# How the Maryland State Data Center is Using LED Data

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# Maryland State Data Center



- Part of the Maryland Department of Planning
- Founded in 1979
- Monitors development trends
- Analyzes social, economic and other characteristics
- Prepares population, housing, employment, labor force, and income projections
- Provides the baseline for planning for growth and development in the State
- http://planning.maryland.gov/msdc/

# Before LED: Lack of Adequate Data



- Few public data sources allow measurement of small-area employment and commuting distance
- Decennial Census and ACS:
  - Measure commute time, not distance
  - Has small-area data for where workers live (block groups), but not for where they work since the 2000 CTPP
  - 2006-08 CTPP has origin-destination for counties and large places only
  - Will the 2005-09 CTPP correct this?
- Public QCEW Data / BEA Employment Data
  - Lacks small-area data
  - Has data suppression issues

# LEHD Data Benefits



- Tracks origins and destinations of workers
- Uses a reasonably small geography (blocks)
- Separates workers into three:
  - Age groups
  - Income groups
  - Industry categories
- Based on a large dataset with near-national coverage, allows comparisons to other regions
- Tracks commuting patterns over time, is updated yearly

# LEHD Data Limitations



- Suppression of small areas for O/D data
- Synthetic data to protect confidentiality
- Lack of data on non-QCEW employment and sole proprietors
- Lack of Federal civilian employment data
- Lack of data for commuters to Washington, D.C.

# Locating Federal Workers and Maryland – Washington, D.C. Commuters

- Federal civilian workers make up a large percentage of both residents and workers in Maryland
- Washington, D.C. is a major source of employment for Maryland residents
- The lack of data for Federal civilian and D.C. workers who reside in Maryland is a major gap that needs to be filled

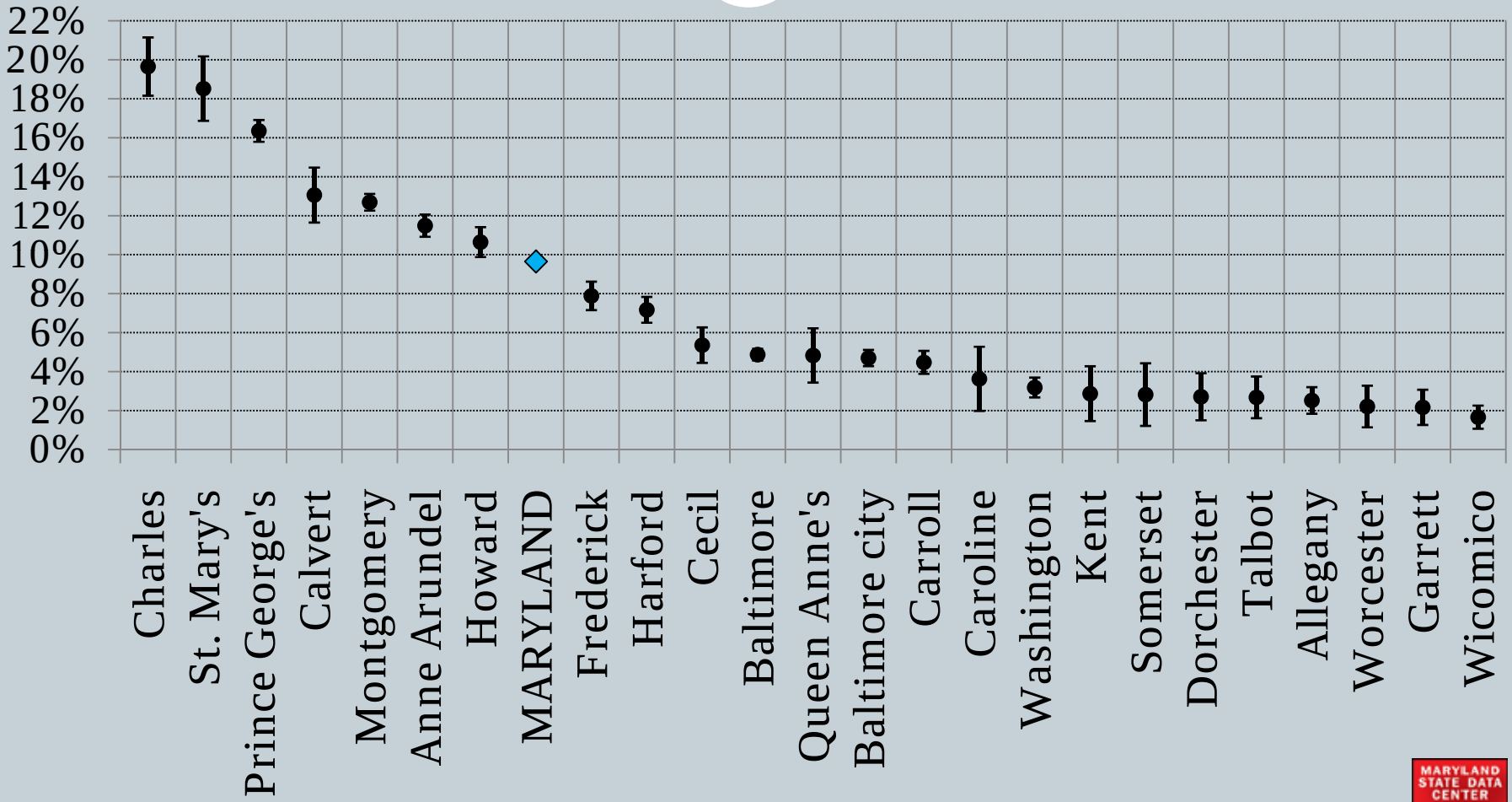
# Federal Employment Data for Maryland



- MD hosted 135,281 Fed. QCEW jobs in 2010:Q1
  - 5.7% of all QCEW jobs in State
- 278,618 (+/-5,071) Federal civilian workers resided in MD in the 2006-08 period
  - 9.6 percent (+/- 0.2) of all employed persons residing in Maryland in the 2006-08 period
- While these data are not directly comparable, it is what we have to work with

# Percentage of Workforce who were Federal Civilian Workers, 2006-08



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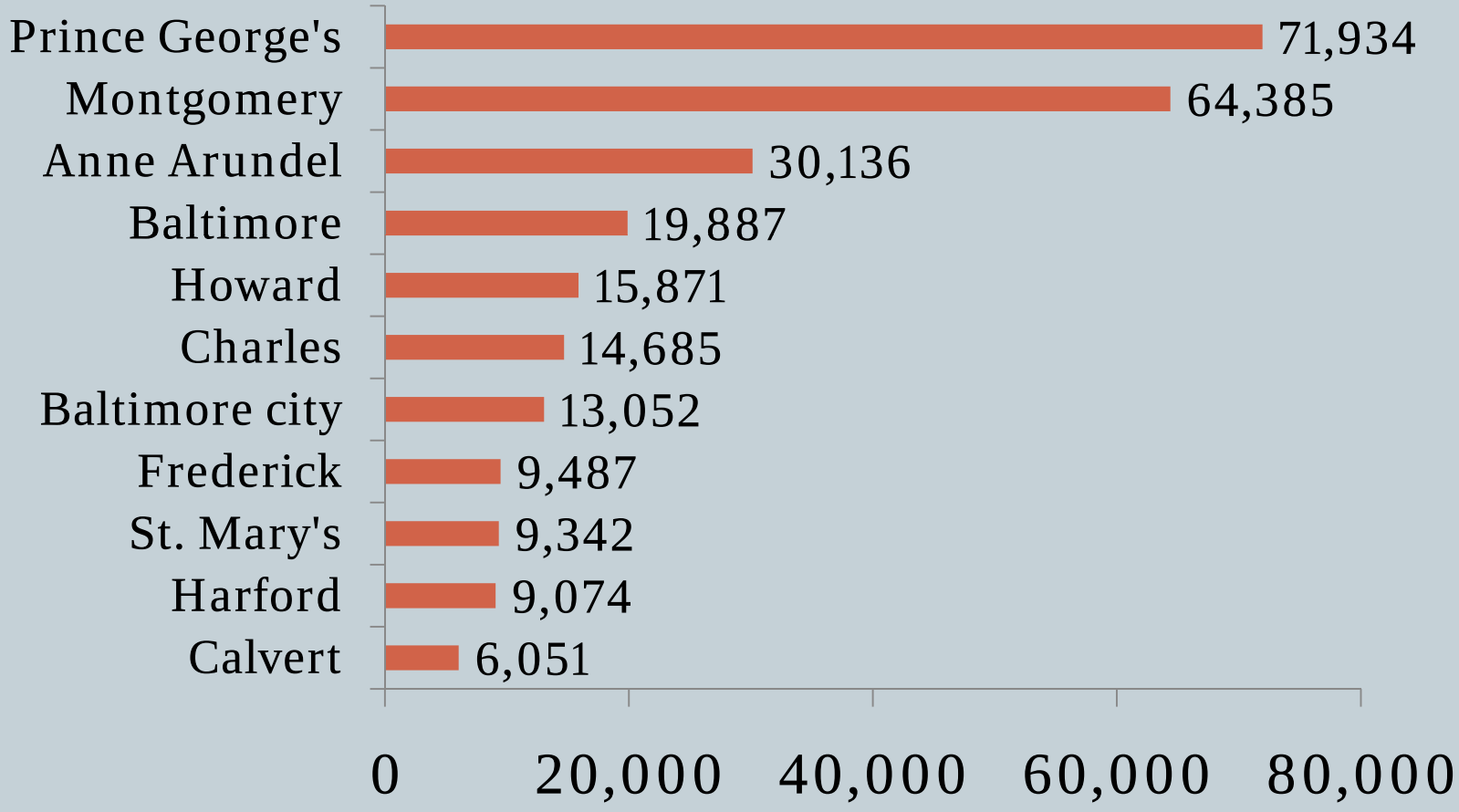
# Number of Workers who were Federal Civilian Workers, 2006-08 (Top 10 Jurisdictions)



