



Bureau of Transportation Statistics

Estimating Freight Activity on Major Highways with the Freight Analysis Framework (FAF)

Geospatial Interest Group of the Federal Committee on Statistical Methodology
October 16th, 2015
Michael Sprung



	Total	Domestic	Exports ¹	Imports ¹
Total	20,063	17,950	914	1,199
Truck	13,955	13,732	120	103
Rail	1,858	1,681	82	94
Water	808	410	89	309
Air, air & truck	15	3	5	7
Multiple modes & mail	1,554	459	559	536
Pipeline	1,539	1,391	11	137
Other & unknown	333	274	47	13



Understanding Freight Transportation

- **How much** & **what** freight moves from place to place?
 - Weight
 - Value
 - Type of commodity
- **Where** & **how** is freight moving?
 - Origin & destination
 - Route used
 - Mode of transport
- **When** is freight being carried?
 - Season
 - Time of day



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What FAF Does

- Estimate current and future volumes of freight moving within and between regions by mode and commodity
- Assigns truck flows on highway corridors
- Identify baseline conditions for a better understanding where there are freight-related challenges
- Forecast the pressure future freight flows would place on the existing highway network



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What FAF Does Not Do

- Estimate flows precisely within local regions and on individual routes
- Estimate temporal variations in freight flows
- Include effects of capacity limitations on forecasts of future demand
- Forecast future capacity expansion
- Adjust for changes in costs of transportation



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FAF Data Products

- A tabular database of regional O-D freight flows by tons and value for all modes, including annual provisional updates, and long-range forecasts
- An assignment of the average number of freight-hauling trucks to individual highway segments on the national network

	2013			
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FAF Data Product Details

Regional O-D Database

- Tons & value
- Origin/destination
- All modes
- Commodity detail
- Base year, most recent year, & forecast years
- Accessed with tabular data software or create subsets using the online data tabulation tool

Network Database

- Avg. Daily traffic counts on highway segments
- Highway only
- No origin/destination
- No commodity detail
- Base year and 30 year forecast
- Accessed with GIS software



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Origin-Destination Database Details

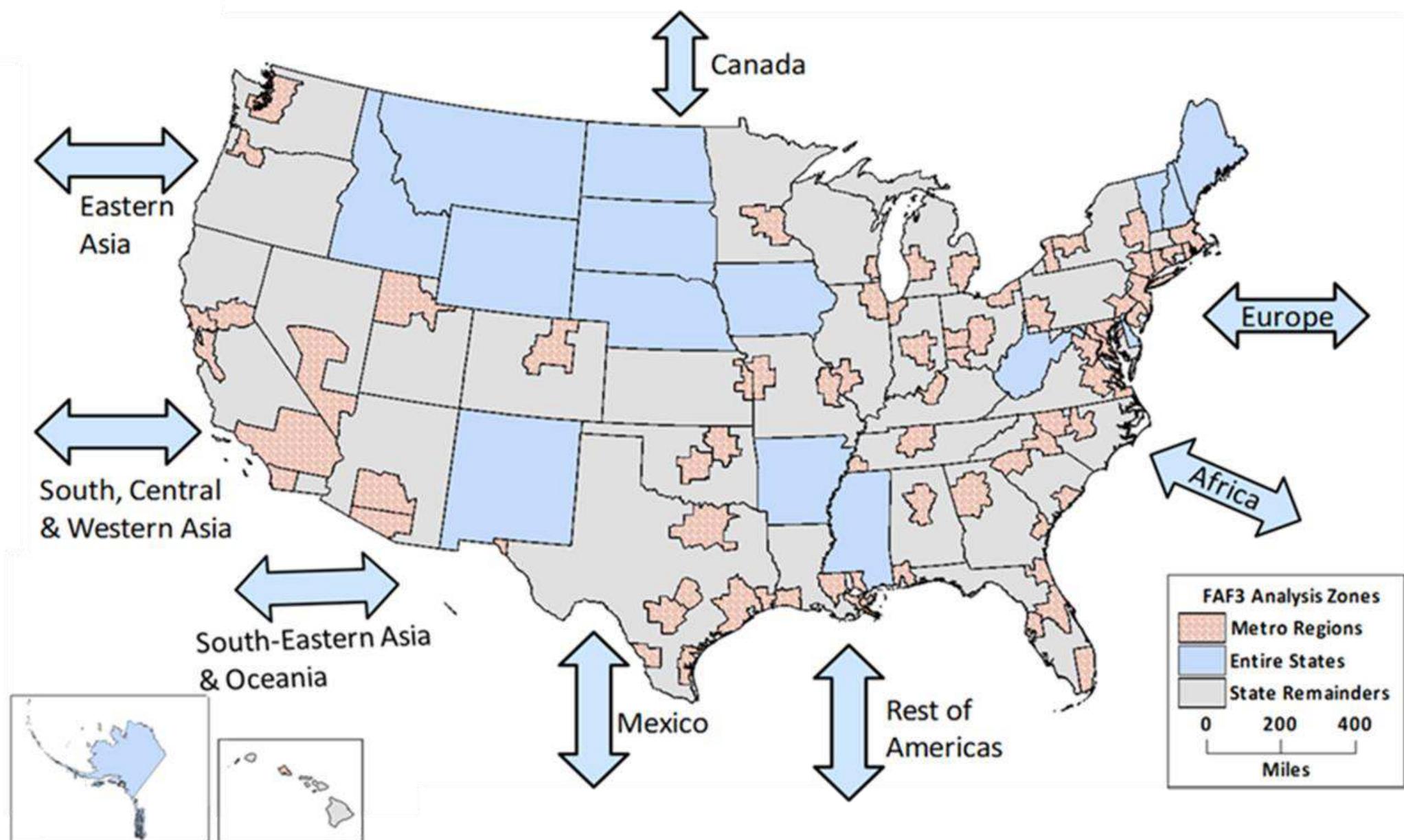
- *Value & weight* for all domestic, export, & import shipments
- *8 Domestic modes* (truck, rail, water, air, multiple modes & mail, pipeline, other & unknown, and no domestic mode)
- *7 Foreign modes*
- *131 Domestic regions*
- *8 International regions* (Canada, Mexico, & 6 groupings of all other countries)
- *43 Commodity classes* (2-digit SCTG codes)



