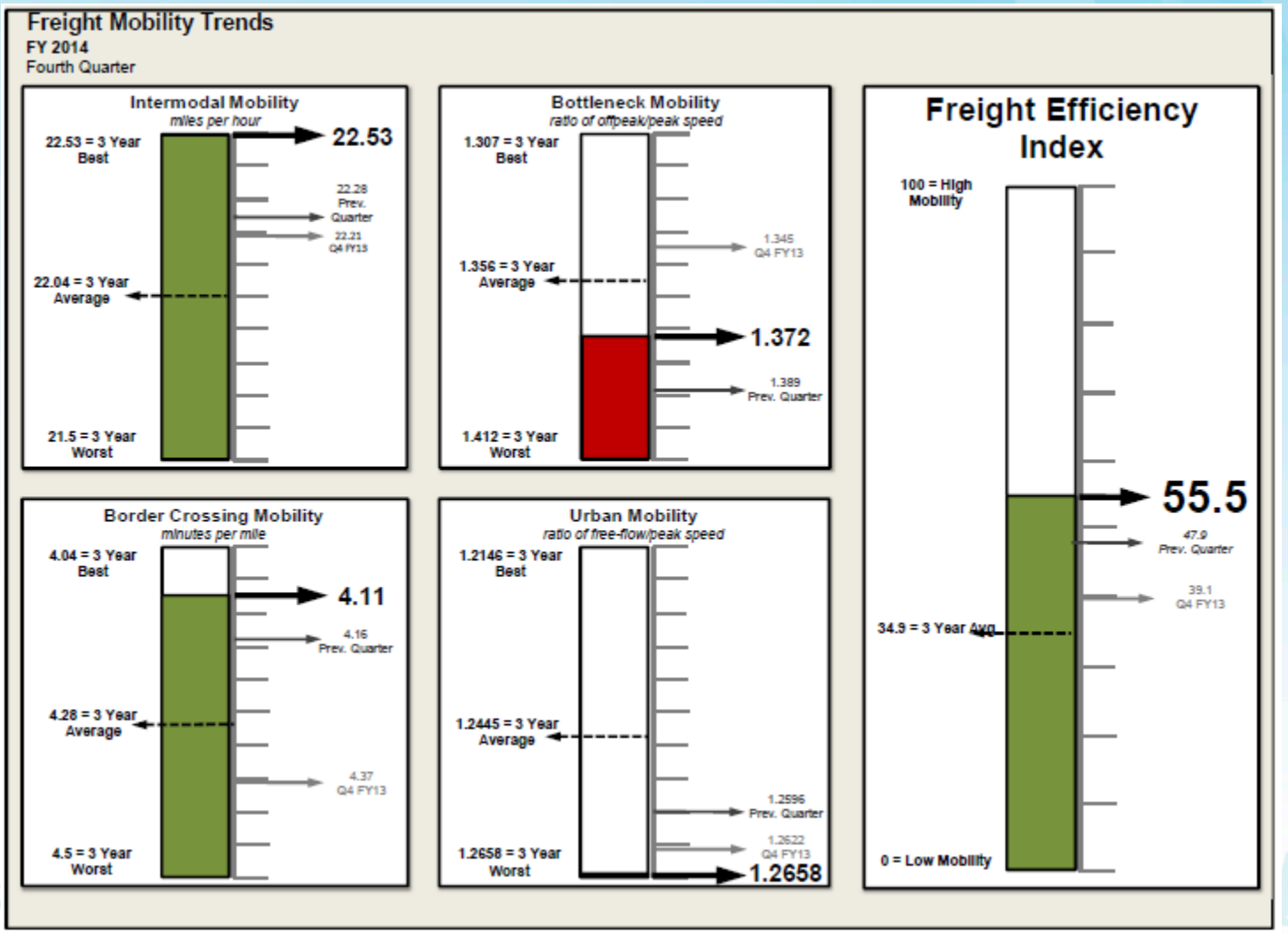
U.S. Department of Transportation
Federal Highway Administration

Congestion Trends on the Most-Congested Domestic Freight Corridors in the U.S., 2011-2014

Buffer Index (The *buffer index* represents the extra time (or time cushion) that travelers must add to their average travel time when planning trips to ensure on-time arrival.)



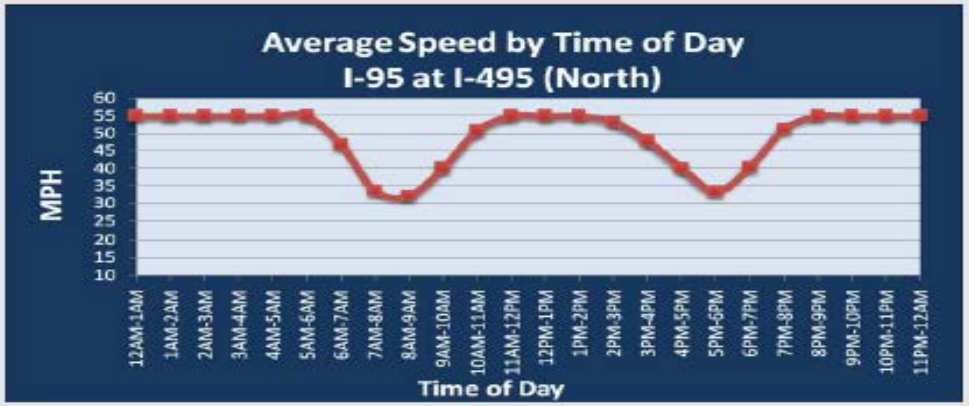
Freight Movement Efficiency Index



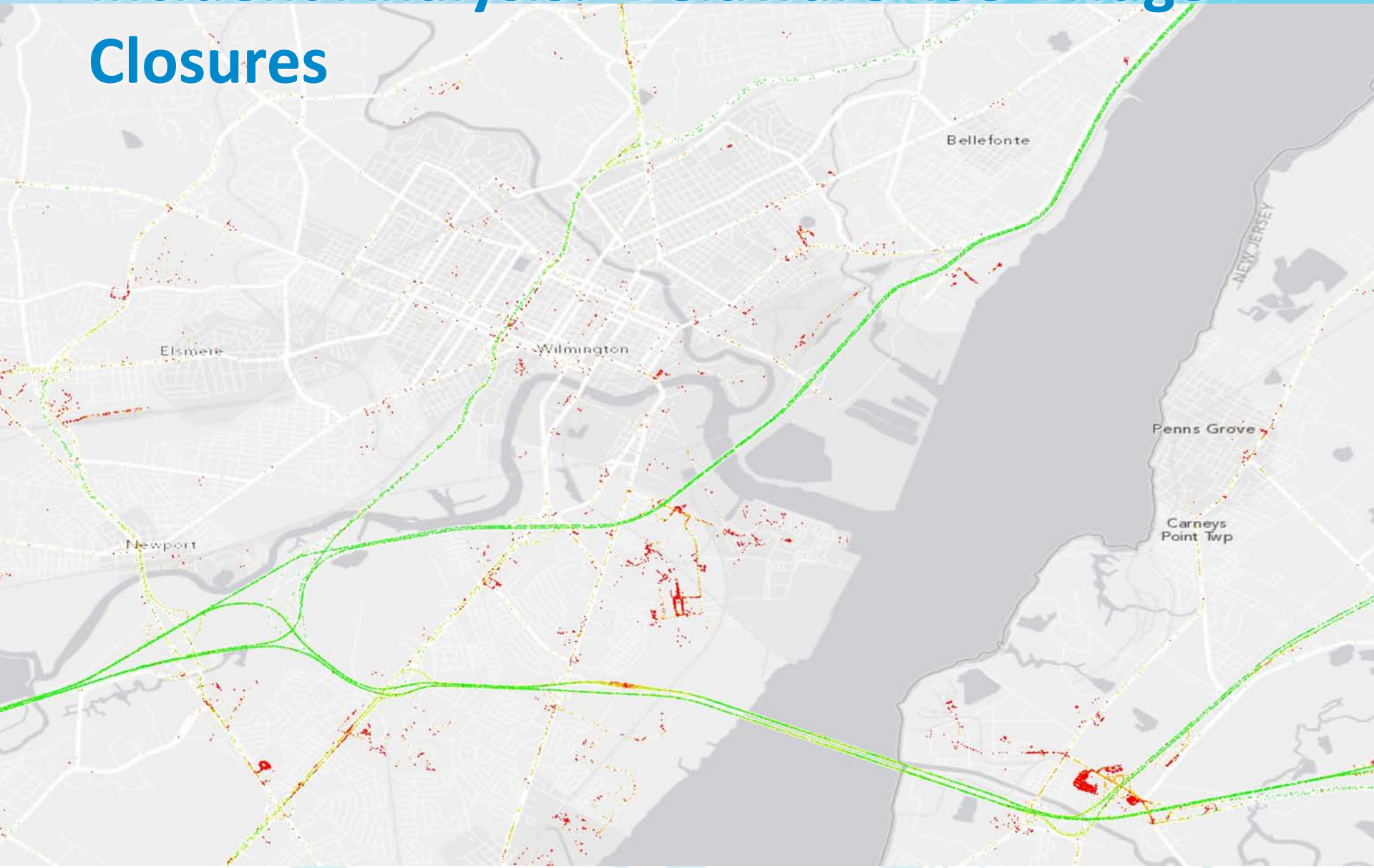
Example: Location of Significant Freight Activity

