



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

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	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



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



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



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

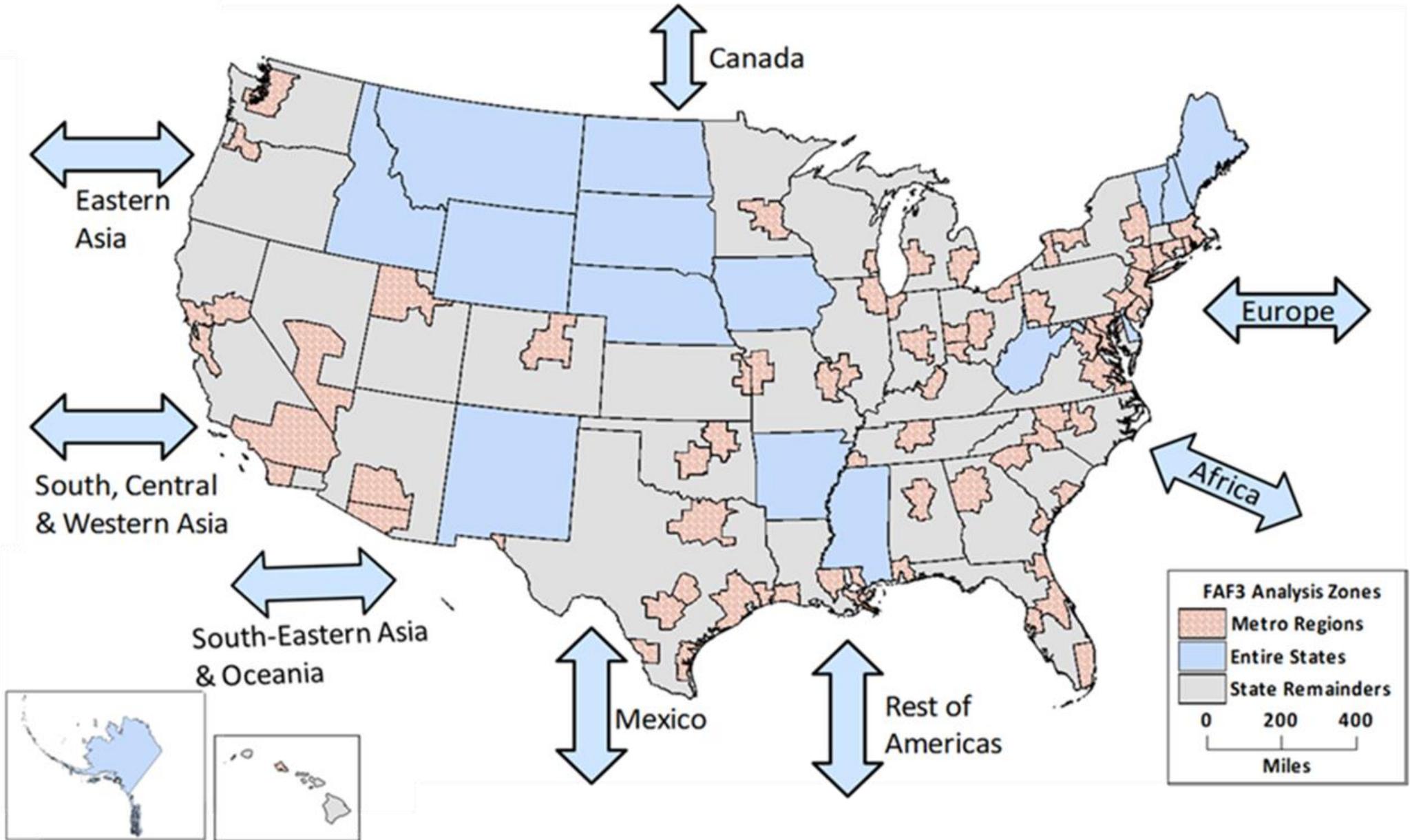


Origin-Destination Database Details

- *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)