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FAF Regions



Network Database Details

- Approximately 450,000 miles of the nation's highways where trucks are permitted to operate
- Route type
- FAF trucks (freight hauling trucks)
- All trucks
- All highway vehicles
- Capacity measures
- Volume to capacity ratios
- Base and forecast year



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FAF Network Coverage

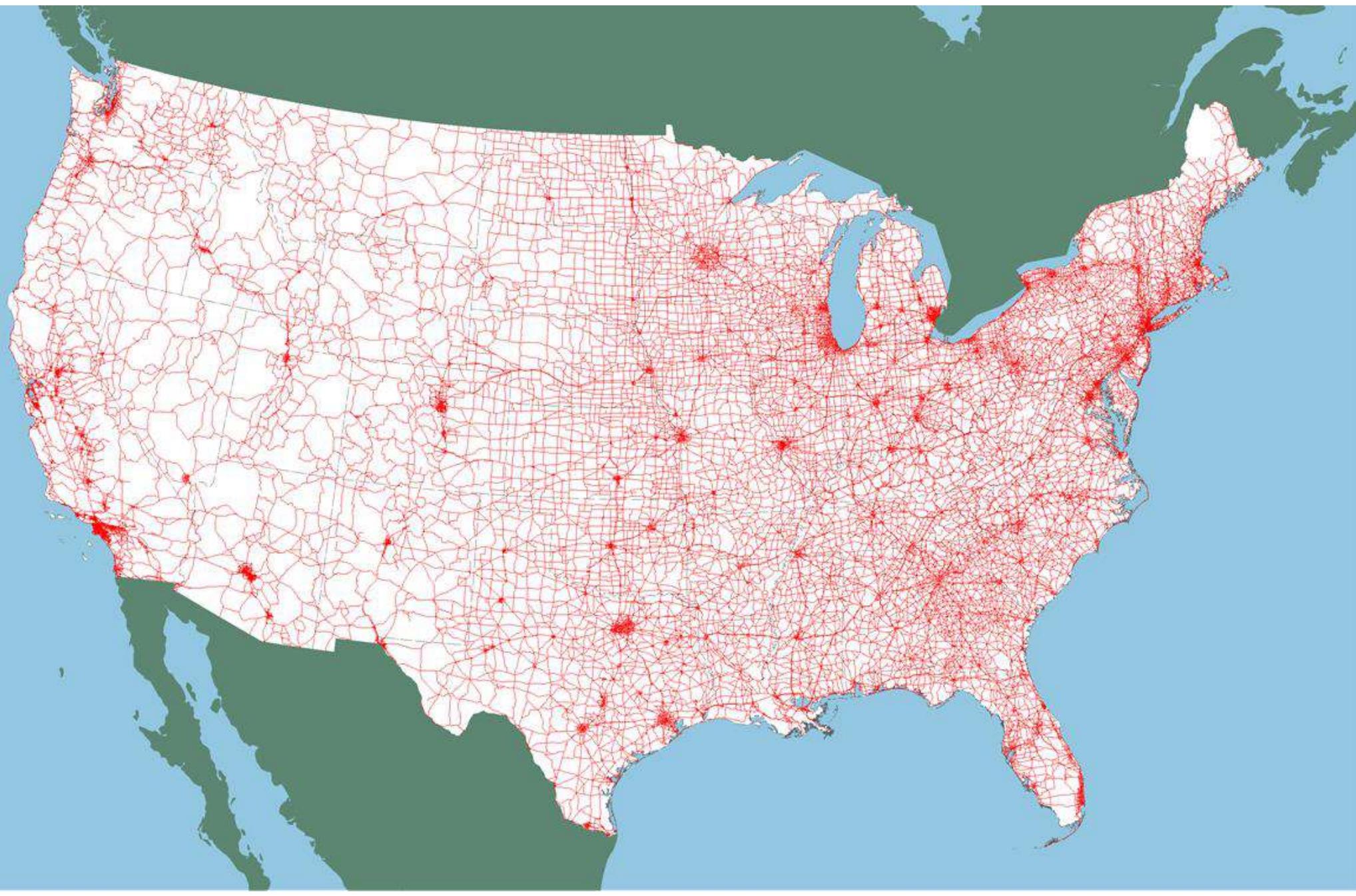
- All interstate highways
- Non-interstate NHS routes
- NN routes not part of NHS
- Other rural and urban principal arterials
- Intermodal connectors
- Rural minor arterials for those counties that are not served by either NN or NHS routes
- Urban bypass and streets as needed for network connectivity



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Routable FAF Network



Network Assignment Components

- O-D matrix
- Routable highway network
- Truck payload factors (VIUS & VTRIS)
- Empty trucks estimate (VIUS)
- Calibrated O-D disaggregation
- Assignment model
- Traffic counts (HPMS)
- Network capacity/restrictions
- Impedance factors