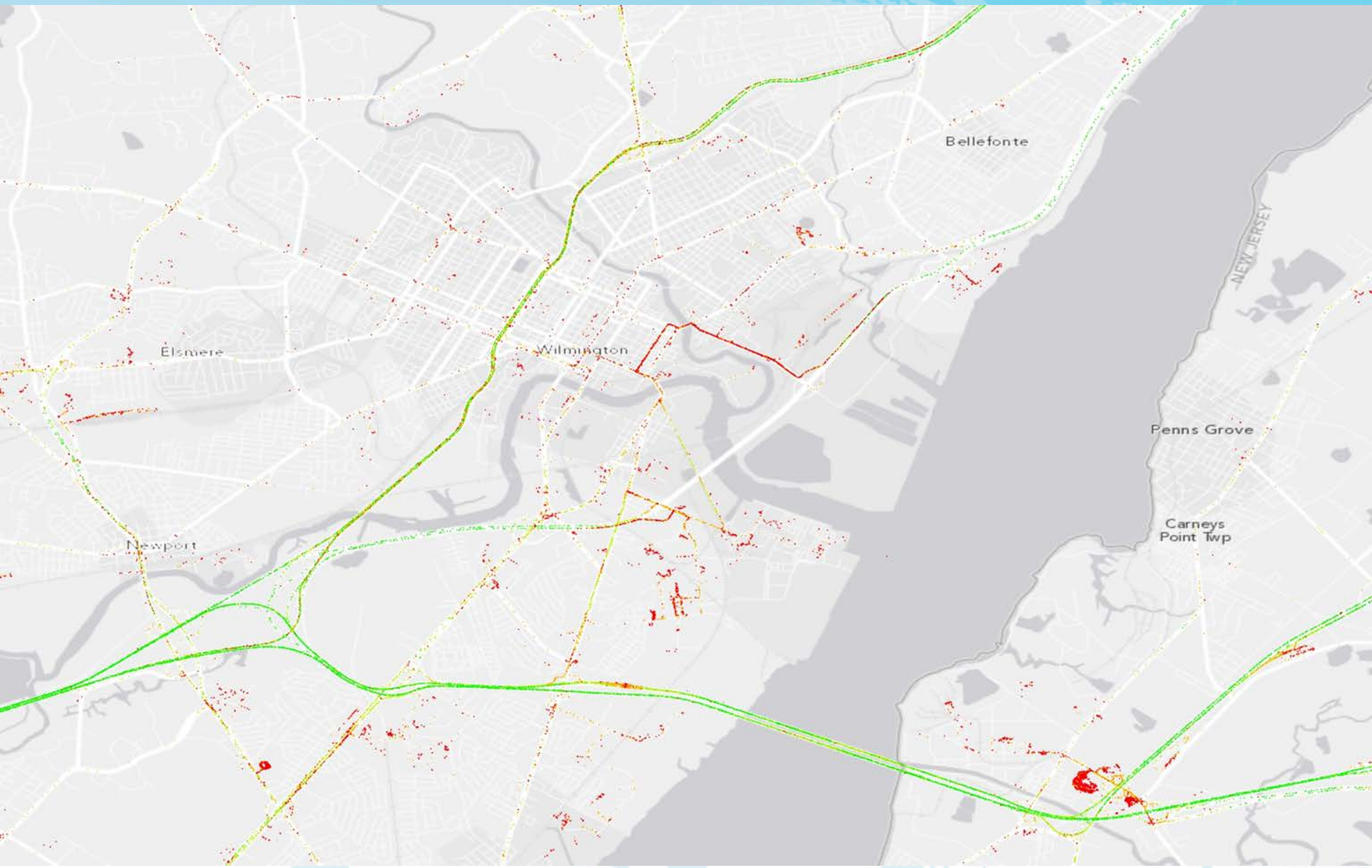
Washington, DC: I-95 at I-495 (North)

Summary	
National Ranking by Congestion Index	51
Average Speed	48
Peak Average Speed	38
Nonpeak Average Speed	53
Nonpeak/Peak Ratio	1.41