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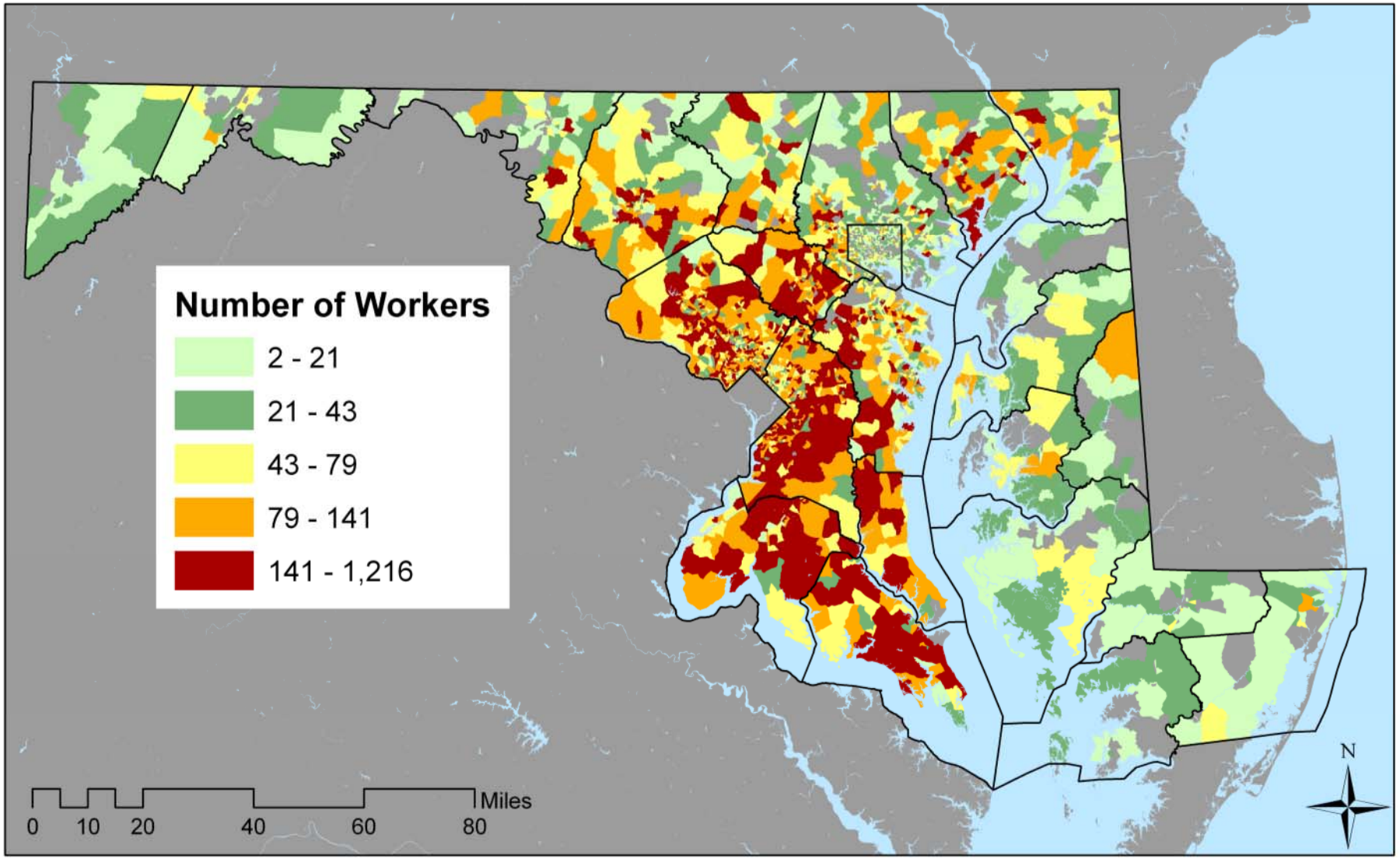
# Modeling Federal Employment in Maryland



**Resident Workers**:

- Draw federal employment by Block Group from the 2005-09 ACS (ignoring massive MoEs)
- Calculate percentage of housing units that lie within each of the blocks that form each block group
- Distribute federal employment by block based on weighted average of housing units by block
- Check sum of Federal employment to ensure it matches State total

# Residence Location of Federal Civilian Workers in Maryland by Block Group, 2005-09

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# Modeling Federal Employment in Maryland



**Location of QCEW Jobs:**

- Point locate major Federal employers in MD
- Use various sources to assign Federal civilian employment numbers to each point
- Use QCEW data by Jurisdiction as a check on employment numbers
- Now that workplace and residence of Federal civilian workers have been estimated, can O-D data be?

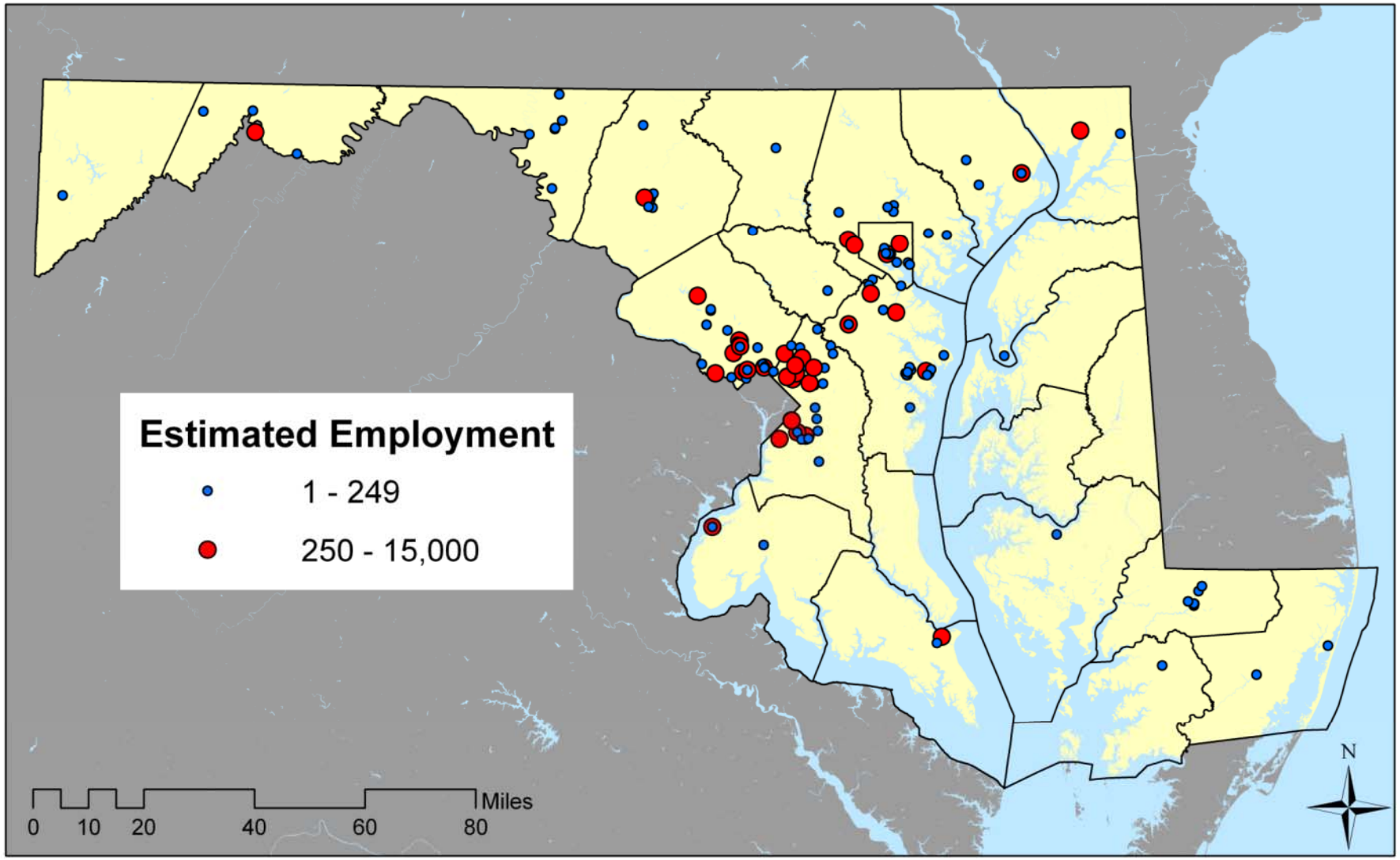
# Federal Civilian Jobs by Workplace



- Largest Federal Employers in 2010:
  - Fort George G. Meade (41,000, but includes NSA and military employment)
  - National Institutes of Health (17,842)
  - Aberdeen Proving Ground (13,984, but includes military)
  - U.S. Social Security Administration (13,000)
  - Naval Air Station Patuxent River (10,965, includes mil.)
  - National Naval Medical Center (8,108, includes mil.)
  - Joint Base Andrews Naval Air Facility Washington (8,057, includes military)