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

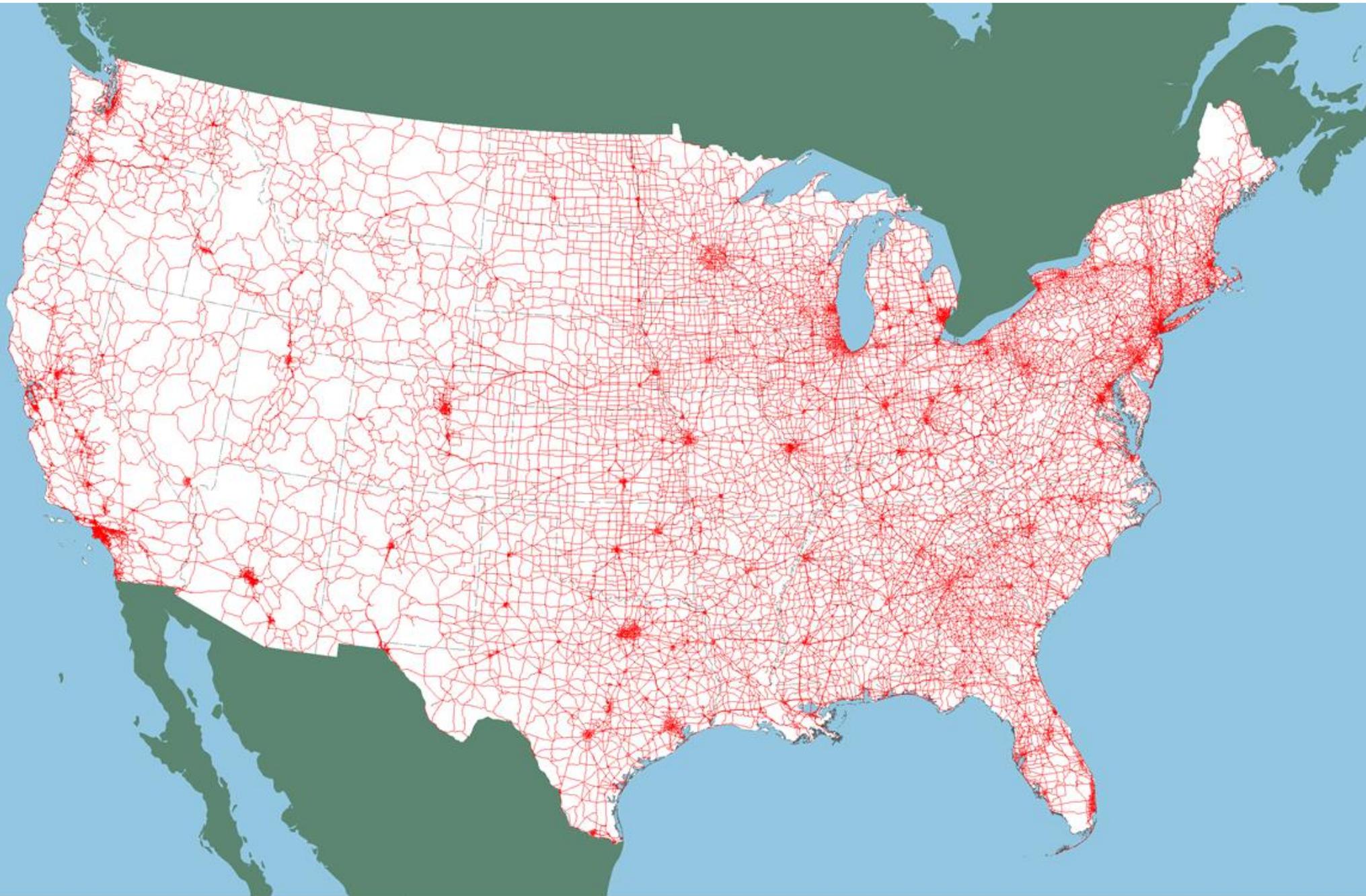


FAF Network Coverage

- 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



Routable FAF Network



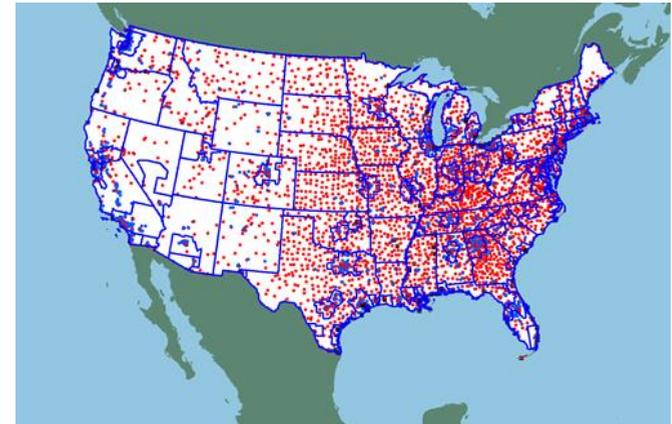
Network Assignment Components

- O-D matrix