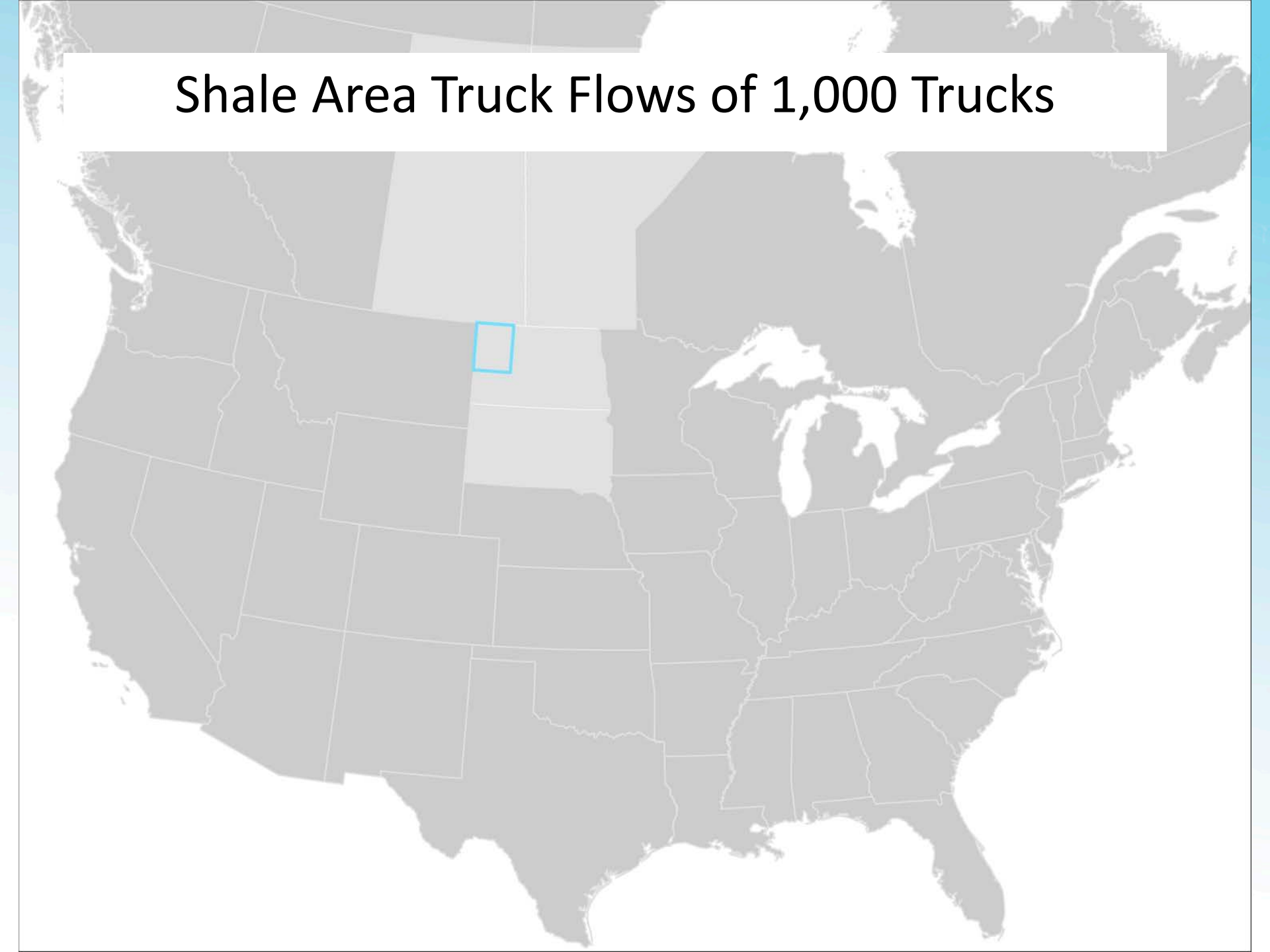


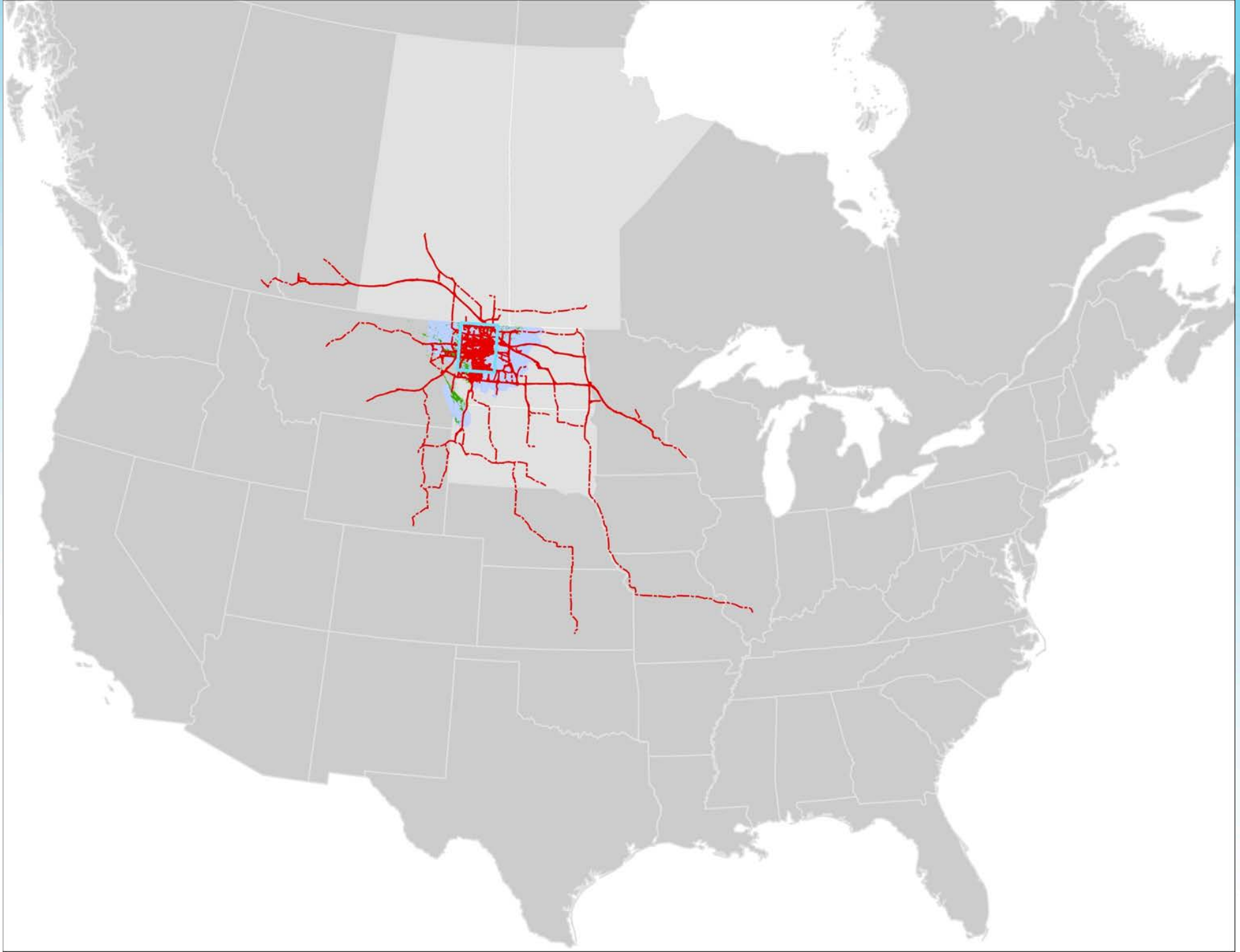
Incident Analysis: Delaware 495 Bridge Closures