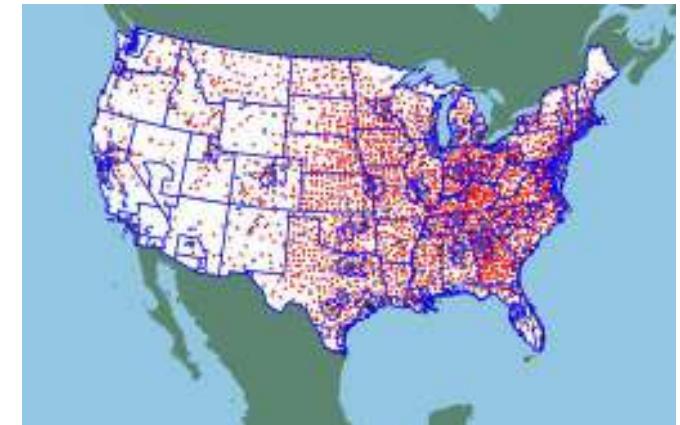


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O-D Disaggregation

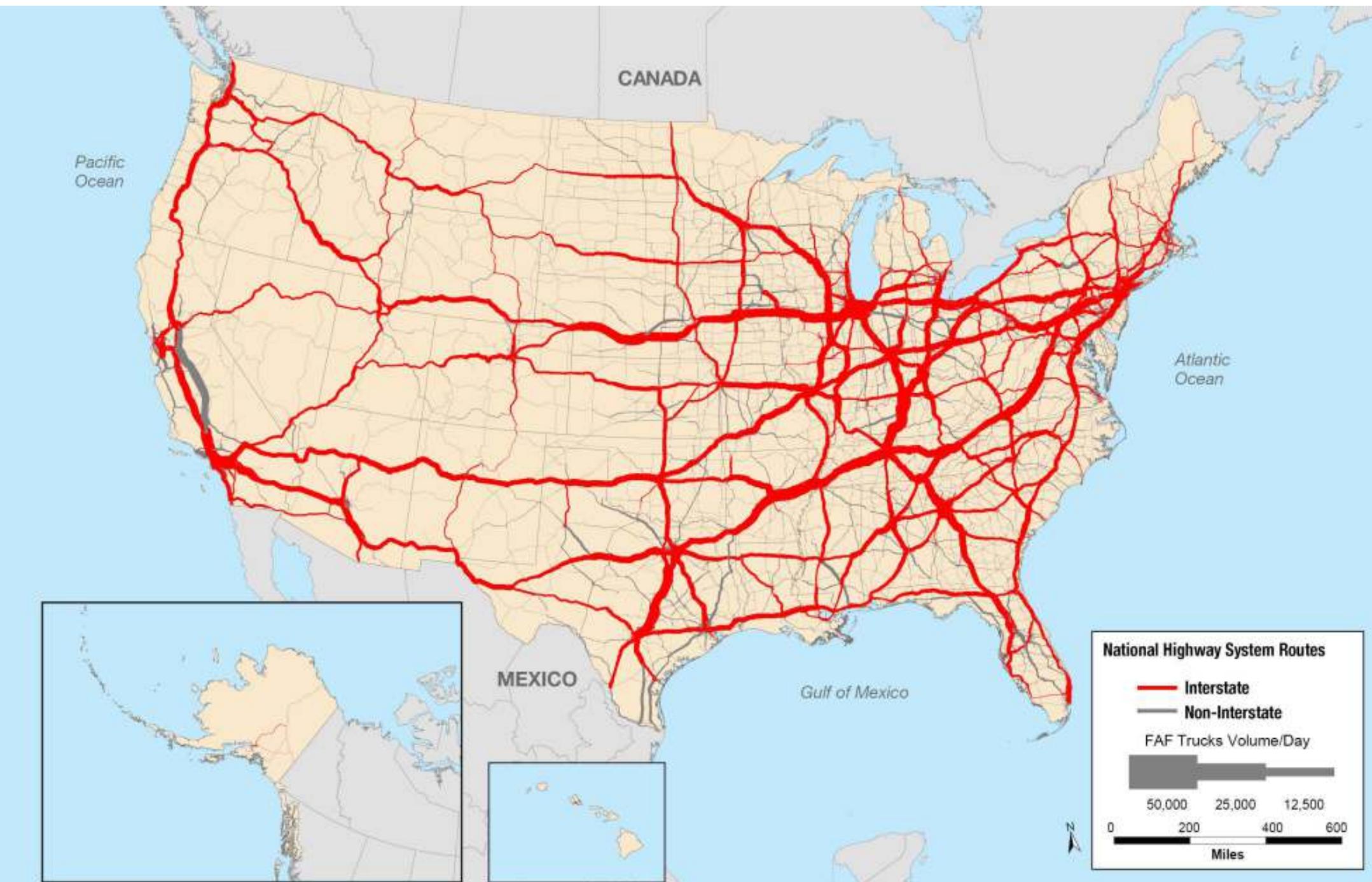
- More than 4600 O-D centroids created based on several factors:
 - County Business Patterns
 - Truck based distribution centers
 - Warehouse clusters
 - Rail/Truck intermodal facilities
- Secondary disaggregation at international freight gateways:
 - Land border crossings
 - Water ports
- Calibrated trip distribution model applied to account for the spatial interaction of freight movements