- Rutable 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



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



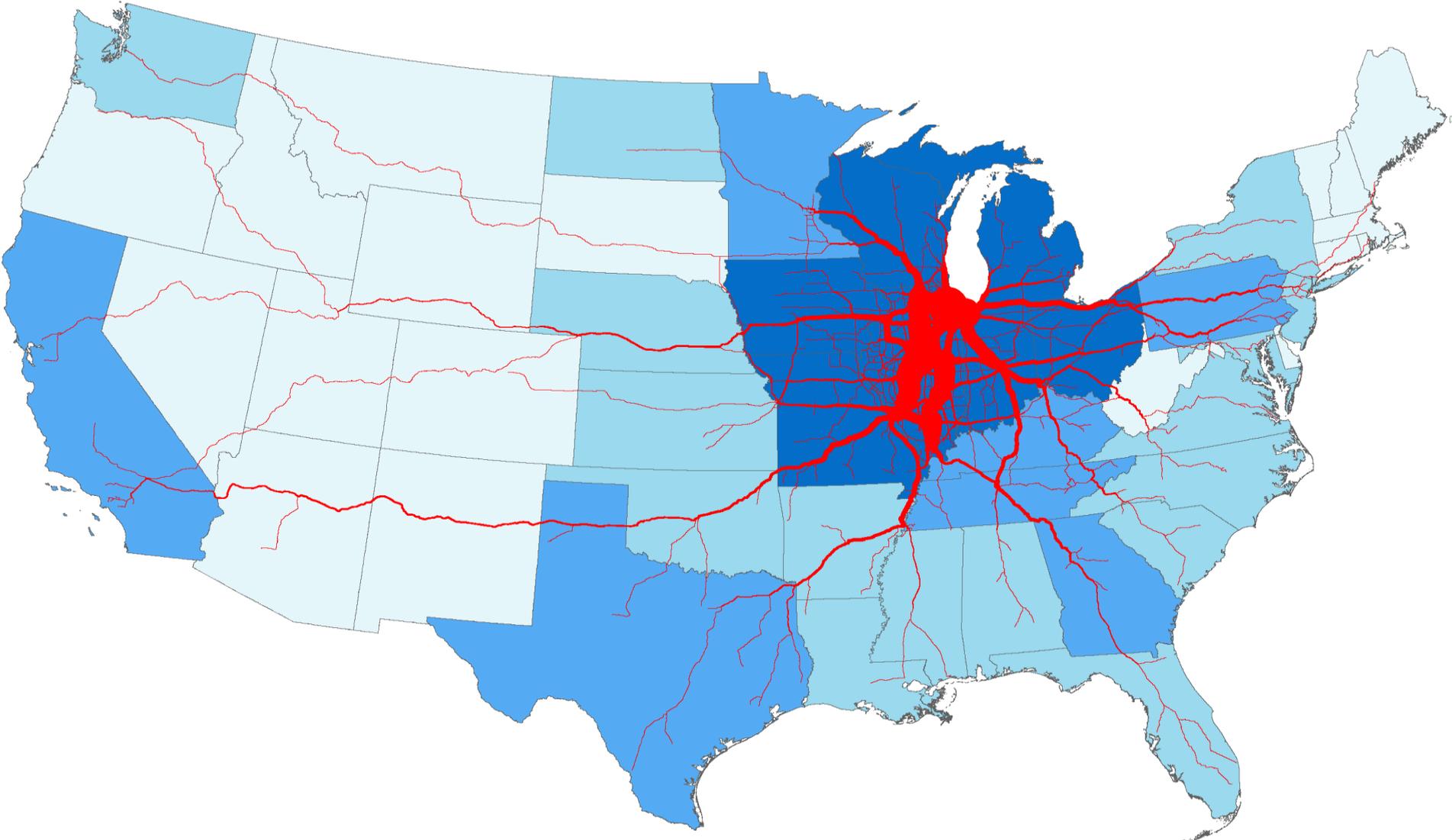
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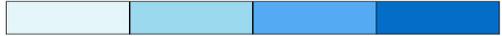
Trucks on the Network