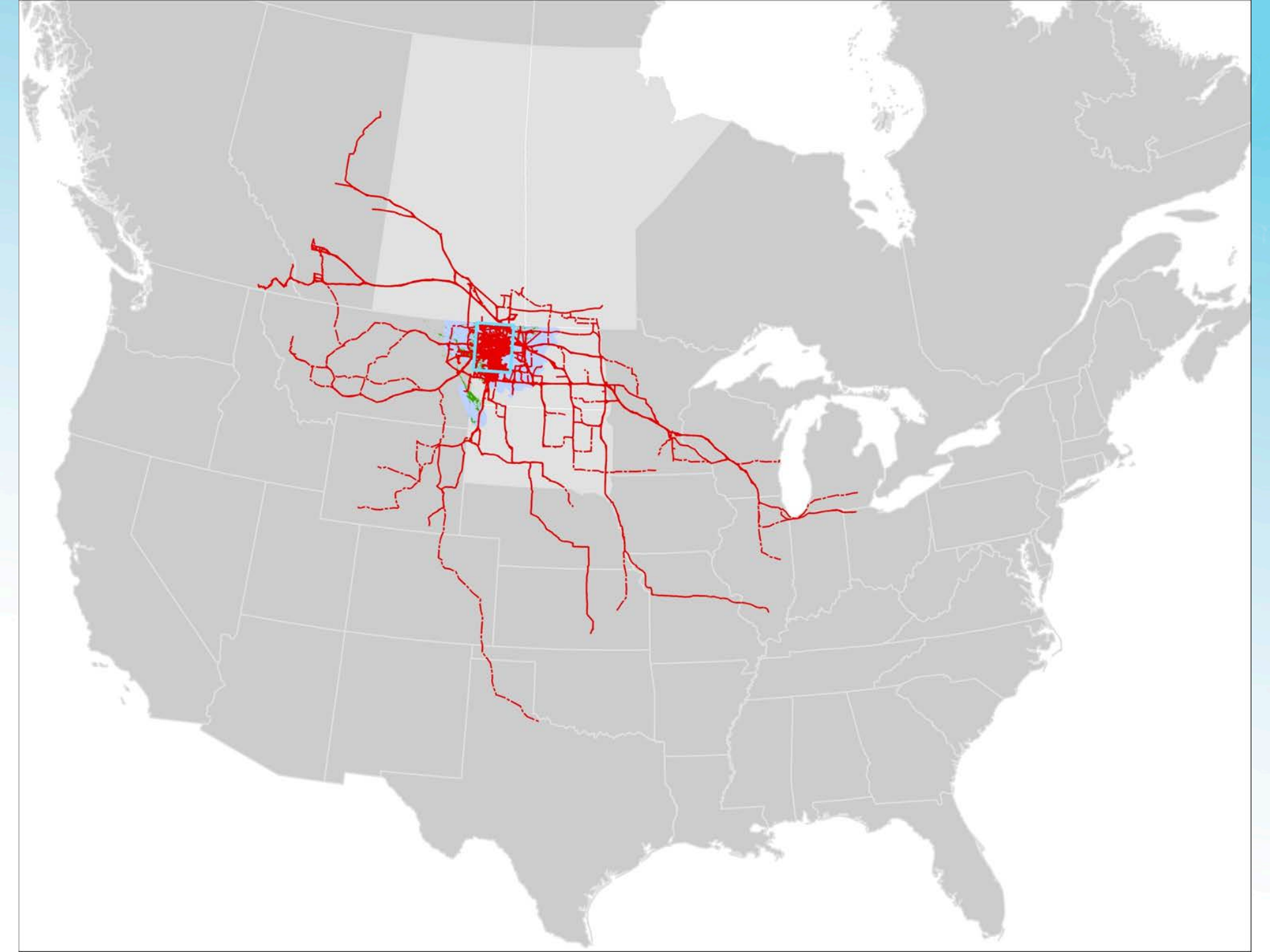


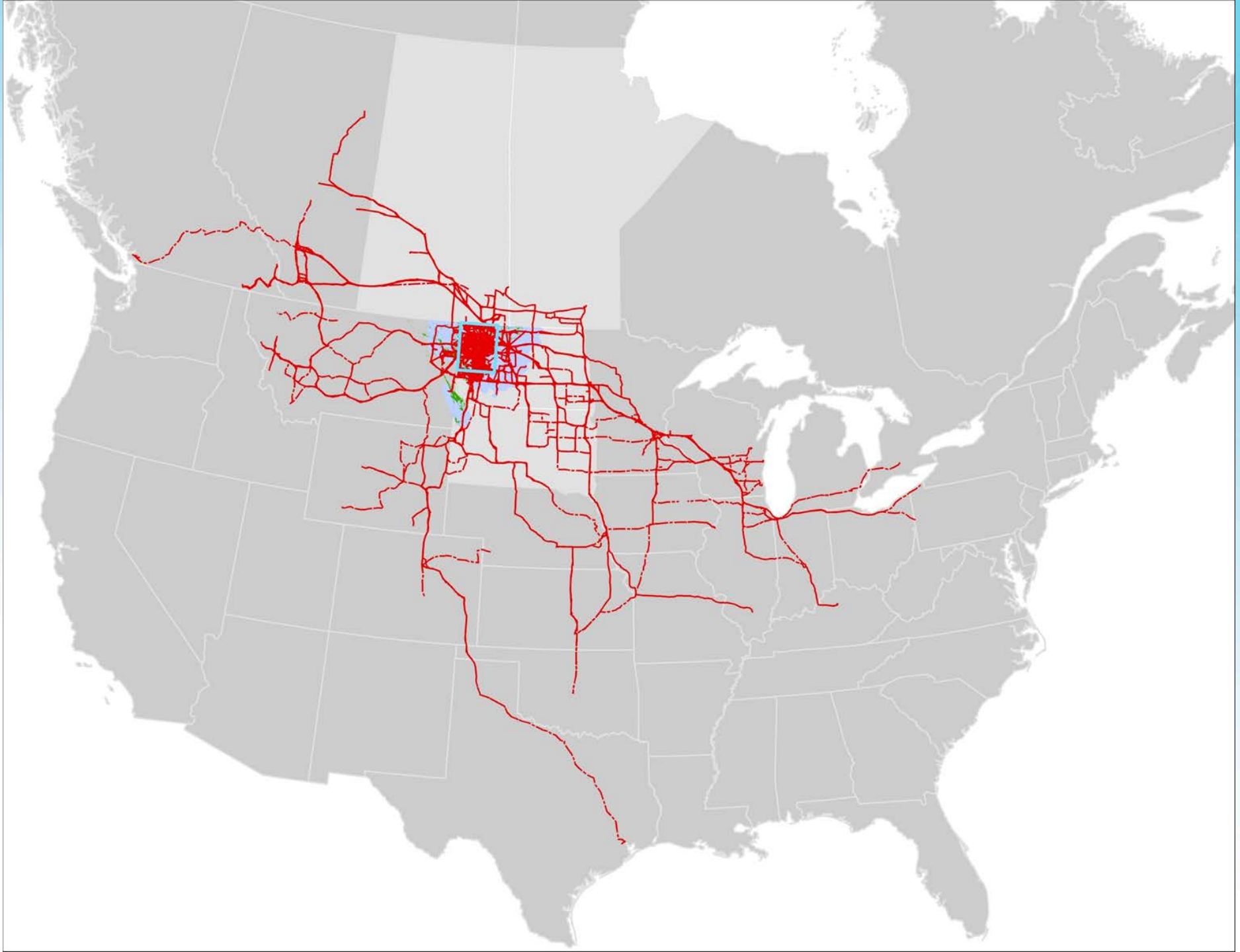

Bellefonte
Elsmere
Wilmington
Penns Grove
Carneys
Point Twp
Newport

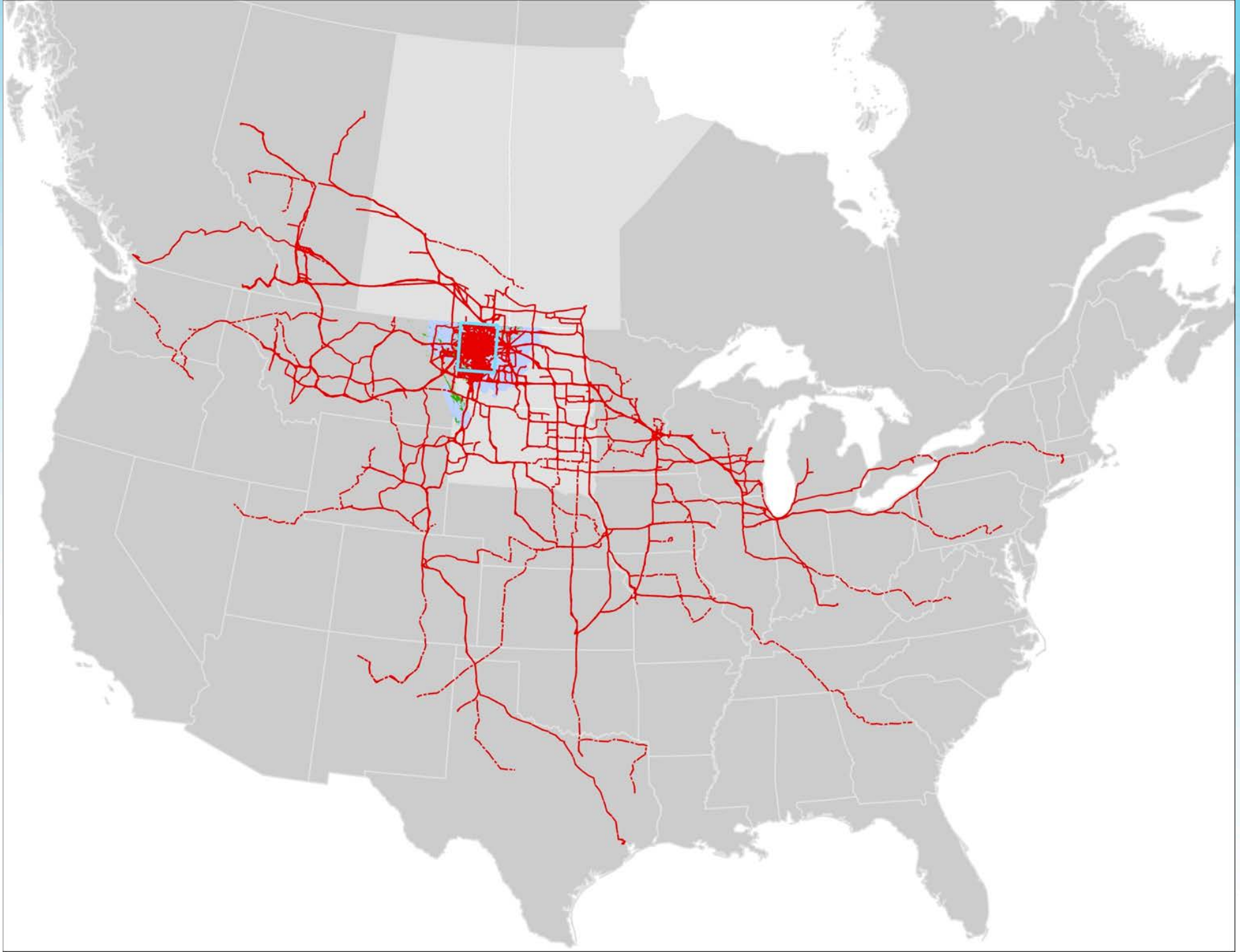