Source: Maryland Department of Business and Economic Development

## Location of Known Federal Civilian Workplaces in Maryland, 2010




Only about 50 sites employ more than 250 persons (80+ % of employment)

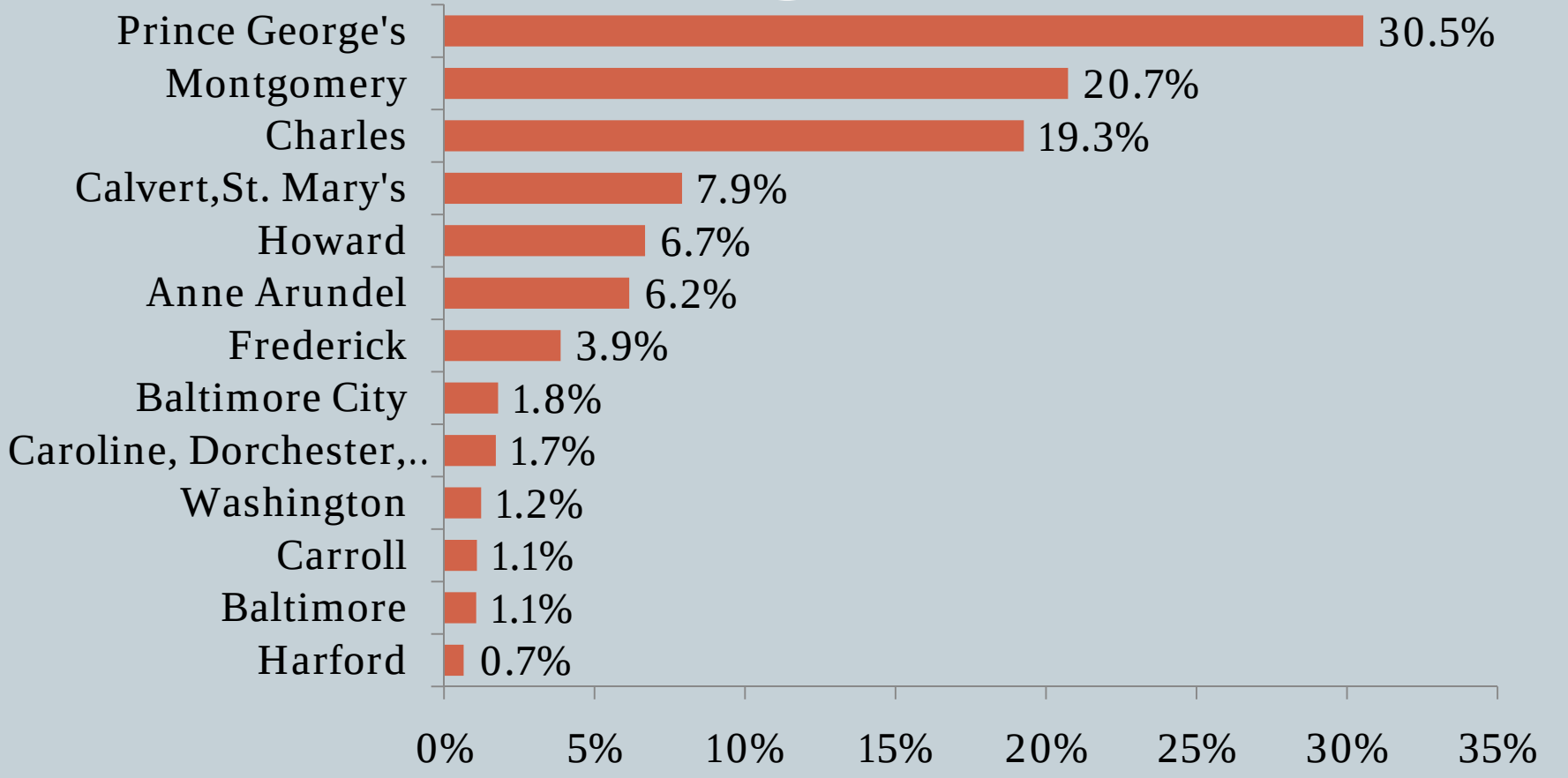
# Commuters to Washington, D.C.



- 300,405 (+/-5,220) persons commuted to Washington, D.C from Maryland in the 2006-08 period
  - This represents 10.4 percent (+/- 0.2%) of all workers who resided in Maryland at that time
- Commuting data is available through PUMS
  - PUMS data allows Federal employment to be tracked, avoiding duplication
  - County CTPP data can be used to check multi-county PUMAs
- Employment can be distributed to blocks within PUMAs using weighted averages

# Percentage of Resident Workers Commuting to Washington, D.C.



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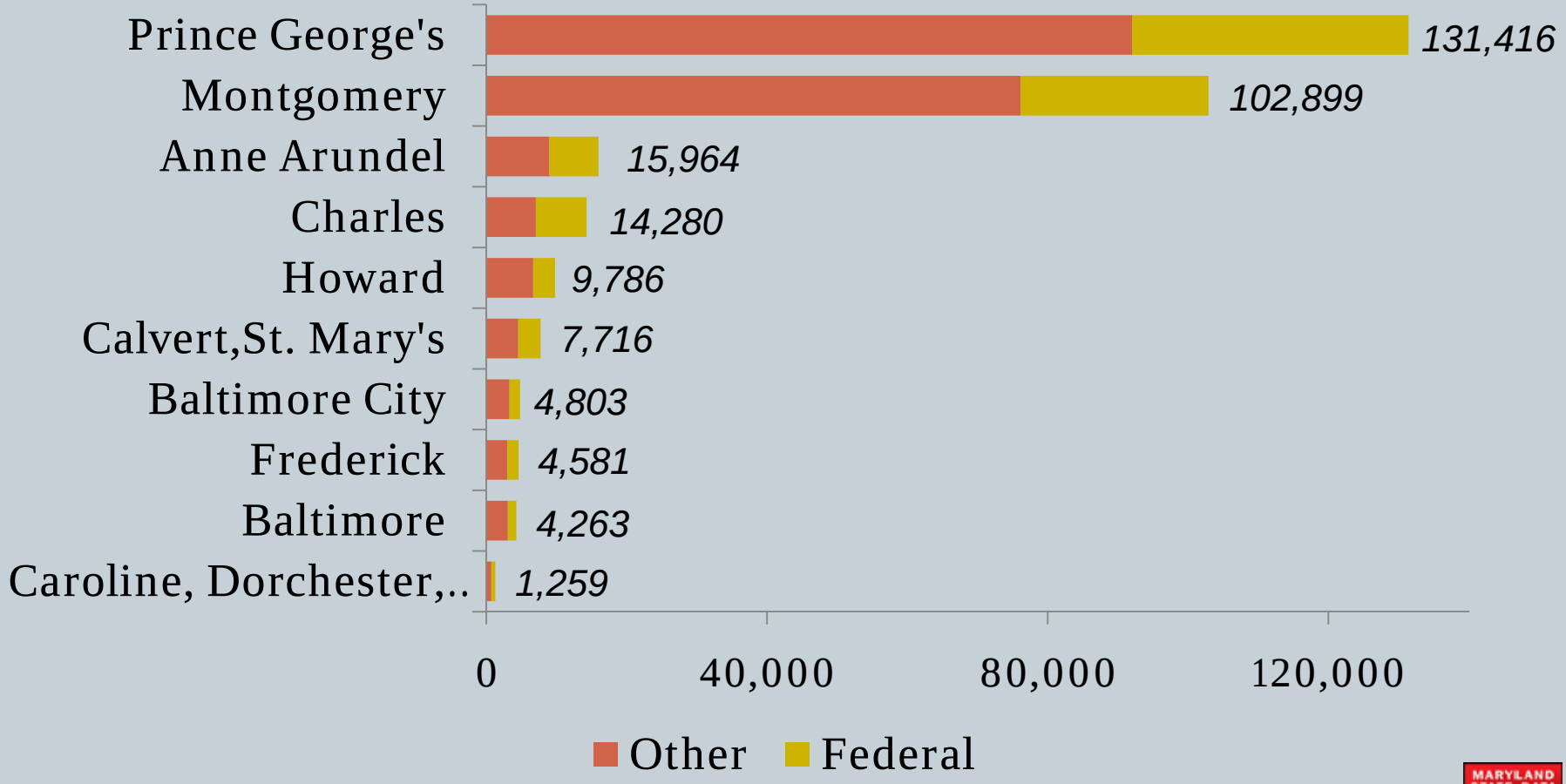