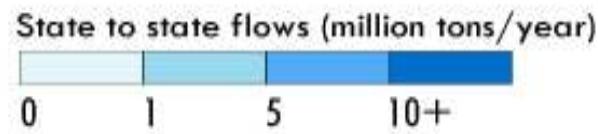
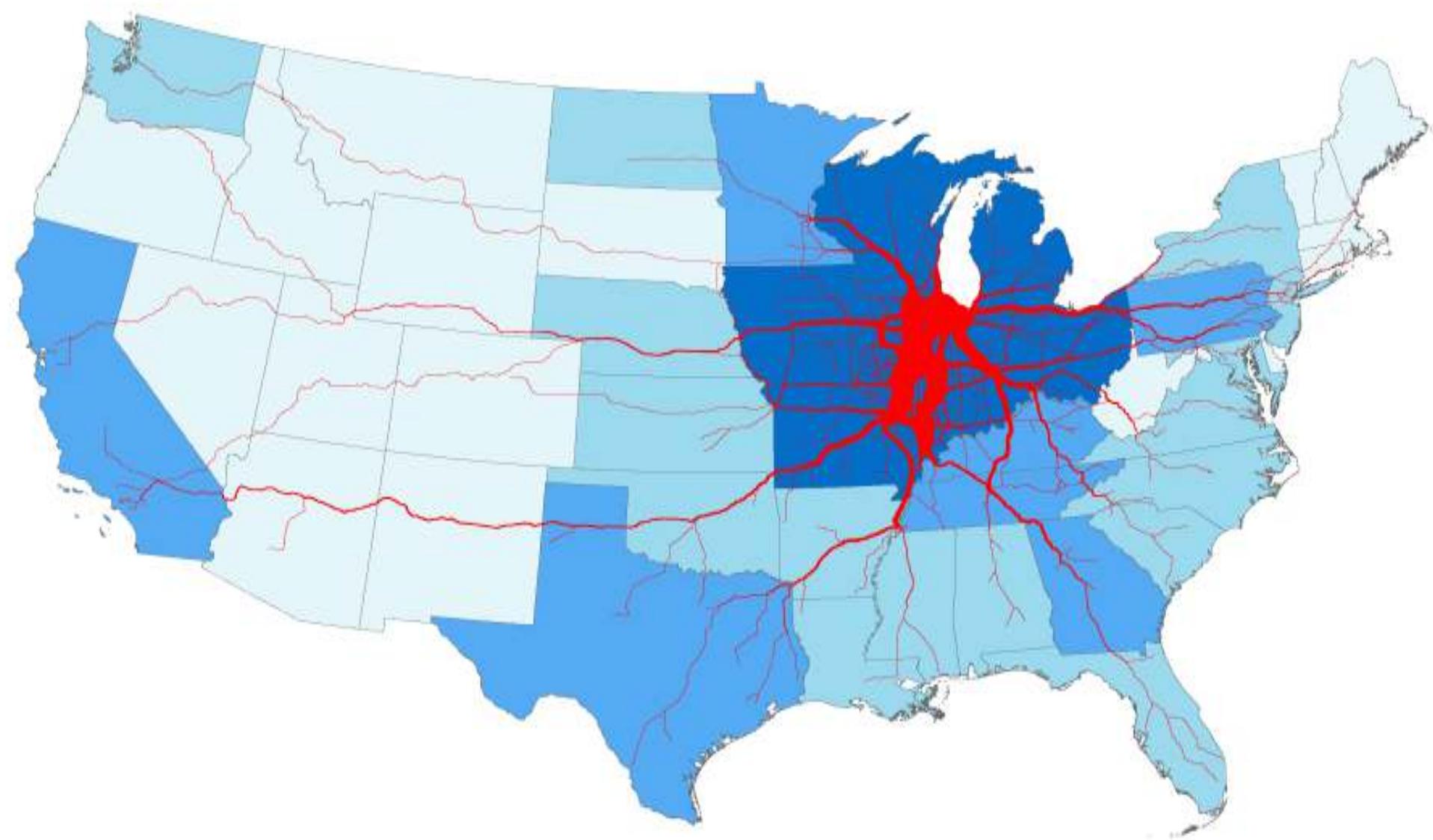
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Trucks on the Network