Shale Area Truck Flows of 1,000 Trucks

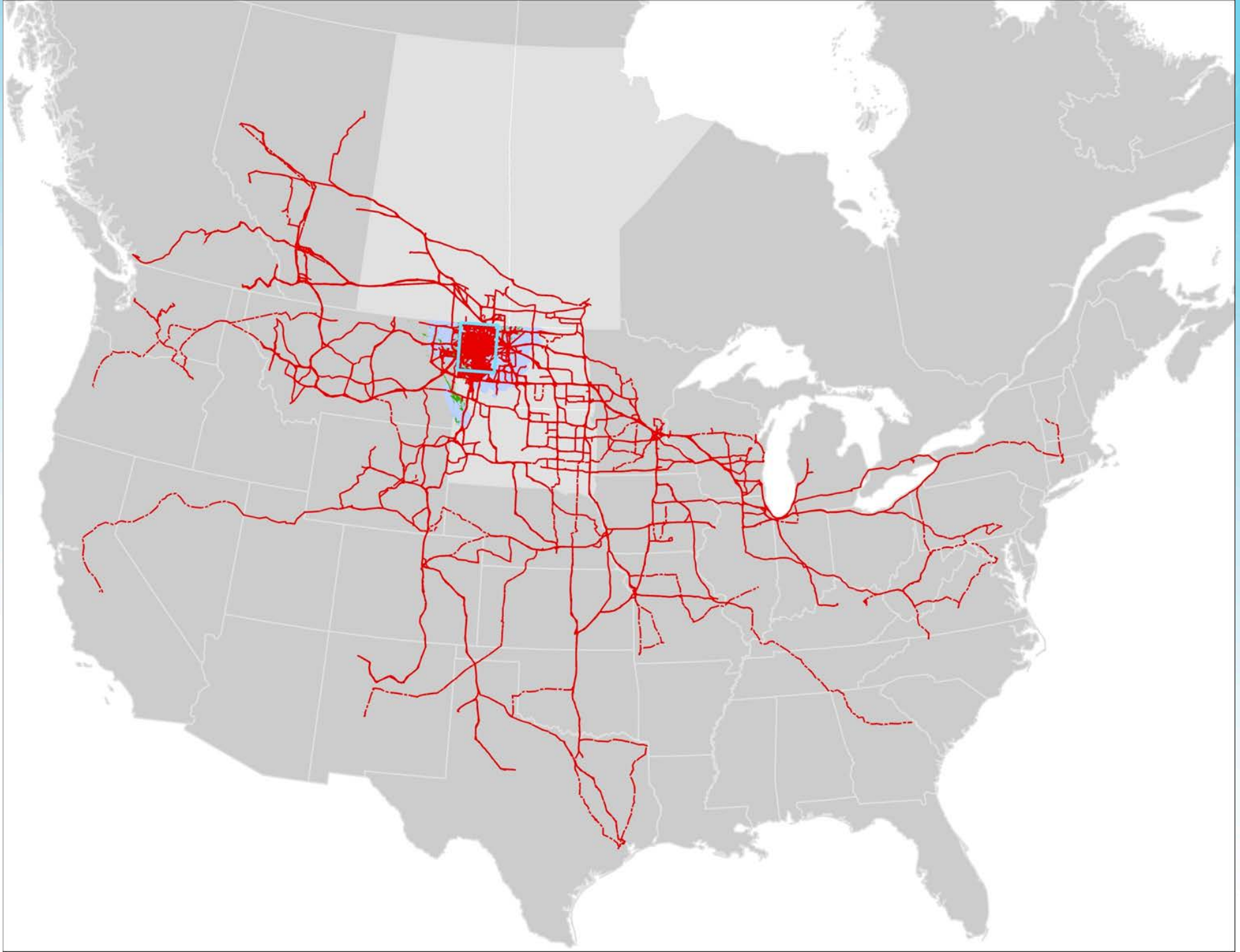






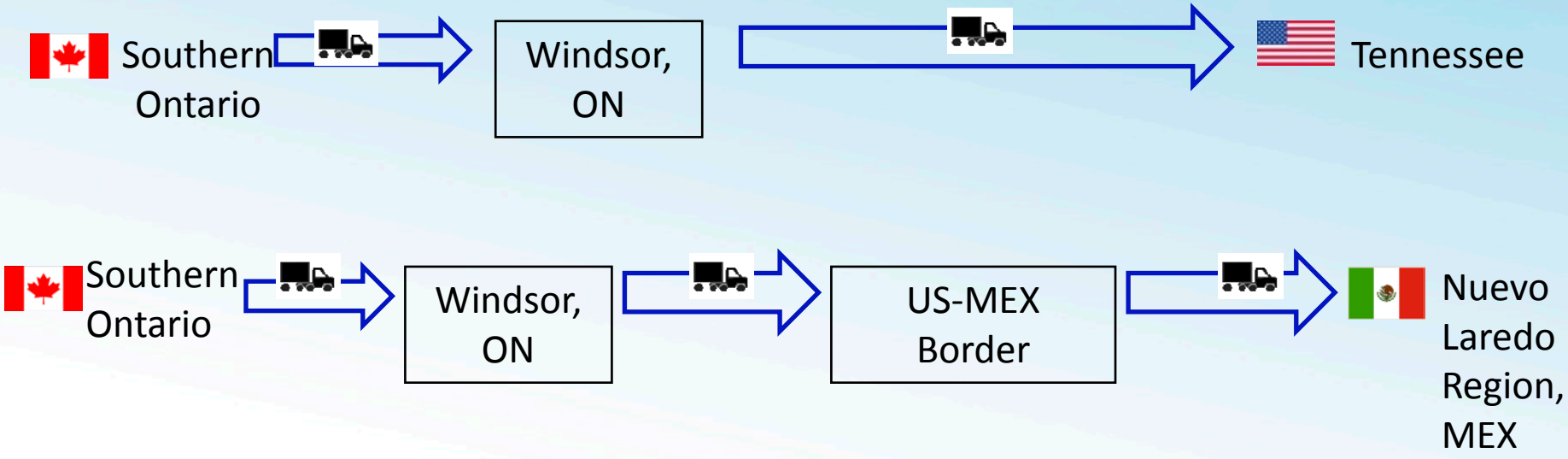






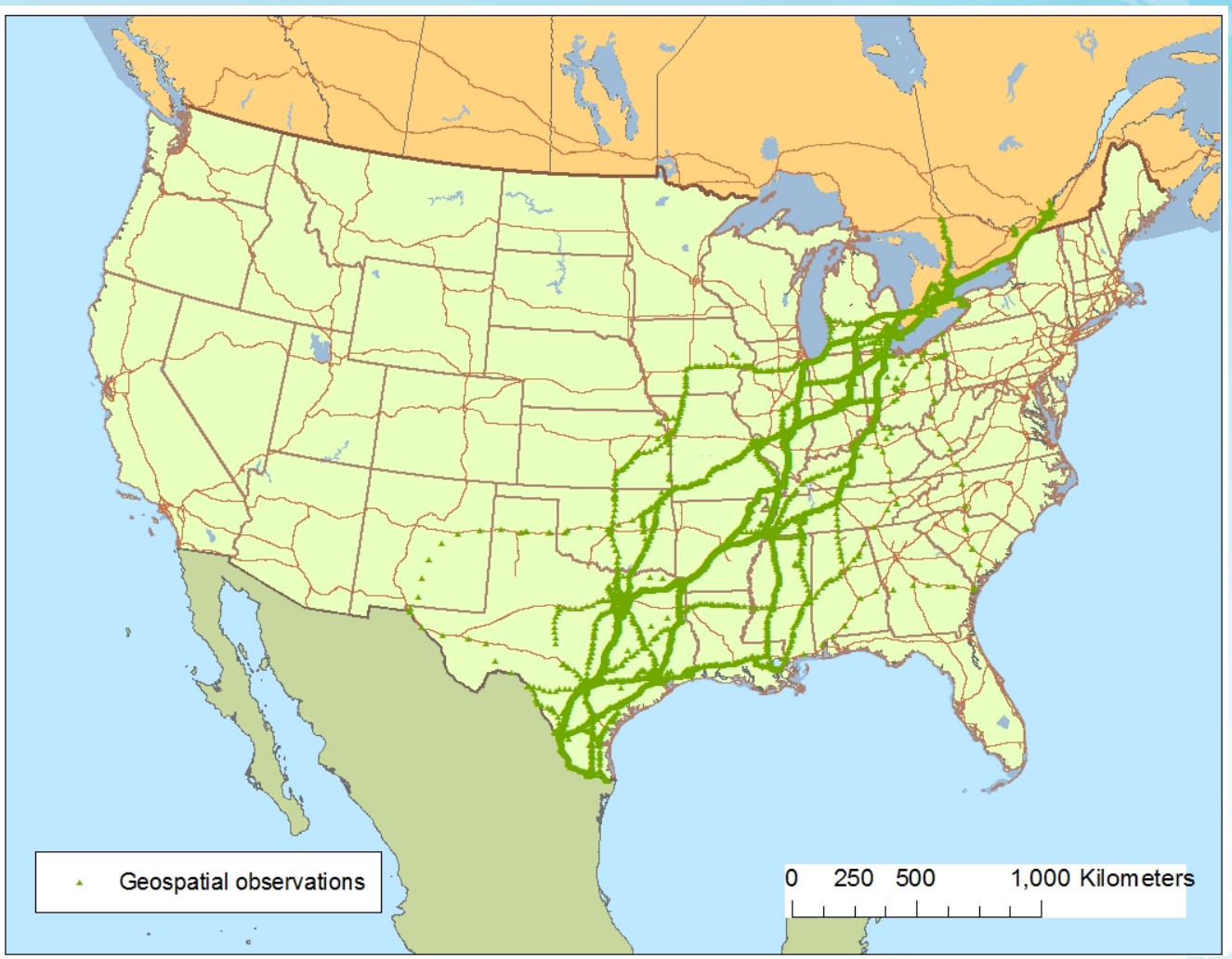
North American Case Study: Automotive Parts Manufacturing