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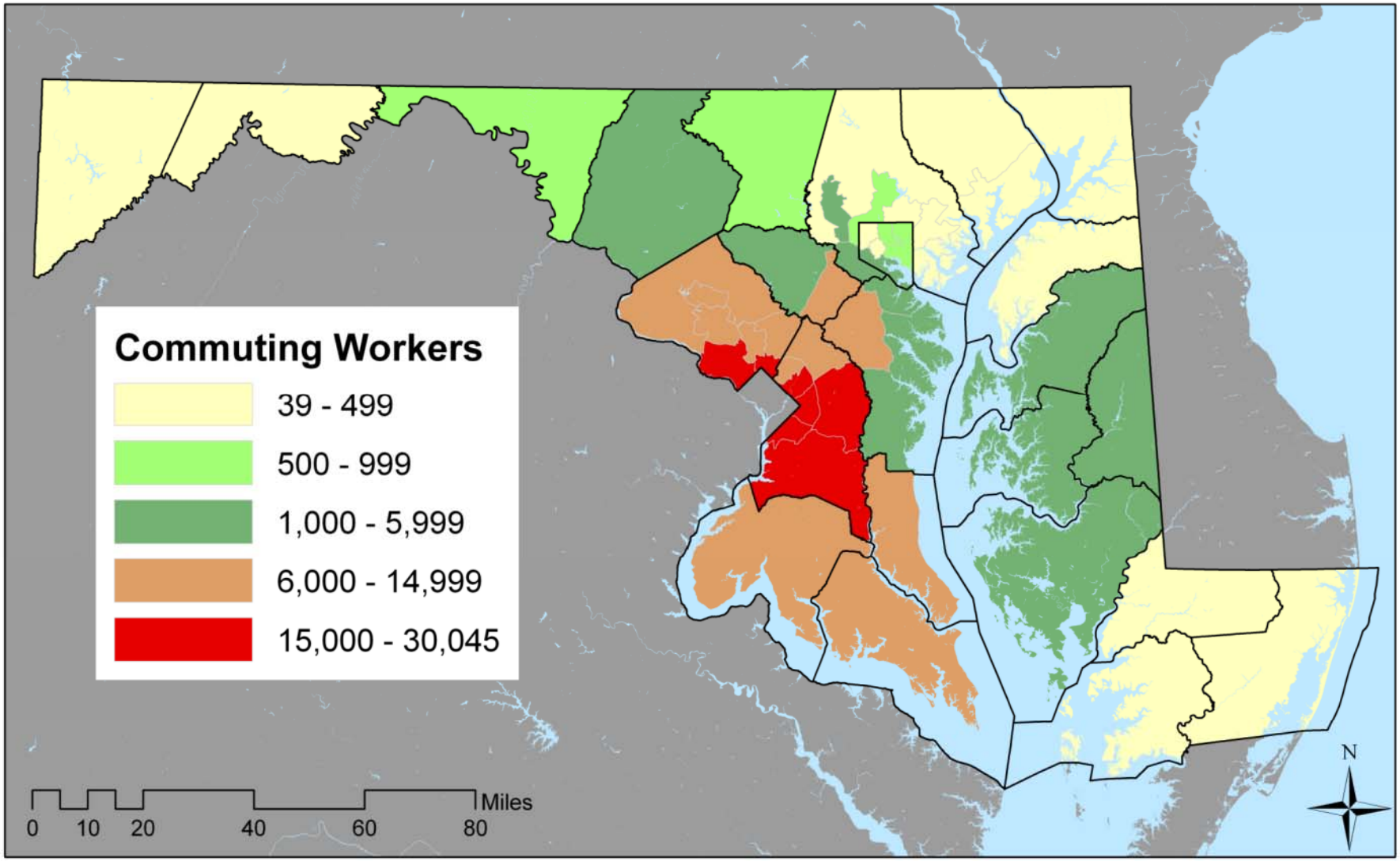
## Commuters from Maryland to Washington, D.C by PUMA, 2006-08

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# Research in Progress

- Tag each Census block in Maryland with identifying values:
  - Inside or outside Priority Funding Areas
  - Incorporated or not, or part of a Census Designated Place
  - Serviced by public sewer or water
  - Within certain distances from transit stops
  - Etc.
- Estimate commute lengths by distance
- Track origins and destinations of workers
  - Inside/outside PFA
  - By income

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# Overlaying Census Blocks With Identifying Features

- The census 2000 block layer from TIGER was overlayed with various other data layers in ArcGIS10. Data from these other layers was joined to the block layer using the program's 'Spatial Join' function

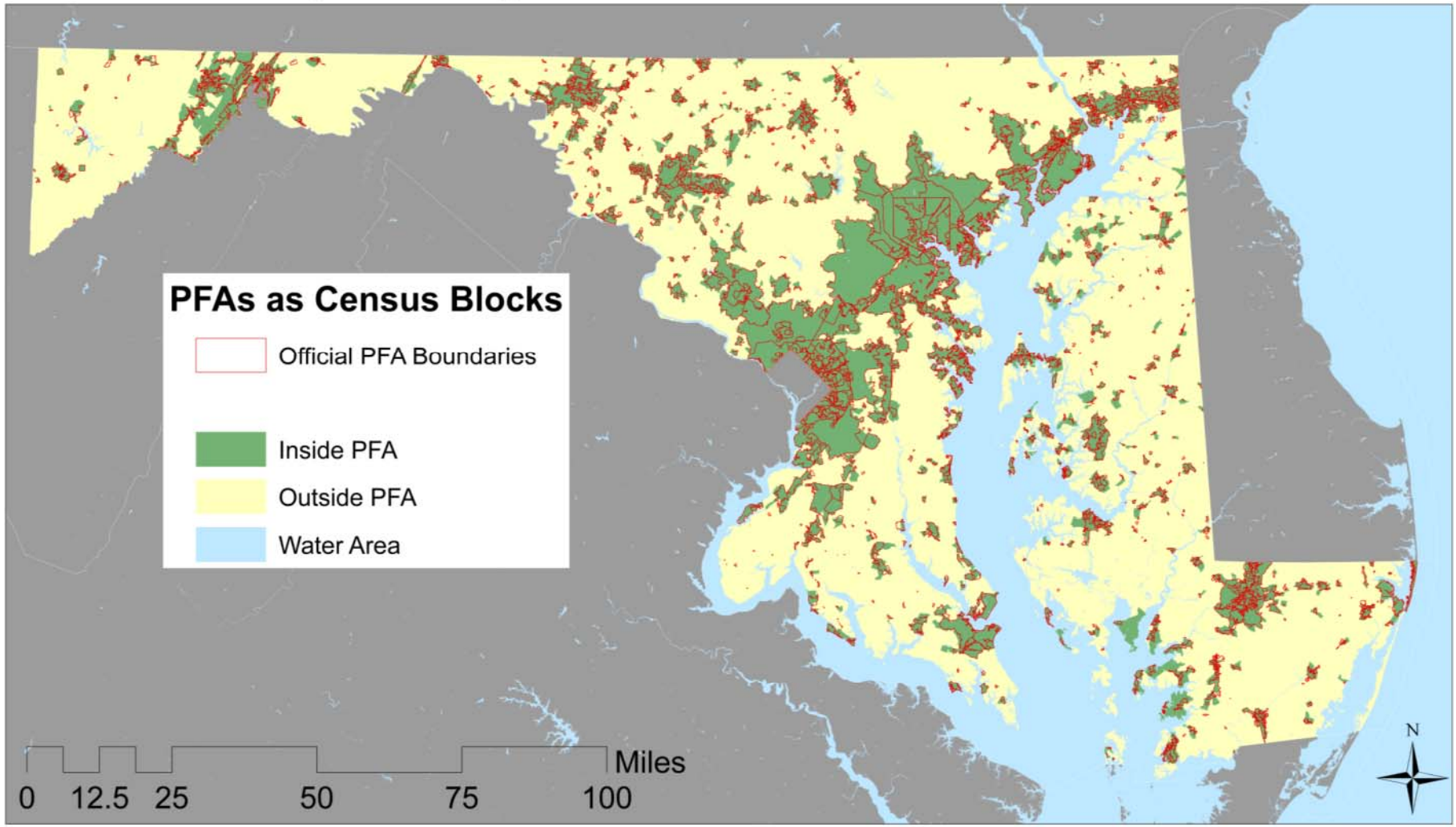
- To overlay PFA data, multiple methods were used. A combination of parcel points and overlays was used to make up for the fact that PFA boundaries do not match Census block boundaries