Major Truck Freight Flows by State



State to state flows (million tons/year)



0 1 5 10+

Volume scale (freight trucks/day)



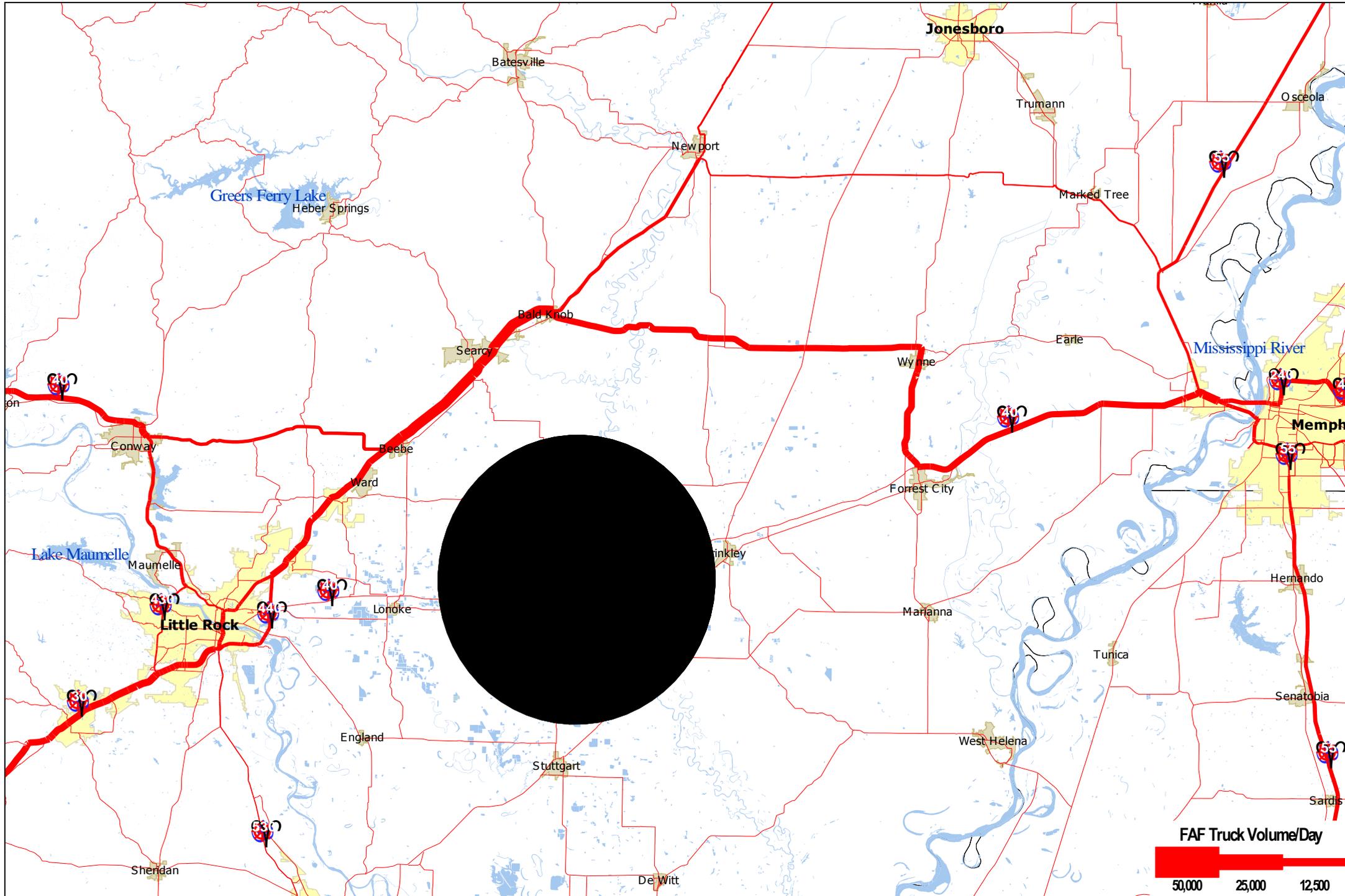
3,750 7,500 15,000

Diversion Analysis Example

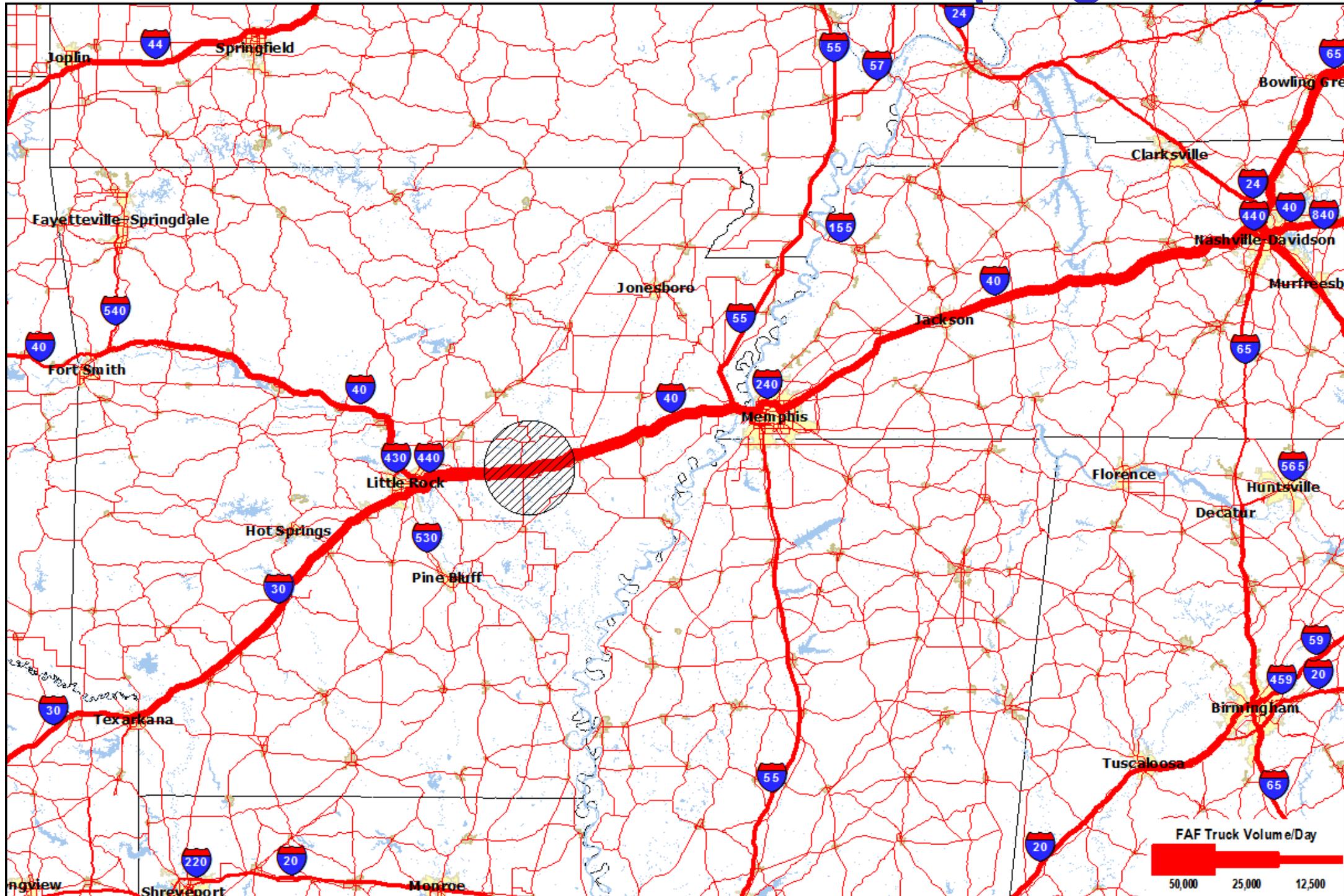
- May 2011 - a section of I-40 in Arkansas was closed due to flooding from the White River
- Major non-interstate routes in the surrounding area were also flooded or closed because of the possibility for flooding
- Of the ~31,000 vehicles that cross the I-40 White River Bridge on an average day, an estimated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