Transit Option 1: trucking



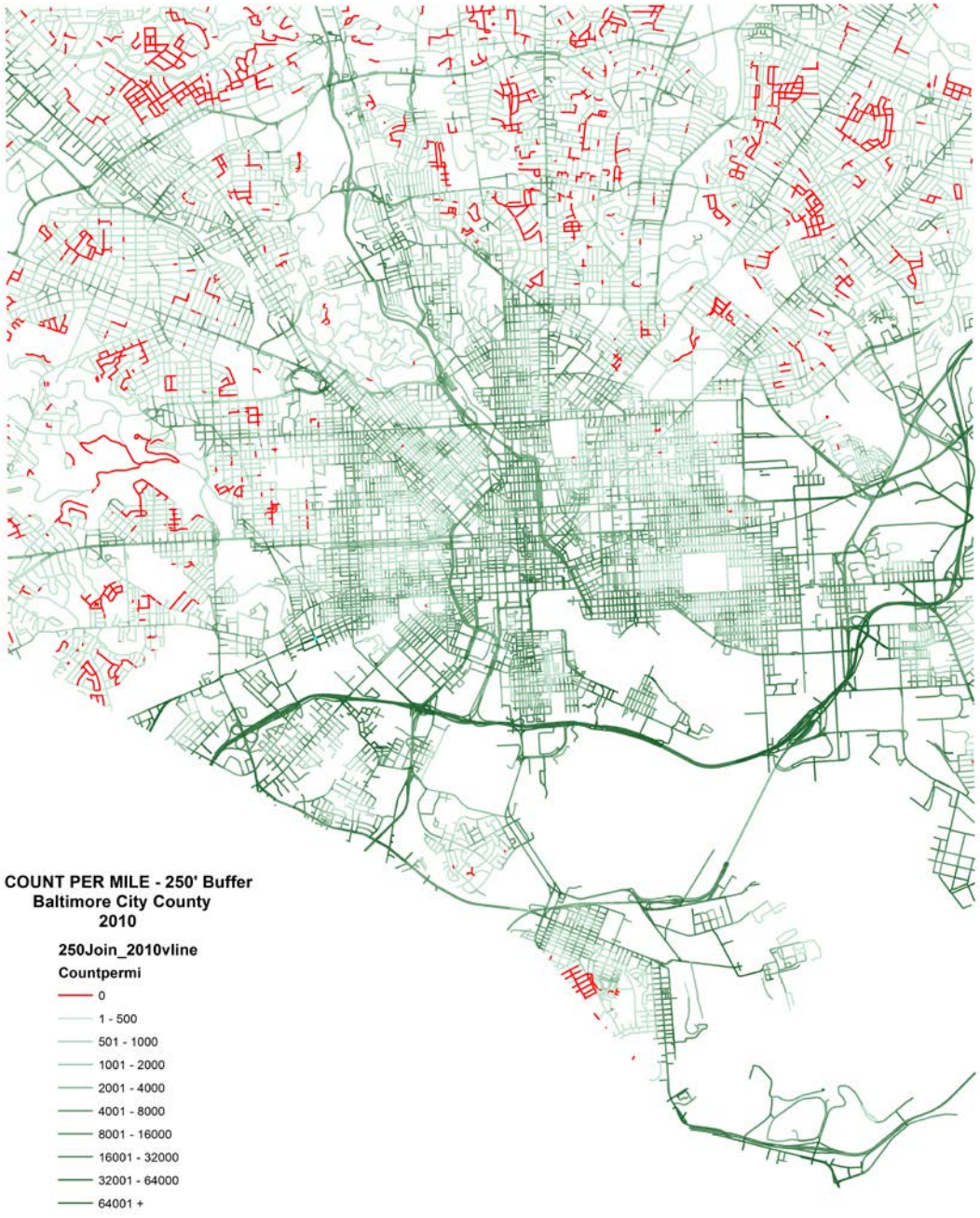
Source: Transport Canada

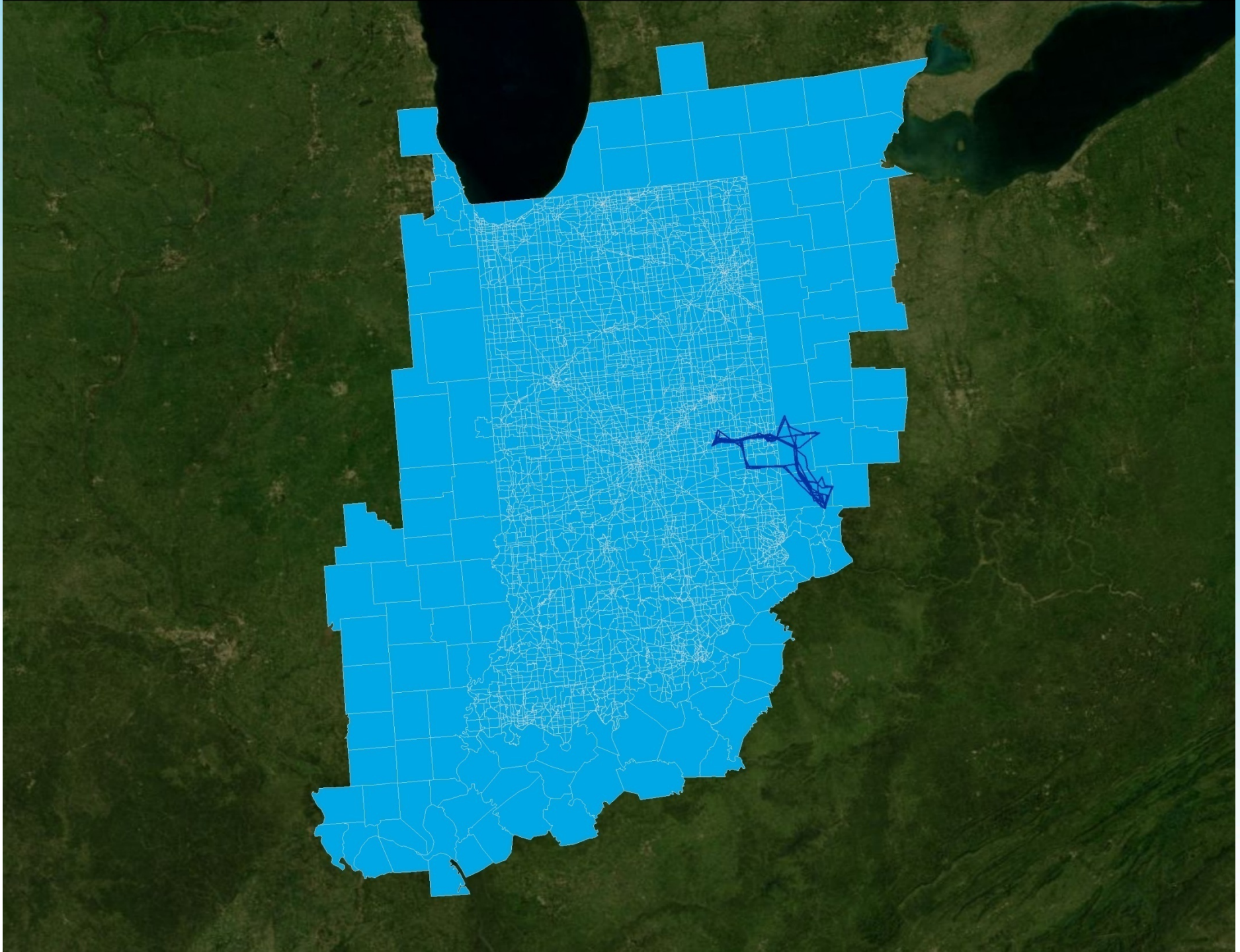
Truck Trips: Southern Ontario to US-Mexican Border, September 2014

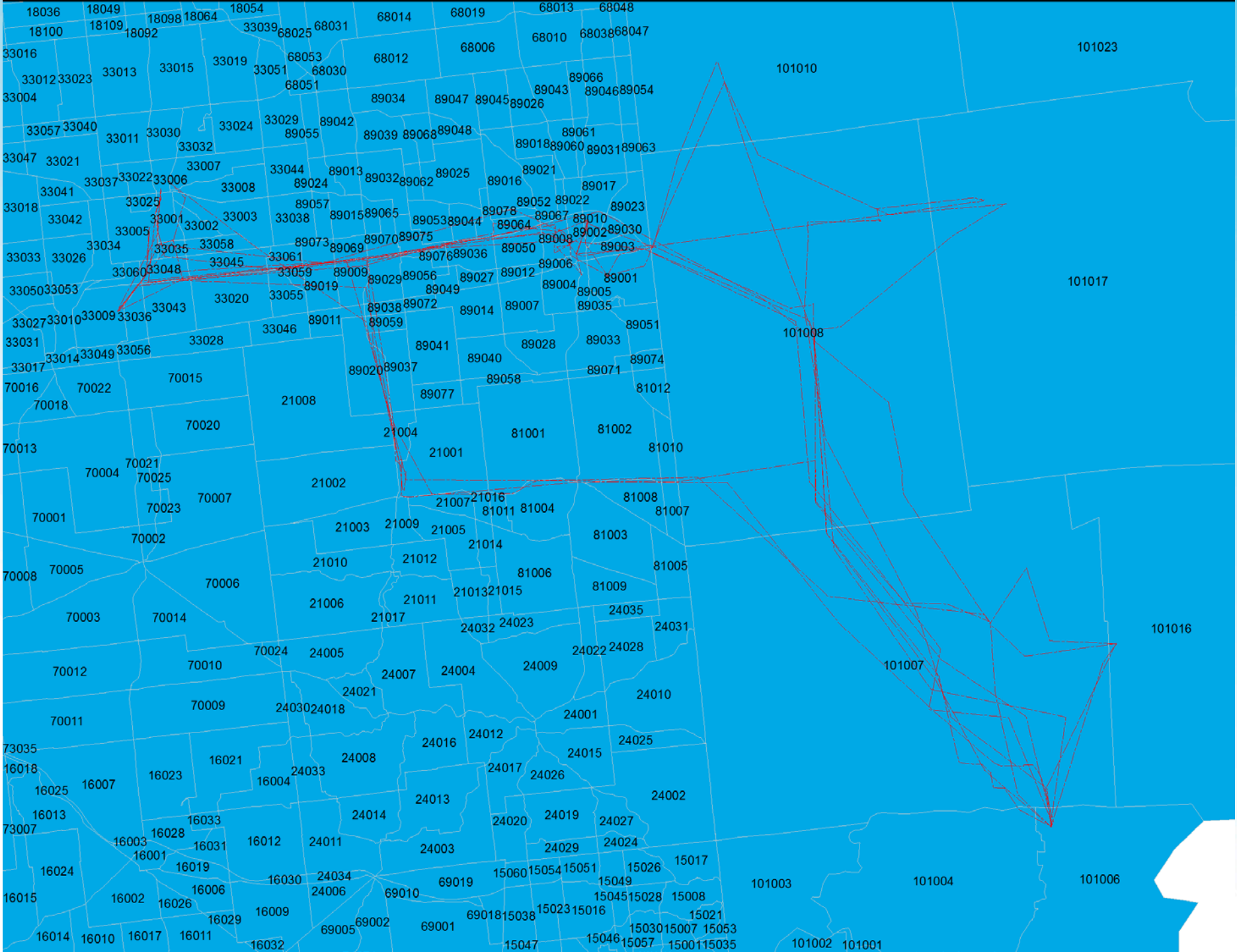


- 424 trucks trips were identified
- The average travel time was 70 hours

Source: Transport Canada, adapted from third-party satellite tracking data provider (Shaw), October 2014.