# Priority Funding Areas (PFAs)

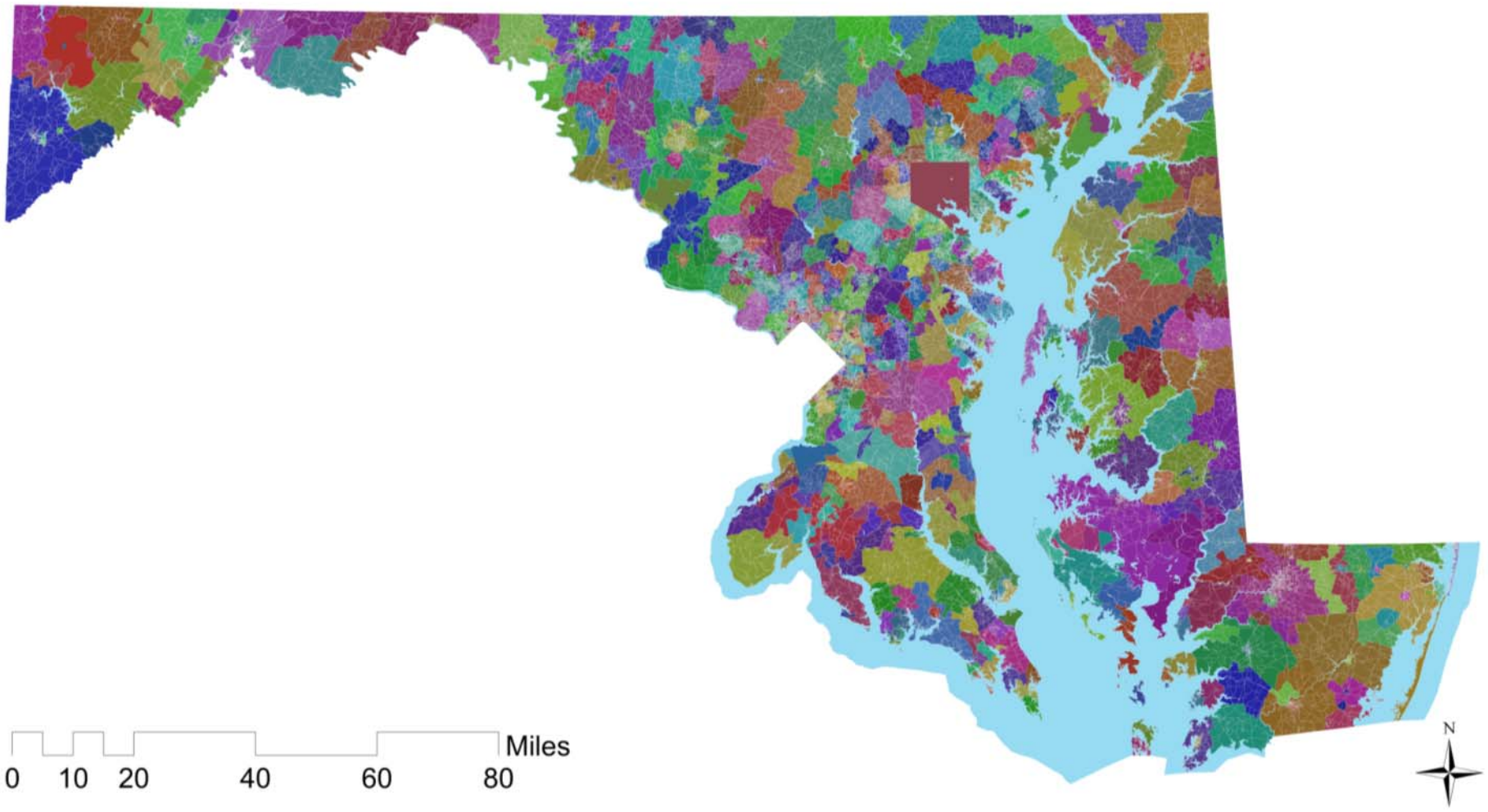


- Maryland's "Priority Funding Areas":
  - Were created by the 1997 Priority Funding Areas Act
  - Direct state investment into "existing communities and places where local governments want State investment to support future growth."
  - Consist of:
    - every municipality, as they existed in 1997;
    - areas inside the Washington Beltway and the Baltimore Beltway;
    - areas already designated as enterprise zones, neighborhood revitalization areas, heritage areas and existing industrial land;
    - Areas designated by local governments for future industrial, commercial, or residential growth.

# Priority Funding Areas Translated to Census Blocks



# Area Names for Residence, Workplace, and O-D Analysis



# Usefulness of Identified Blocks

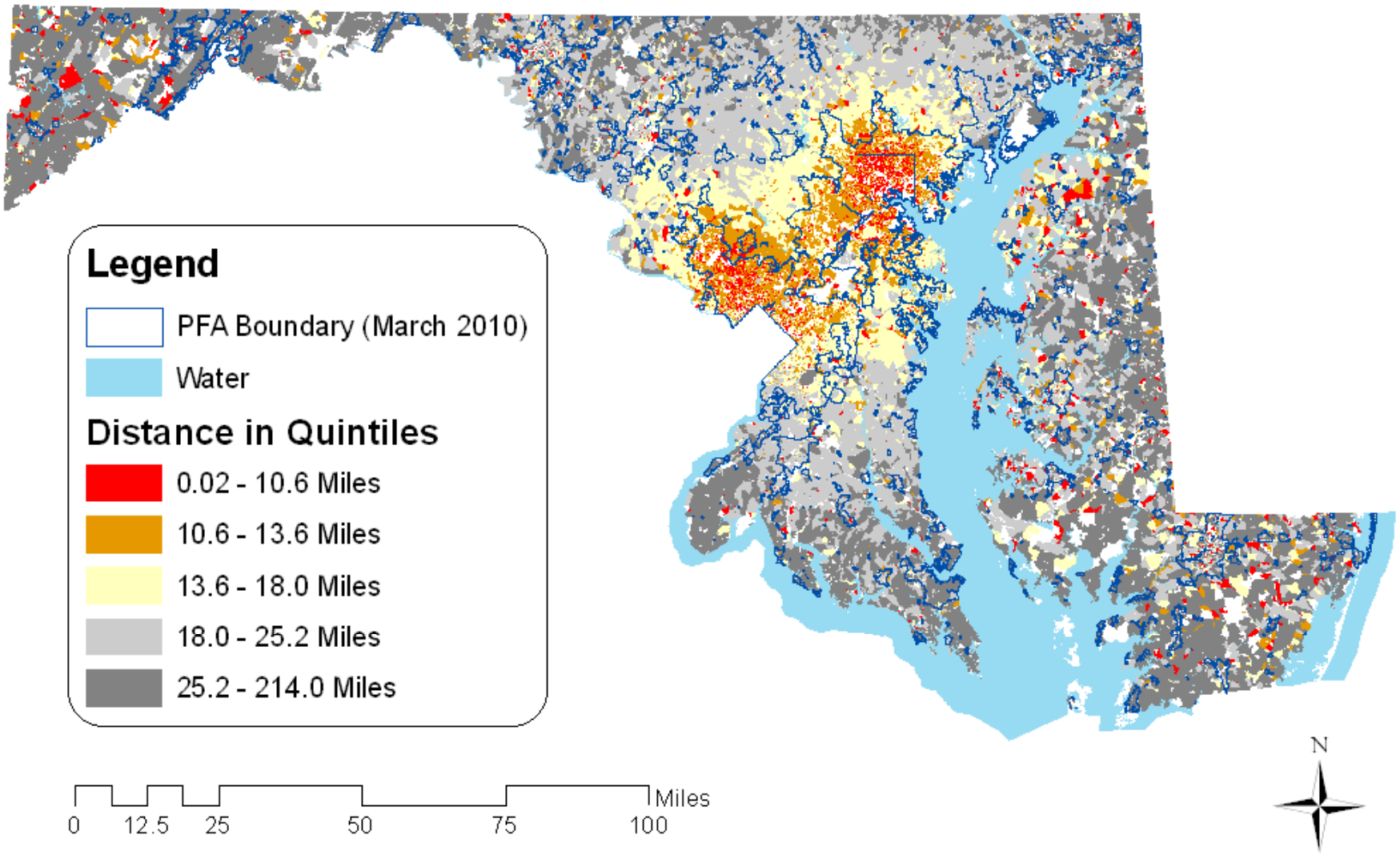


- Blocks can be overlayed with almost any data layer
- Spatial analysis can be conducted on many questions:
  - Average housing unit sales price by distance to workplace
  - PFAs that lack local employment for residents
  - Growth of economic activity on environmentally sensitive areas
- Currently, area names are being reviewed for "truthiness"
- Near-nationwide LEHD coverage allows comparisons to non-Maryland areas

# Measuring Average Distance to Workplace for Maryland Residents

- Distance between block centroid points for 2008 data was calculated using the "spherical law of cosines." (LEHD 5 data saves this step)
- Distance data was aggregated using the PFA overlay discussed previously
- Data shows commute distances vary for people residing inside and outside PFAs, but not all PFAs are equal
- Presented to APDU, September 2010

# Average Distance to Workplace from Residence by Census Block for Persons Who Live and Work in Maryland (by Residence Block), 2008