Major Truck Freight Flows by State



Diversion Analysis Example

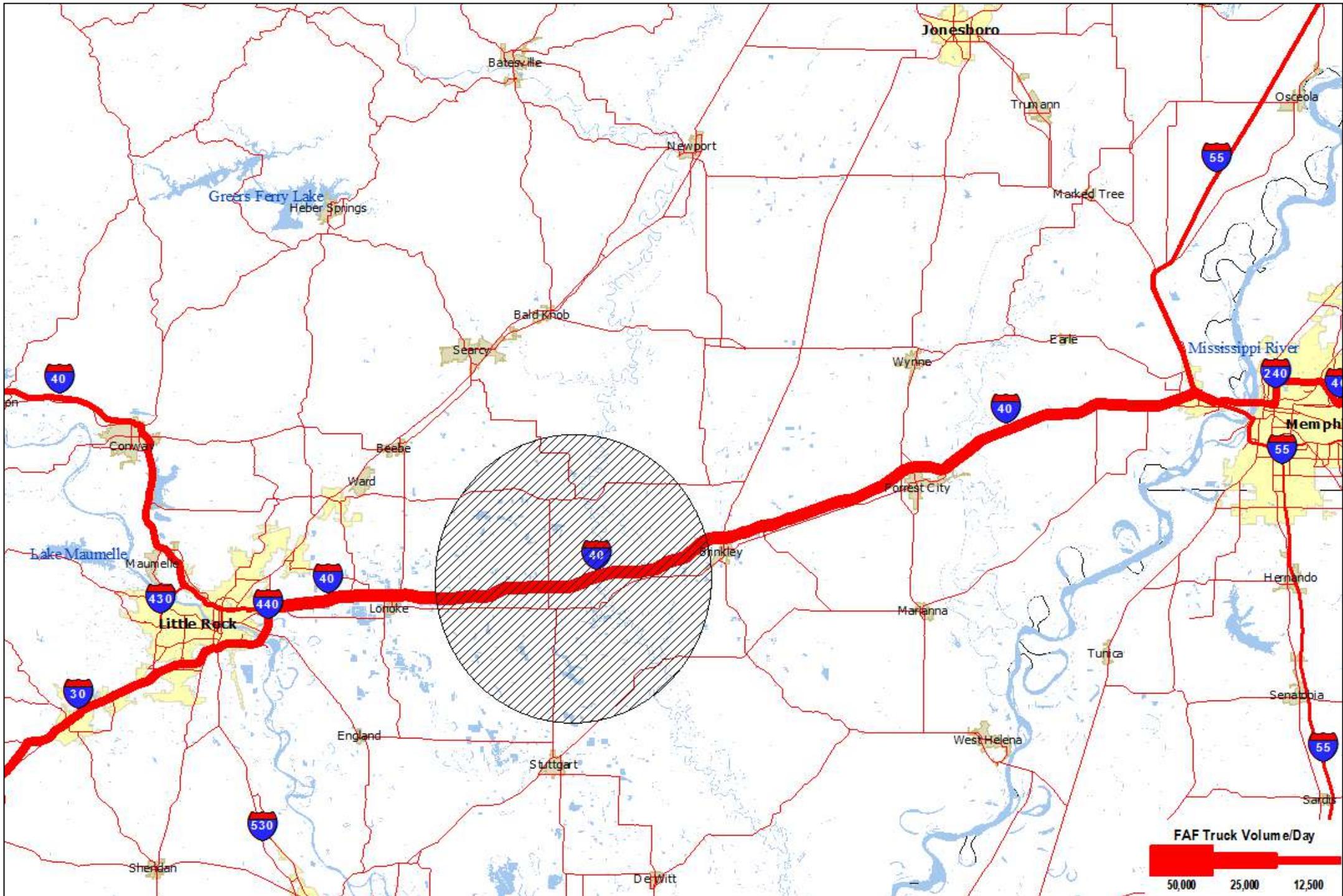
- May 2011 - a section of I-40 in Arkansas was closed due to flooding from the White River
- Major non-interstate routes in the surrounding area were also flooded or closed because of the possibility for flooding
- Of the ~31,000 vehicles that cross the I-40 White River Bridge on an average day, an estimated 60% are large commercial vehicles

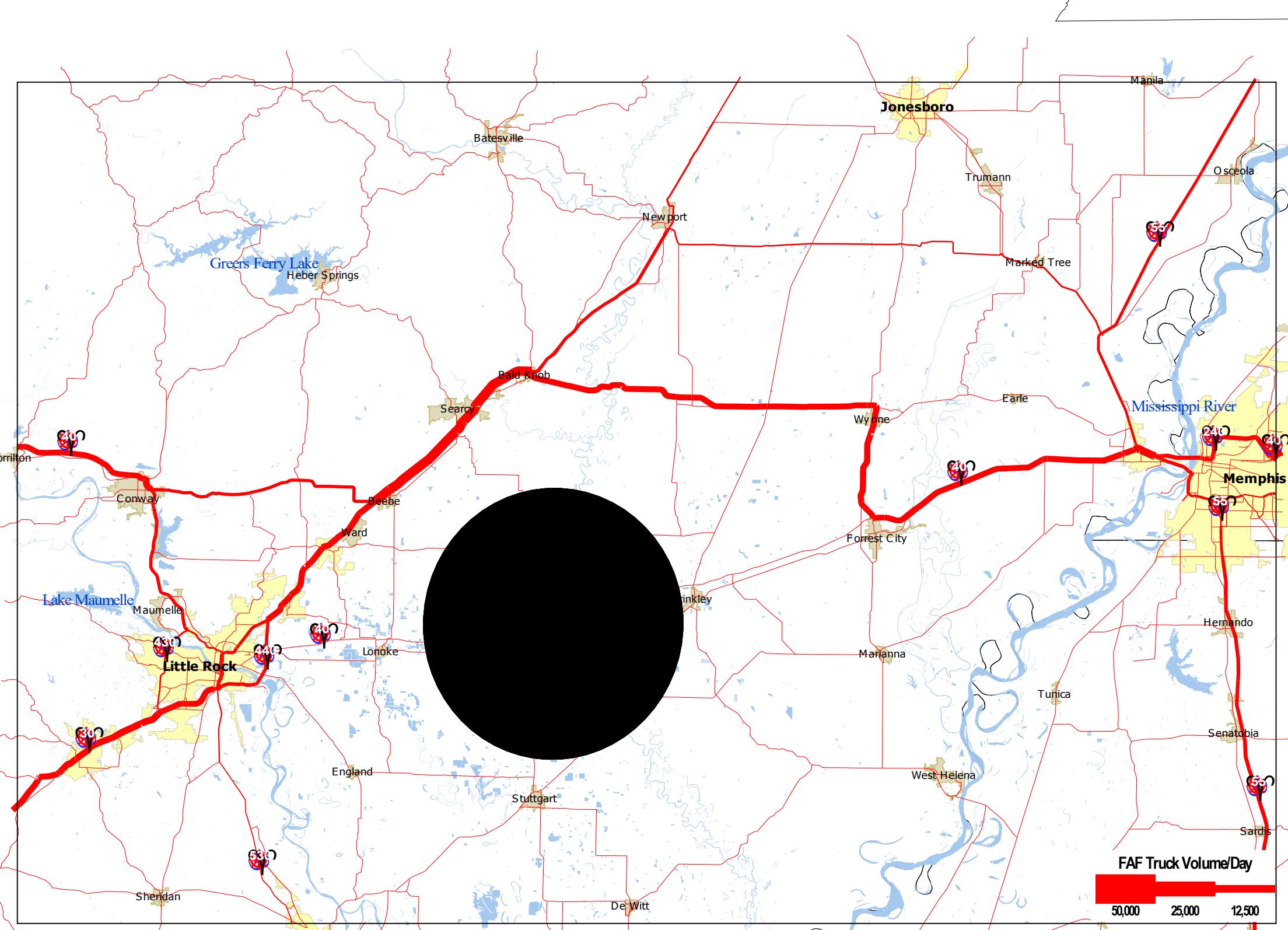


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Pre-Scenario FAF Truck Flow (Local)