COUNT PER MILE - 250' Buffer
Baltimore City County
2010
250Join_2010vline
Countpermi
0
1 - 500
501 - 1000
1001 - 2000
2001 - 4000
4001 - 8000
8001 - 16000
16001 - 32000
32001 - 64000
64001 +

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18100 18109 18092 33039 68025 68031 68010 68038 68047
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33059 89009 89056 89027 89012 89001 101017
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70021
70004 70025 21002
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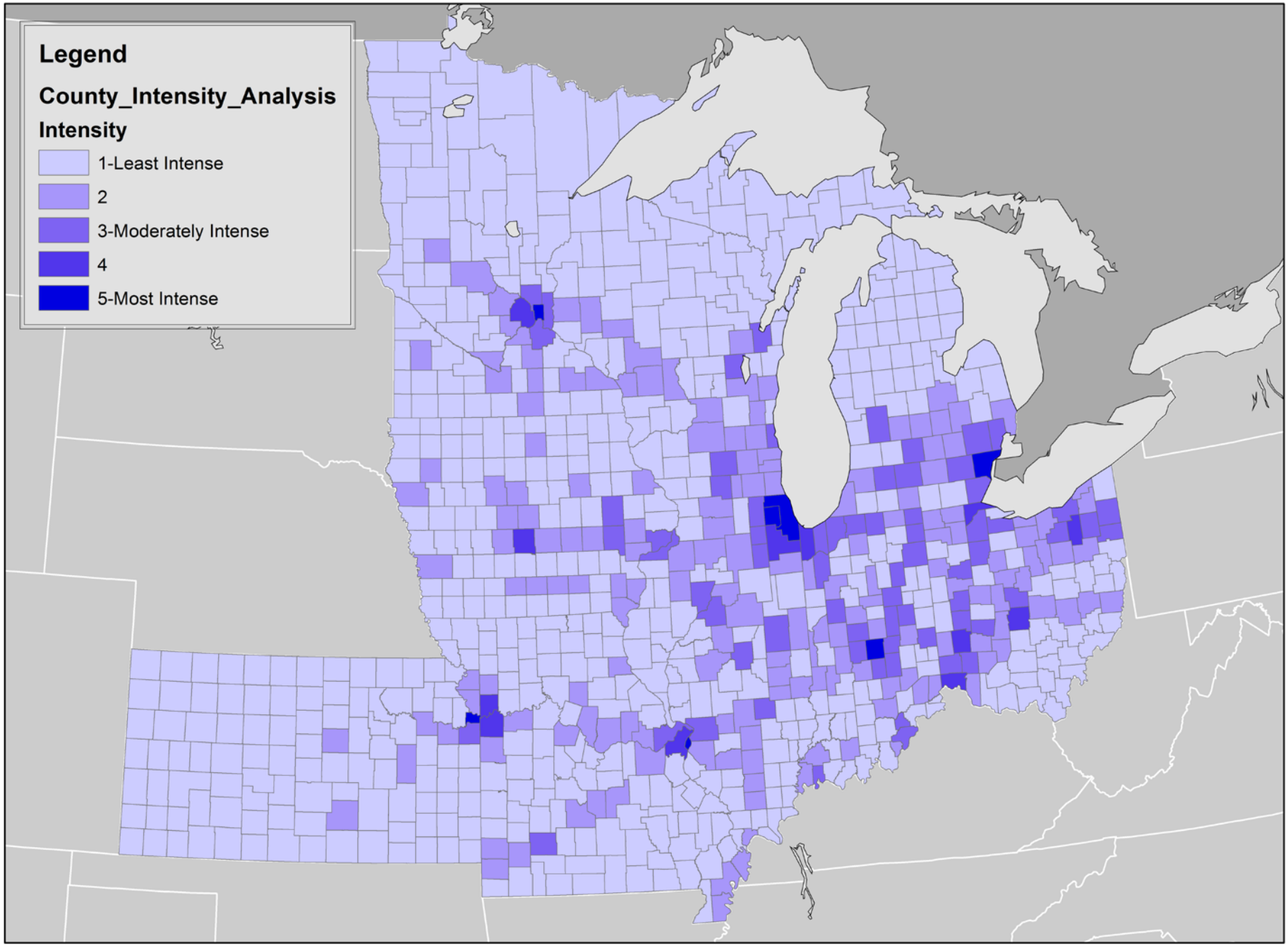
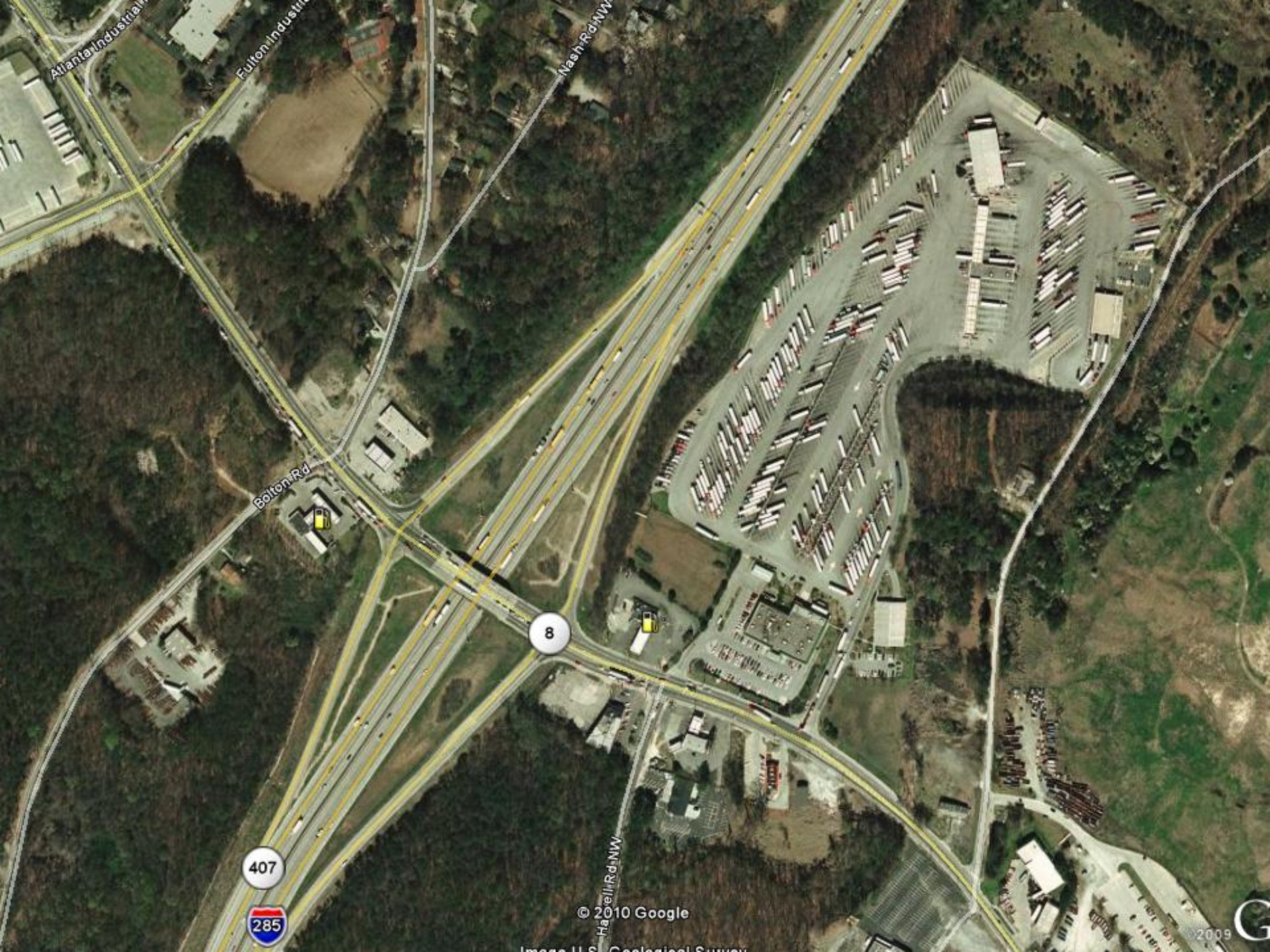

Legend
County_Intensity_Analysis
Intensity
1-Least Intense
2
3-Moderately Intense
4
5-Most Intense