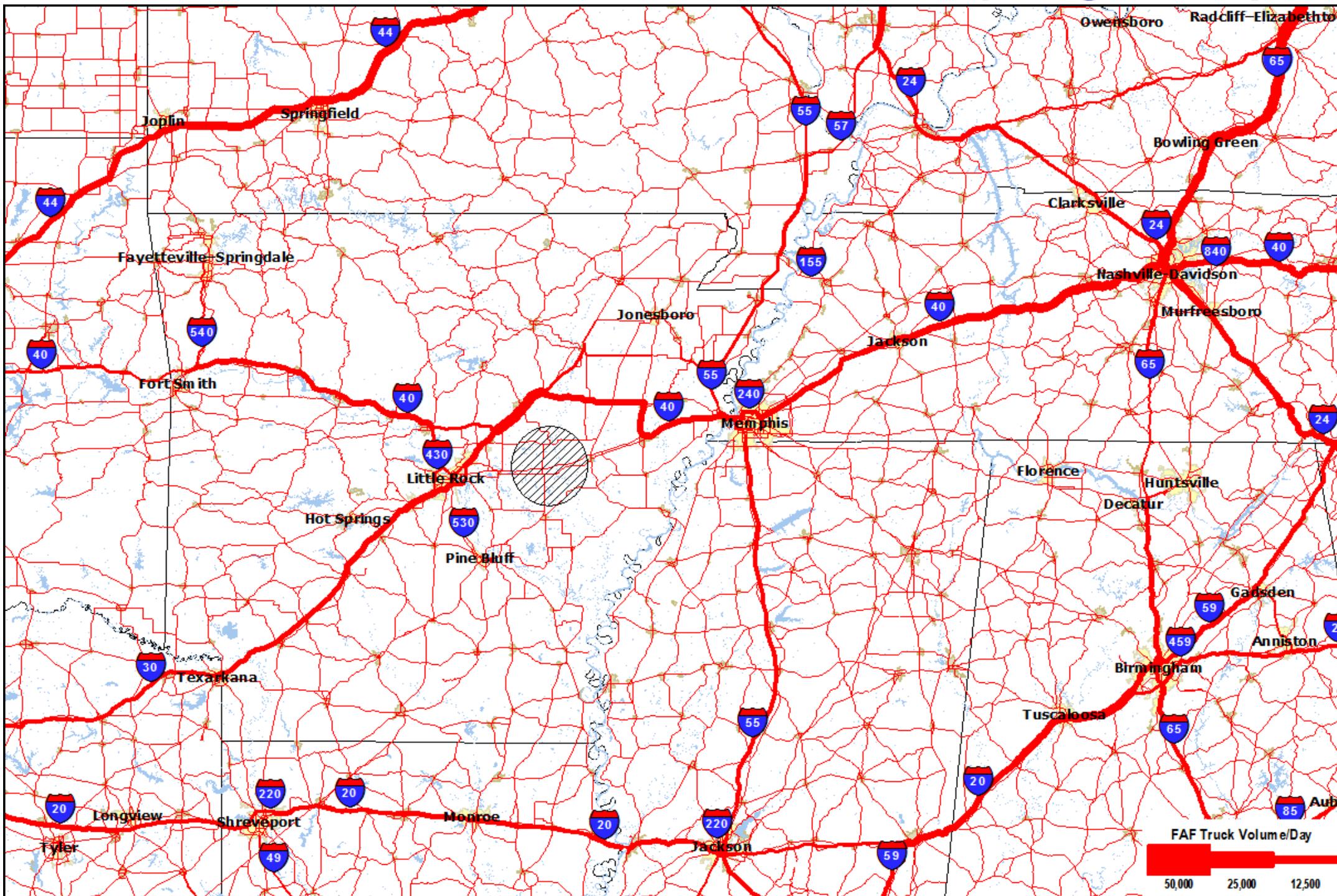
Post-Scenario FAF Truck Flow (Local)



Pre-Scenario FAF Truck Flow (Regional)



Post-Scenario 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





Freight Analysis Framework

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

- [FAF³ Network Database and Flow Assignment for 2007 and 2040](#)

FAF³ Documentation

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

• Freight Analysis Framework Version 3

- [Overview](#)
- [Version Descriptions](#)
- [Summary Statistics](#)
- [Data Tabulation Tool](#)
- [FAF³ 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](#)

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



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*



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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