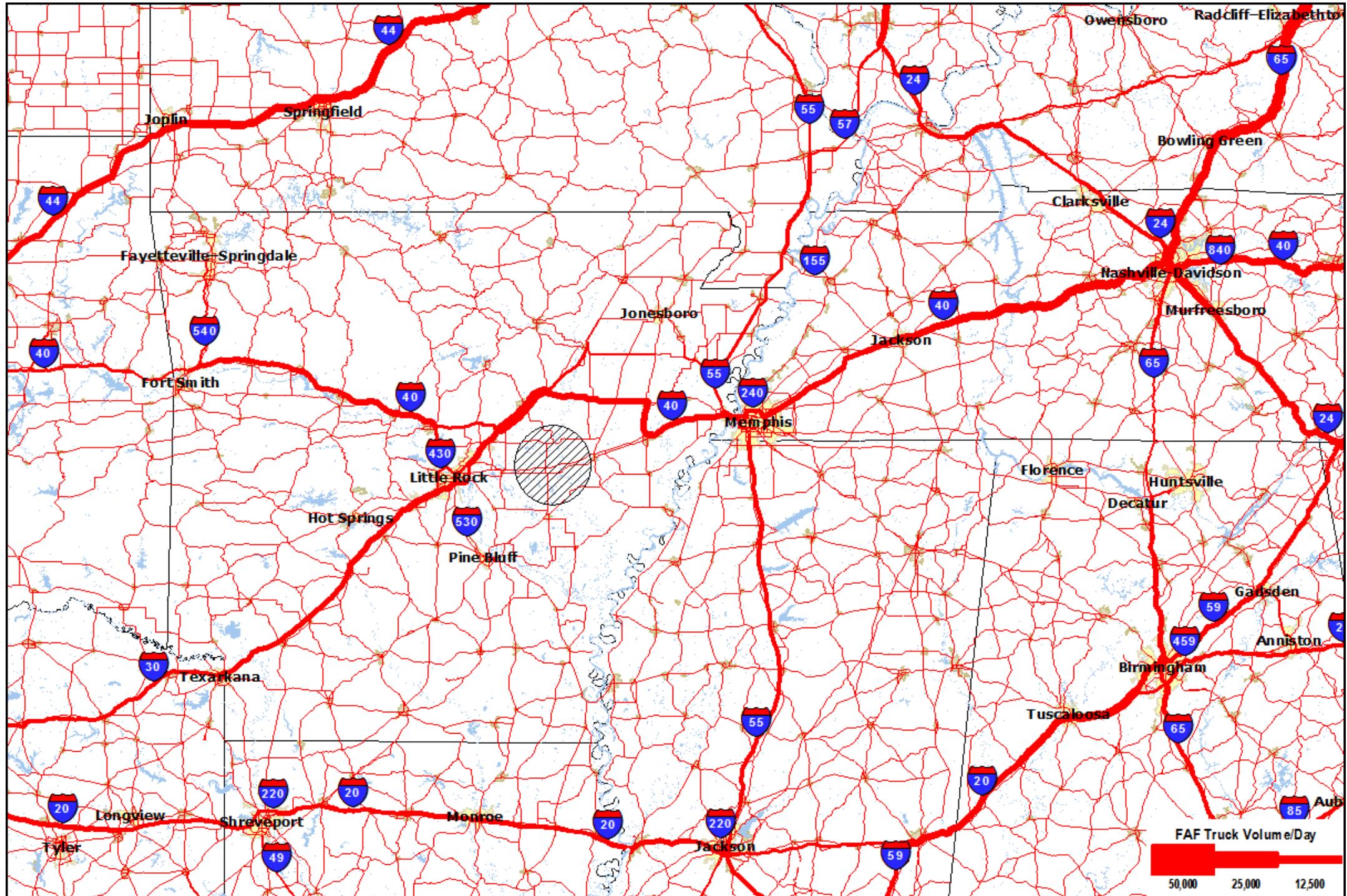




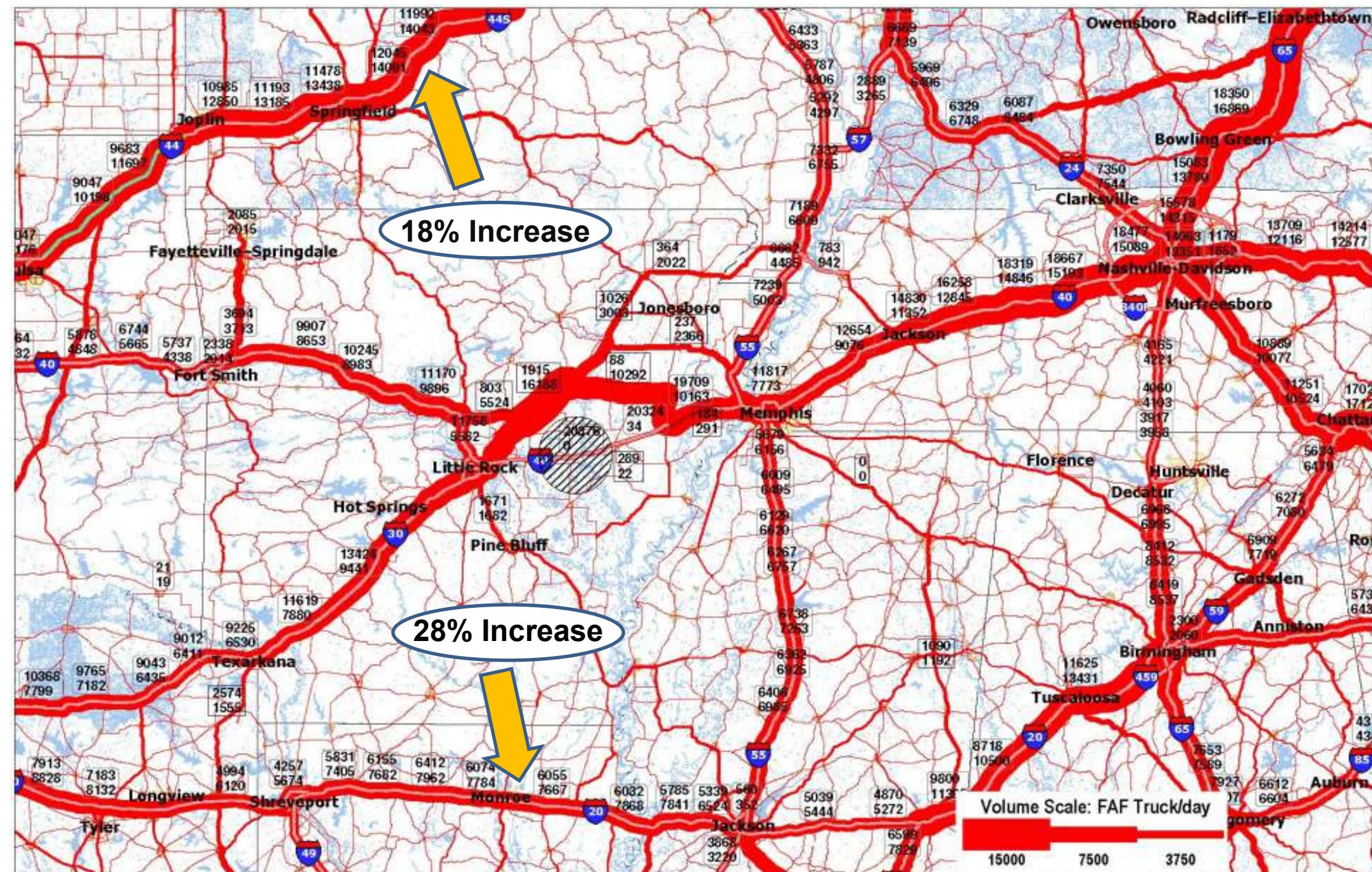
Pre-Scenario FAF