Note: Excludes Federal civilian workers

# Results of 2008 Commute Distance Analysis



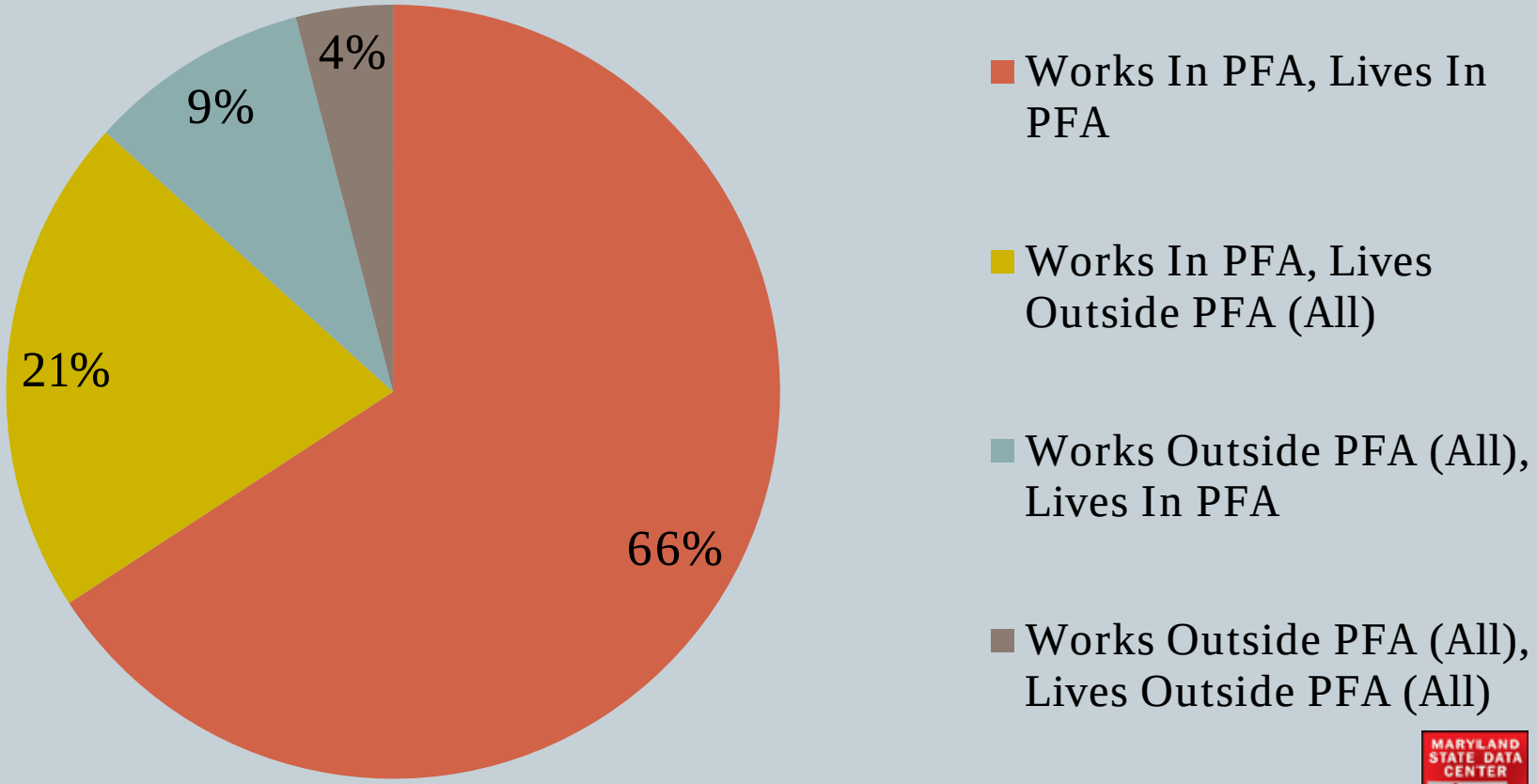
| Works | Resides | Total Workers | Percentage of Workers | Distance (mi) | Average (mi) |
|---|---|---|---|---|---|
| In PFA | In PFA | 1,684,407 | 65.8% | 25,521,380 | 15.2 |
| In PFA | Outside PFA (In MD) | 339,460 | 13.3% | 7,829,454 | 23.1 |
| In PFA | Outstate | 195,270 | 7.6% | 7,595,898 | 38.9 |
| Outside PFA (In MD) | In PFA | 96,396 | 3.8% | 1,872,985 | 19.4 |
| Outside PFA (In MD) | Outside PFA (In MD) | 52,024 | 2.0% | 740,847 | 14.2 |
| Outside PFA (In MD) | Outstate | 16,129 | 0.6% | 670,058 | 41.5 |
| Outstate | In PFA | 140,650 | 5.5% | 5,126,210 | 36.4 |
| Outstate | Outside PFA (In MD) | 35,507 | 1.4% | 1,405,926 | 39.6 |
| Total | | 2,559,843 | 100.0% | 50,762,759 | 19.8 |

Note: Excludes Federal civilian workers and Maryland residents who commute to Washington, D.C.

# Results of 2008 Commute Distance Analysis



Percentage of Workers Living and Working In and Out of PFA

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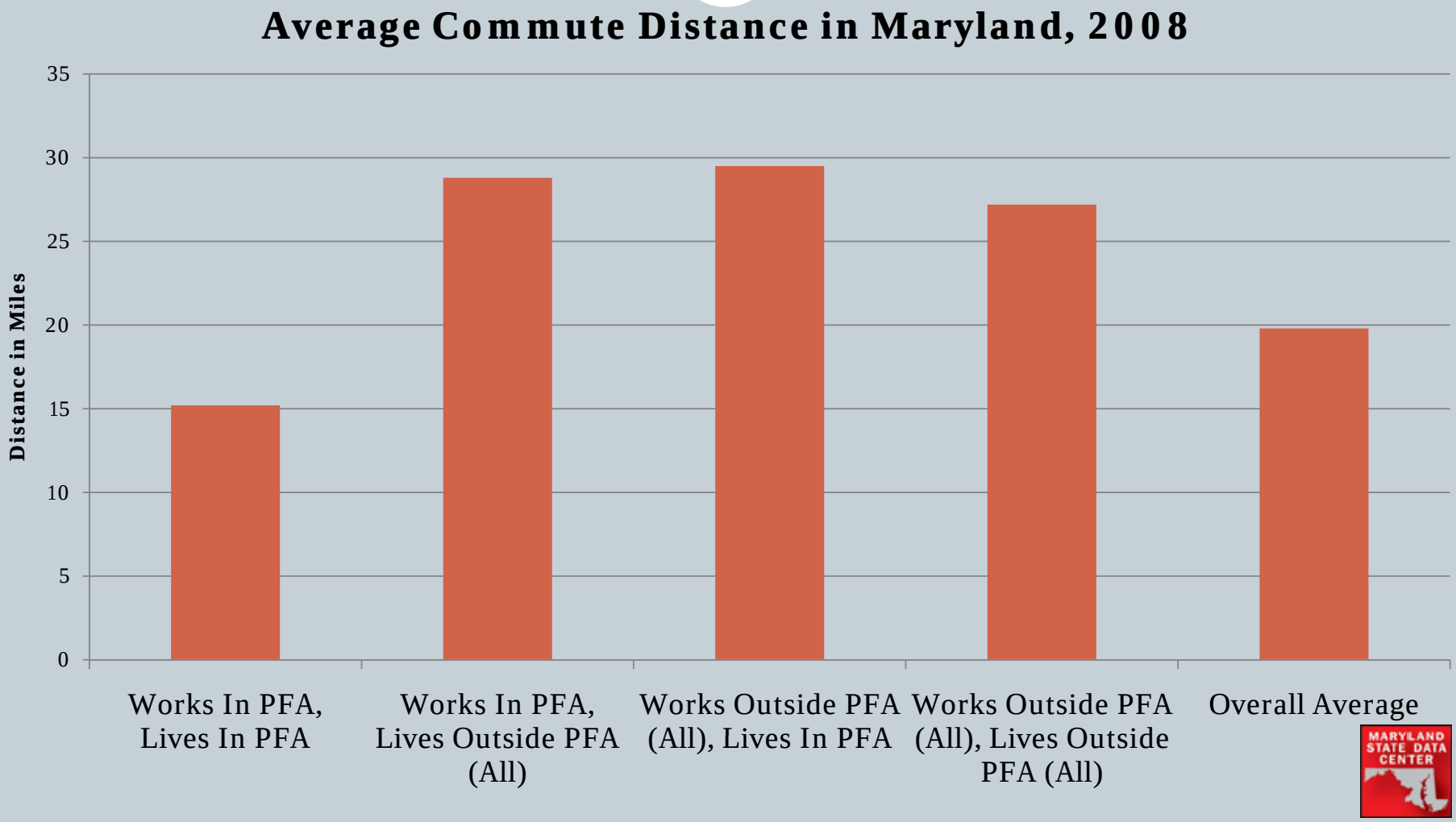



Note: Excludes Federal civilian workers and Maryland residents who commute to Washington, D.C.

# Distance Analysis Limitations



- Not measuring commutes, but distance to workplace (really, payroll processing location)
- Not actual distance, but centroid-to-centroid distance
- Some blocks are larger than others, a problem when calculating distance matrices
- Formula result is air distance only, does not take road system into account
- Some commute lengths are very long, implying that workers do not actually work at their "workplace"
  - Extreme commuting may be an issue, telecommuting is more likely