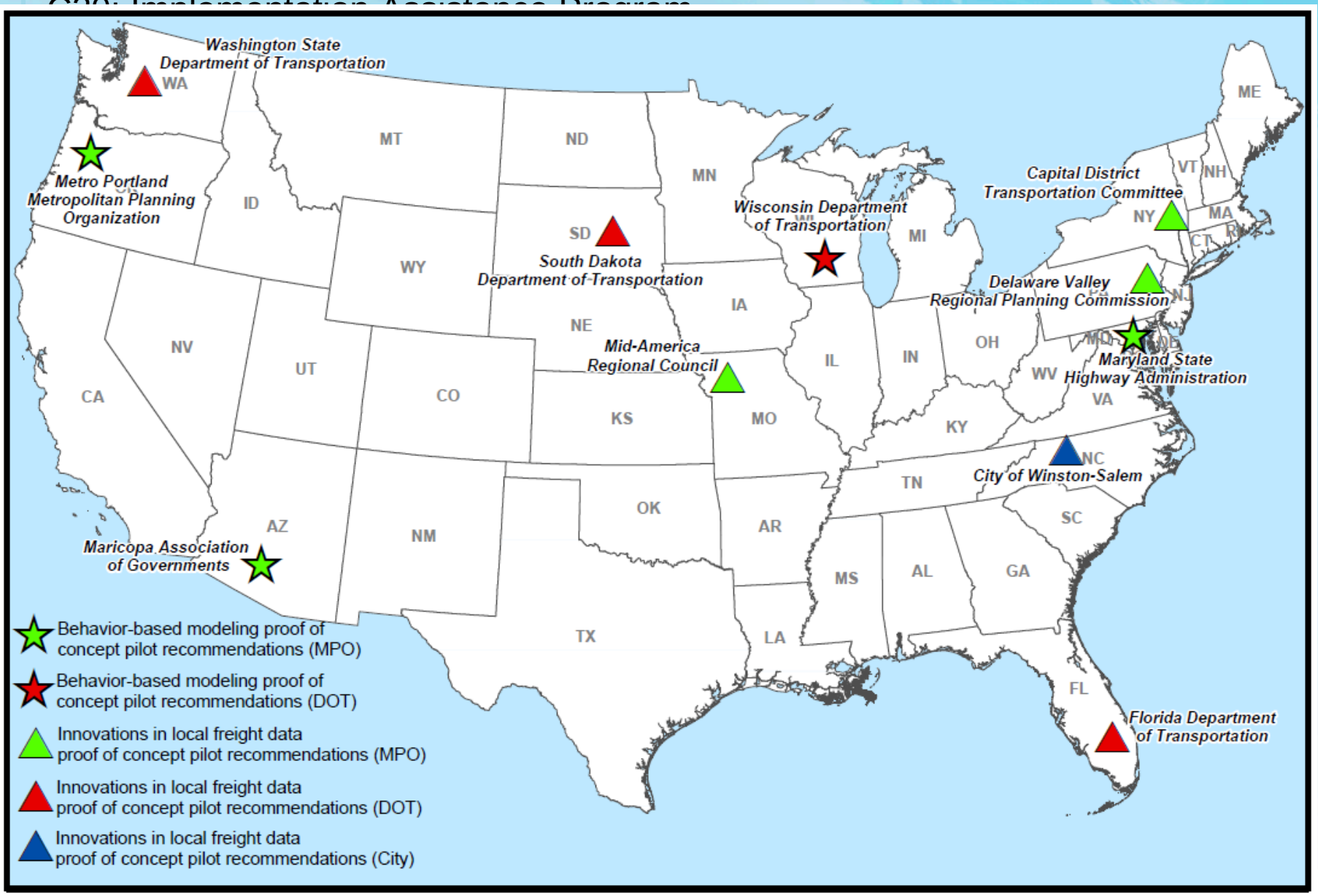

Atlanta Industrial
Fulton Industrial
Nash Rd NW
Bolton Rd
8
407
285
Hazelli Rd NW
© 2010 Google

C20 Project Purpose

To foster fresh ideas and new approaches to design and implement freight demand modeling and data collection that ultimately enhance decision making.

C20: Implementation Assistance Program

- Eleven Proof-of-Concept Pilot Projects were selected:
  - Four Behavior-based Modeling
  - Seven Innovations in Local Data
- Data projects:
  - Identify and adapt disparate sources of data
  - Refine of current data sources
  - Develop new data sources on smaller geographic scales
- Modeling projects:
  - Advance ‘tour-based’ and ‘supply chain’ freight modeling
  - Improve the understanding of decision-making by freight agents and their implications for network modeling


Washington State Department of Transportation
WA
Metro Portland Metropolitan Planning Organization
ID
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South Dakota Department of Transportation
WY
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Wisconsin Department of Transportation
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Mid-America Regional Council
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City of Winston-Salem
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Maricopa Association of Governments
Capital District Transportation Committee
NY
VT
NH
ME
MA
CT
RI
Delaware Valley Regional Planning Commission
NJ
MD
DE
Maryland State Highway Administration
Florida Department of Transportation
Behavior-based modeling proof of concept pilot recommendations (MPO)
Behavior-based modeling proof of concept pilot recommendations (DOT)
Innovations in local freight data proof of concept pilot recommendations (MPO)
Innovations in local freight data proof of concept pilot recommendations (DOT)
Innovations in local freight data proof of concept pilot recommendations (City)

C20: Implementation Assistance Program

Recipient	Project Objective
Capital District Transportation Committee	Create a unified data set for the region at the zip code or TAZ level by integrating diverse data sources.
City of Winston-Salem	Collect data to support development of an advanced freight model, development of an advanced freight sub-model, and a conduct a travel diary survey.
Delaware Valley Regional Planning Commission	Better understand intermodal transportation for freight in the region by integrating data for distribution supply chains and for performance management.
Florida Department of Transportation	Improve the accuracy of freight forecasts by collecting data representing the supply and demand chain for petroleum commodities distributed throughout South Florida.
Maricopa Association of Governments	Develop a multi-modal freight model to better replicate the economic behaviors of establishments, shippers, and carriers.
Maryland Department of Transportation	Develop a regional tour-based truck model covering intra-local distribution with sensitivity to the long-distance truck flows represented in the statewide freight model.
Mid-America Regional Council	Use a combination of existing data and new sources of commercial waybill data to address future freight planning needs.
Portland Metro	Understand the local portion of the region's supply chains, as well as the tour-based behavior of individual trips.
South Dakota Department of Transportation	Study the growth in agricultural commodity demand and production to analyze the needs and impacts on the State and local transportation systems.
Washington State Department of Transportation	Model the key State supply chains' behavioral responses to different State policy scenarios aimed at reducing emissions.
Wisconsin Department of Transportation	Develop a hybridized model for freight demand that, through integration with regional travel demand models, addresses deficiencies in statewide freight forecasting techniques.

C20: Behavior-based Modeling Recipients

Recipient	Project Objective
Maricopa Association of Governments	Develop a multi-modal freight model to better replicate the economic behaviors of establishments, shippers, and carriers.
Maryland Department of Transportation	Develop a regional tour-based truck model covering intra-local distribution with sensitivity to the long-distance truck flows represented in the statewide freight model.
Portland Metro	Understand the local portion of the region's supply chains, as well as the tour-based behavior of individual trips.
Wisconsin Department of Transportation	Develop a hybridized model for freight demand that, through integration with regional travel demand models, addresses deficiencies in statewide freight forecasting techniques.

C20: Local Data Recipients

Recipient	Project Objective
Capital District Transportation Committee	Create a unified data set for the region at the zip code or TAZ level by integrating diverse data sources.
City of Winston-Salem	Collect data to support development of an advanced freight model, development of an advanced freight sub-model, and a conduct a travel diary survey.
Delaware Valley Regional Planning Commission	Better understand intermodal transportation for freight in the region by integrating data for distribution supply chains and for performance management.
Florida Department of Transportation	Improve the accuracy of freight forecasts by collecting data representing the supply and demand chain for petroleum commodities distributed throughout South Florida.
Mid-America Regional Council	Use a combination of existing data and new sources of commercial waybill data to address future freight planning needs.
South Dakota Department of Transportation	Study the growth in agricultural commodity demand and production to analyze the needs and impacts on the State and local transportation systems.
Washington State Department of Transportation	Model the key State supply chains' behavioral responses to different State policy scenarios aimed at reducing emissions.

- Thorough documentation of the C20 IAP Pilot Projects will be completed resulting in several products:
  - Case studies
  - Handbook
  - Project evaluations
  - Self-assessment tool

C20: National Initiatives

- Freight Modeling and Data Expert Task Group
- Freight Data Collaboration and Standardization Workshops
- Freight, Economic, Land Use and Demographic Data Collaborative
- FMIP Portal
- Collaboration, Knowledge Sharing and Outreach
  - Practitioner Handbook
  - Project Case Studies
  - Briefings
  - Peer Exchanges
  - Cross-agency trainings
  - Conferences and presentations
  - Executive training
  - Champion outreach
- Additional Strategic Plan Objectives Development

Schedule for the C20 and C15 Products

- C20 Pilot Projects to be completed by:
  - Data projects: March 2016
  - Modeling projects: September 2016
- C20 National Initiatives
  - Workshops: 2015-2016
  - TEG: 2015-2017
  - Research 2015-2017
- SHRP2 Round 5 application period:
  - January 16 to February 13
  - Recipients announced late winter/early spring

Thank You