Truck Flow (Regional)



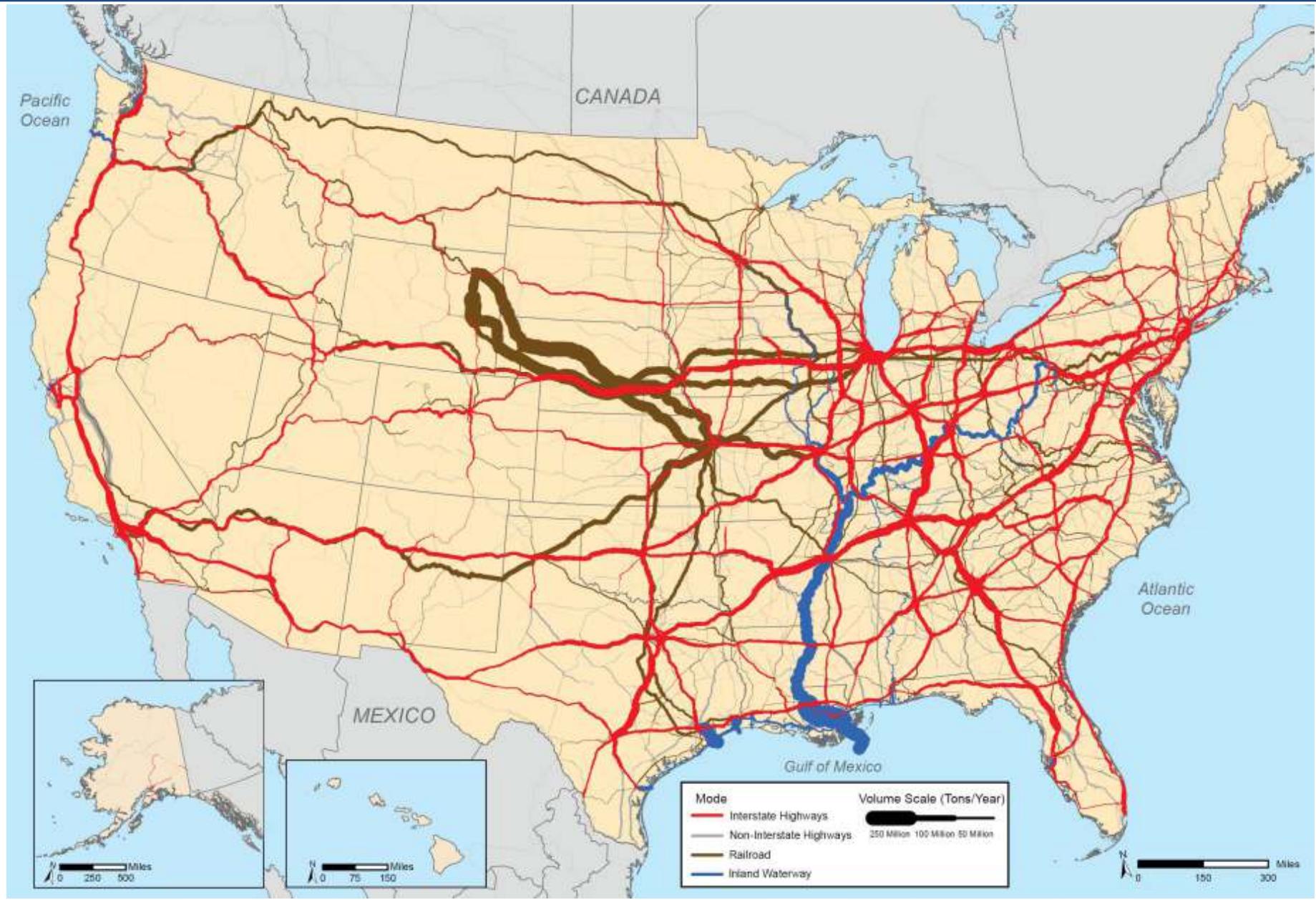
Post-Scenario FAF Truck Flow (Regional)