# Next Steps for Distance Analysis

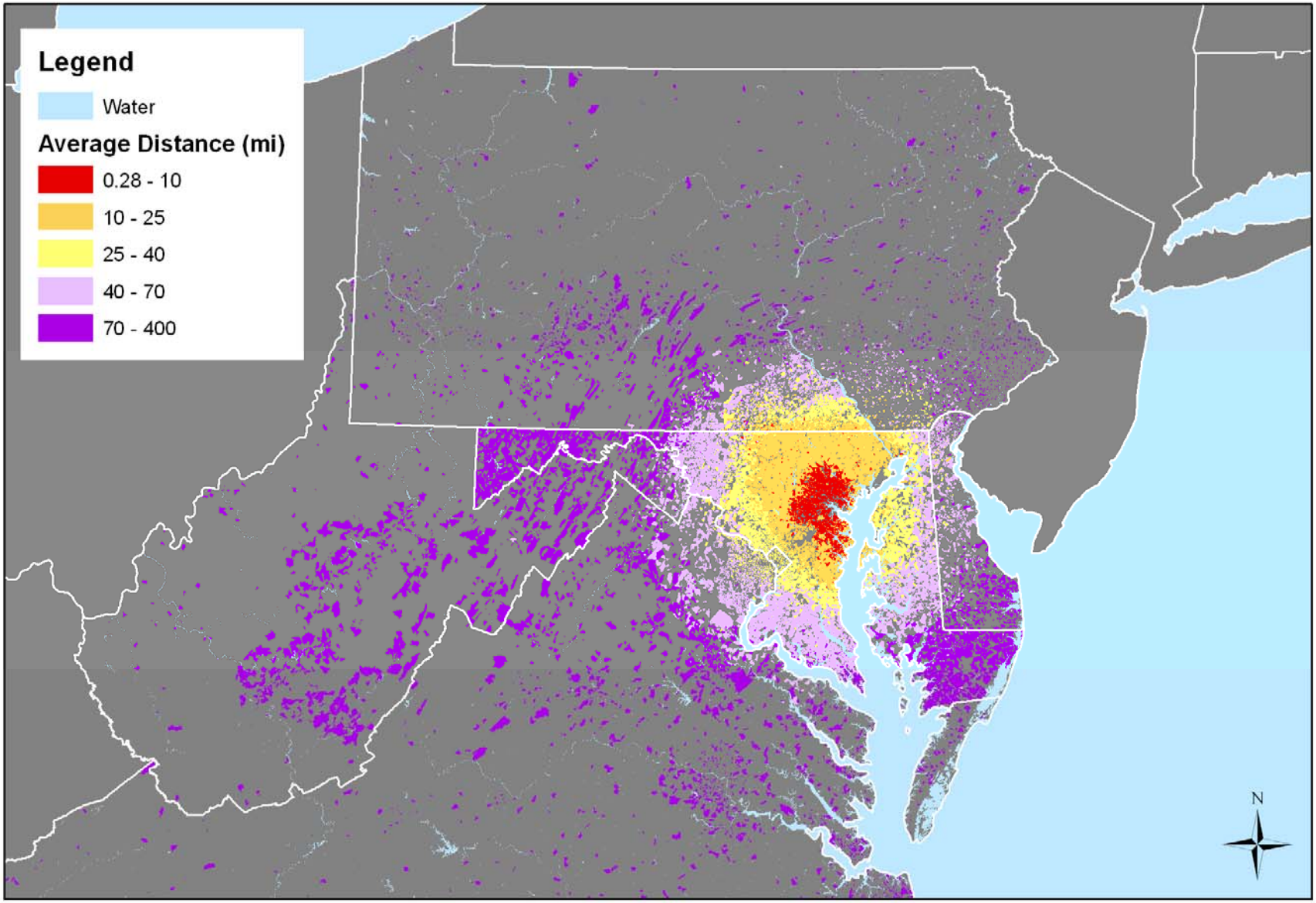


- Calculate distance on road network for sample of origins and destinations
  - Create a multiplier to adjust “air distance” to road distance
- Experiment with different job categories:
  - Primary
  - Private
- More research on extreme commuting vs. data anomalies
- Download 2009 data when available (6 weeks?)
  - 2009 Data released 2/15/2011
  - Check out new variables

# Tracking the Residence of Workers in the Baltimore Metropolitan Region

- Block data was overlayed with the Baltimore Metropolitan Council's service region
- Distance and employment maps were created for workers employed in the BMC region
- Results were presented to the BMC's cooperative forecasting committee

## Average Distance to Workplace by Census Block for Workers Employed in the BMC Region, 2008

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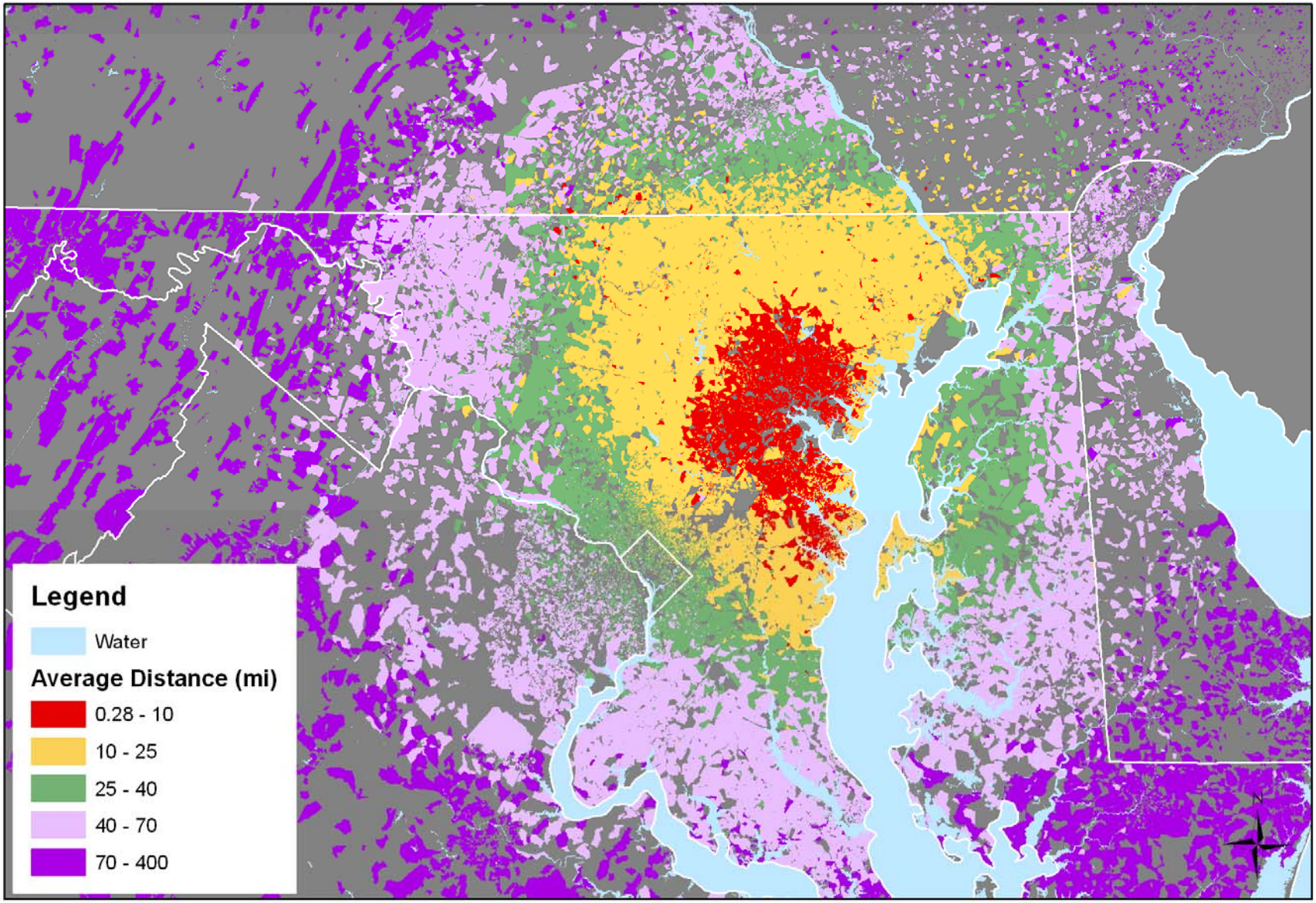
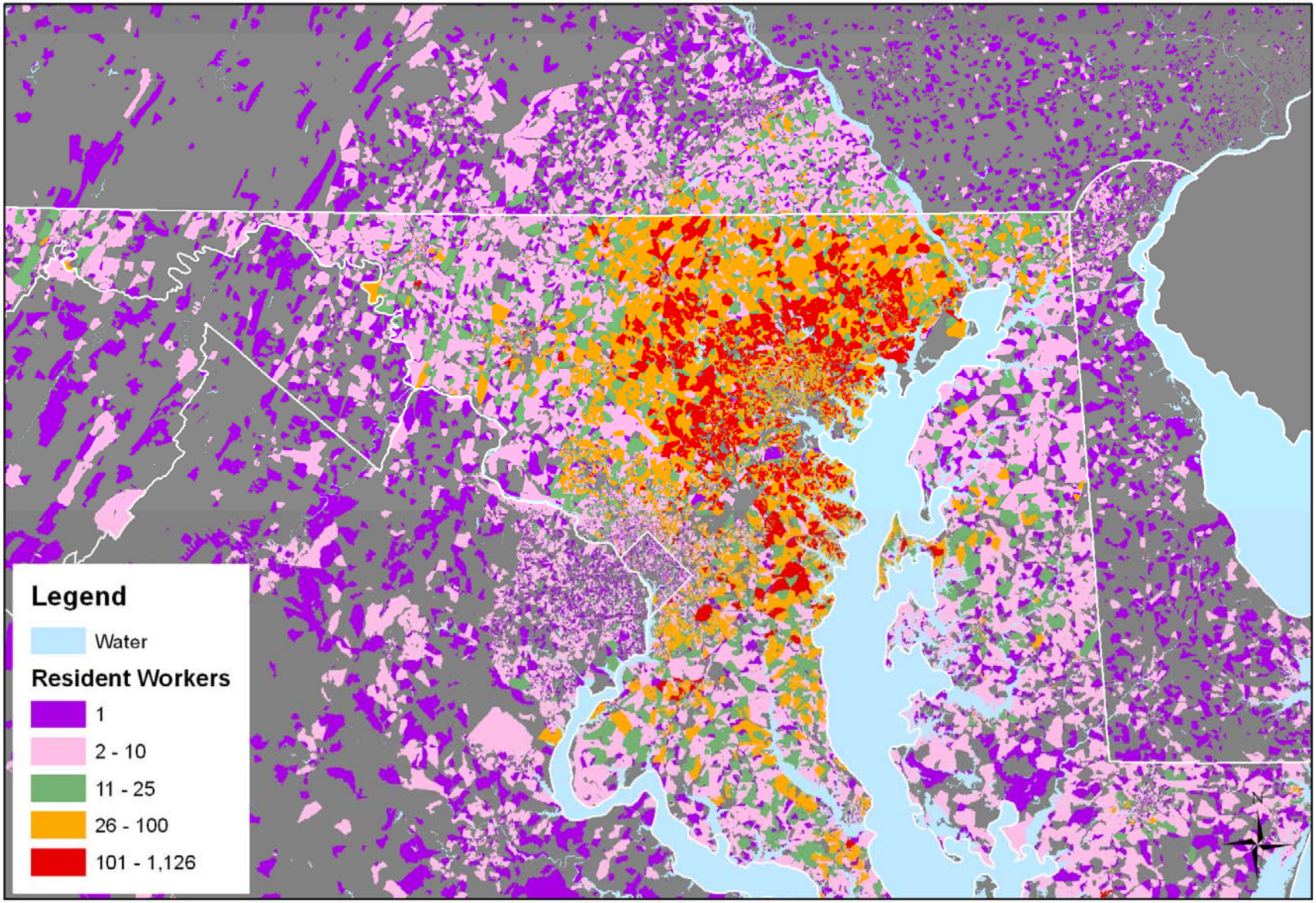