Change in FAF Truck Flow (Regional)



Freight Flows by Highway, Railroad and Waterway



Accessing FAF Data

- U.S. DOT Freight Page:
 - <http://freight.dot.gov/>
- FHWA Website:
 - http://www.ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm
- BTS Website
 - www.bts.gov – Fall 2015



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Freight Analysis Framework

• Freight Analysis Framework Version 3

- [Overview](#)
- [Version Descriptions](#)
- [Summary Statistics](#)
- [Data Tabulation Tool](#)
- [FAF² Maps](#)
- [Network Database and Flow Assignment](#)
- [Documentation](#)

• Related Links

- [Freight Analysis Framework home](#)
- [FHWA Office of Freight Management and Operations home](#)
- [Freight at U.S. DOT](#)
- [CTA/ORNL](#)

The Freight Analysis Framework (FAF) integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation. With data from the 2007 Commodity Flow Survey and additional sources, FAF version 3 (FAF³) provides estimates for tonnage, value, and domestic ton-miles by region of origin and destination, commodity type, and mode for 2007, the most recent year, and forecasts through 2040. Also included are state-to-state flows for these years plus 1997 and 2002, summary statistics, and flows by truck assigned to the highway network for 2007 and 2040.

FAF³ Origin-Destination Data

- [FAF Data Tabulation Tool](#) - Create and download customized FAF³ summary tables.
- Regional Database of tonnage, value, and domestic ton-miles by FAF region of origin and destination, commodity type, and mode for 2007 through 2040
 - FAF³ Regional Database for 2007 with forecasts through 2040, and 2012 and Provisional Data in zipped Microsoft Access format [[FAF3.5_access03.zip](#) 227MB]
 - FAF³ Regional Database for 2007 with forecasts through 2040 in zipped CSV format [[FAF3.5.zip](#) 141MB]
 - FAF³ Provisional Annual Data for 2012 in zipped CSV format [[FAF3.5_provisional_2012.zip](#) 23MB]
- State Database of tonnage, value, and domestic ton-miles by state of origin and destination, commodity type, and mode for 1997 through 2040. Note: 1997 and 2002 have been reprocessed using FAF³ methodology with original source data.
 - FAF³ State Database for 2007 with forecasts through 2040, 2012 Provisional Data, and Reprocessed State Annual Data for 1997 and 2002 in zipped Microsoft Access format [[FAF3.5_access03_State.zip](#) 116MB]
 - FAF³ State Database for 2007 with forecasts through 2040 in zipped CSV format [[FAF3.5_State.zip](#) 51MB]
 - FAF³ State Provisional Annual Data for 2012 in zipped CSV format [[FAF3.5_provisional_2012_State.zip](#) 9MB]
 - FAF³ Reprocessed State Annual Data for 1997 in zipped CSV format [[FAF3.3_1997_State.zip](#) 10MB]
 - FAF³ Reprocessed State Annual Data for 2002 in zipped CSV format [[FAF3.3_2002_State.zip](#) 7MB]

FAF³ Summary Statistics and Products

- [State Summary Tables by Mode and Commodity](#)
- [FAF and Related Freight Maps](#)

FAF³ Network Data

- [FAF² Network Database and Flow Assignment for 2007 and 2040](#)

FAF³ Documentation

- [FAF³ Users Guide](#)
- [FAF² Documentation](#)
- [Version Descriptions](#)

Moving Forward

- **BTS**
 - 2012 benchmark O-D data by commodity and mode
 - Provisional annual updates
- **FHWA**
 - Long range forecasts of O-D
 - Network assignment of truck flows



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Upcoming Releases

- FAF4 O-D data benchmarked to 2012 CFS – *October 2015*
- Long-range forecasts through 2045 – *January 2016*
- Network assignment, and highway flow maps – *March 2016*
- Historical data for 1997, 2002, and 2007 – *May 2016*
- Domestic ton-miles and distance bands – *Summer 2016*



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Thank You

For additional information on BTS programs and products visit: www.bts.gov

For additional information on USDOT freight data programs and products visit: www.freight.dot.gov

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**WITHOUT DATA
IT'S JUST AN OPINION.**



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