Note: Excludes Federal civilian workers

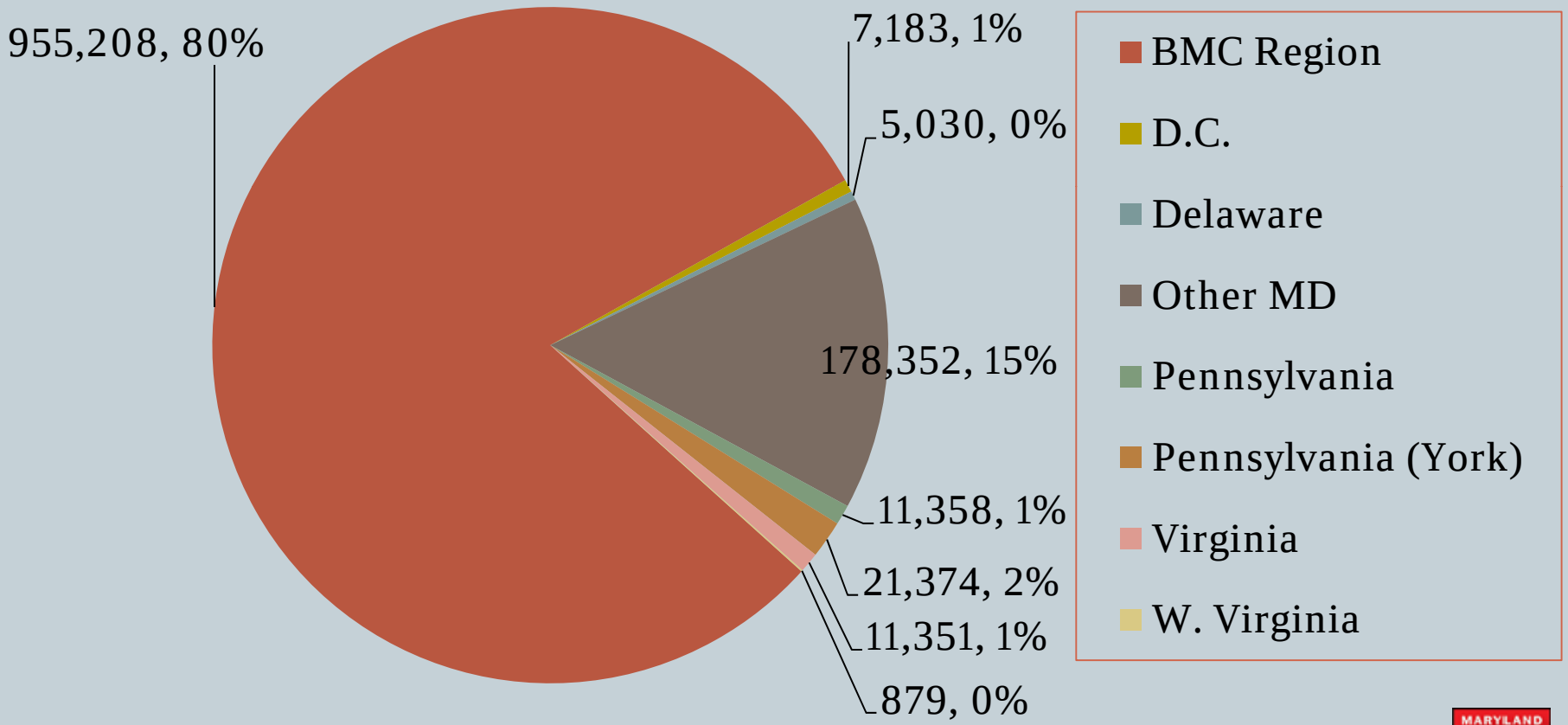
# Resident Workers by Residence Census Block Employed in the BMC Region, 2008




Note: Excludes Federal civilian workers

# Residence of BMC-Region QCEW Workers






Note: Excludes Federal civilian workers

# Distance Traveled by Workers Employed in BMC Region

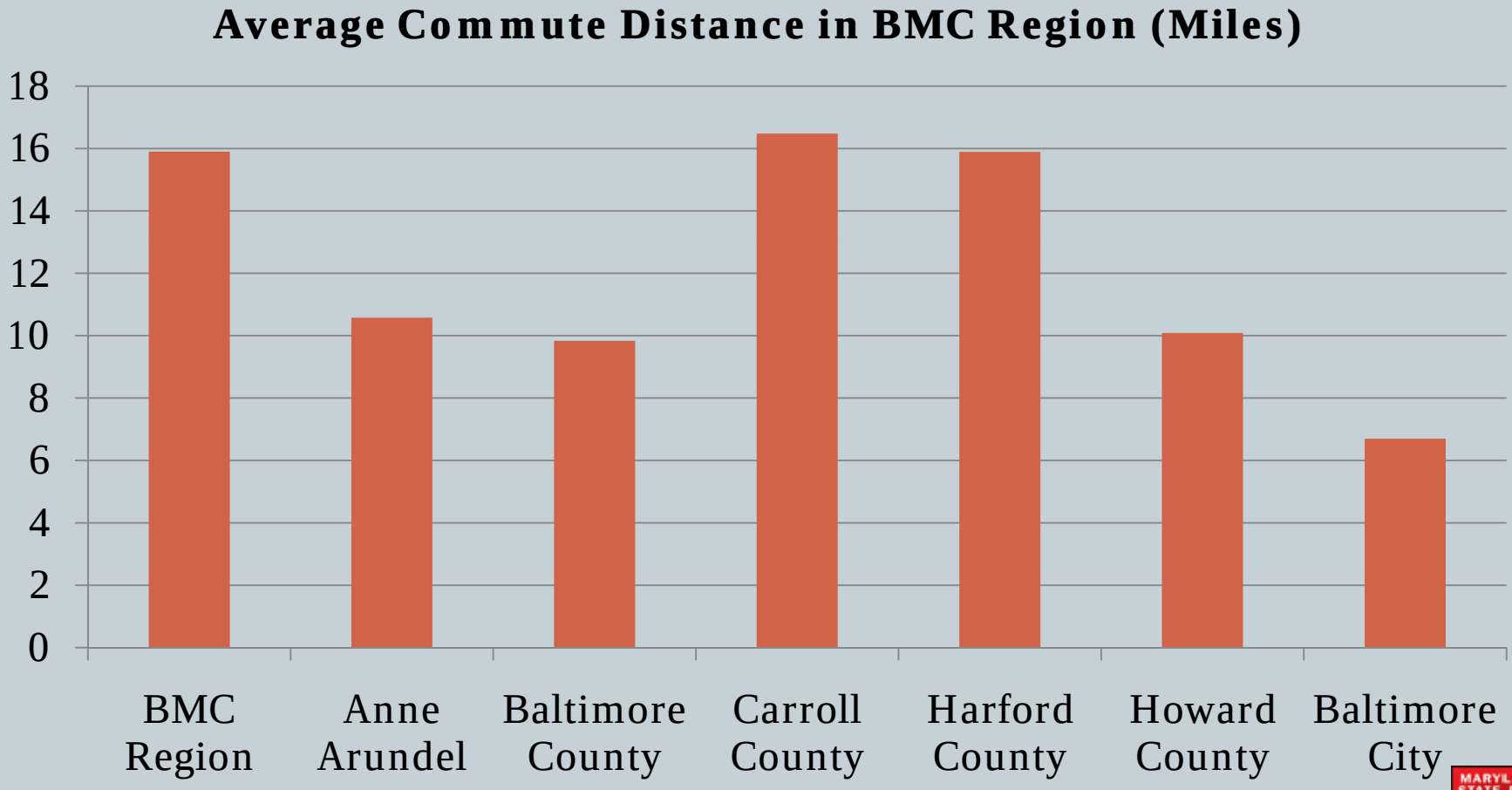


| County | Mean Distance | Median Distance | Workers (120mi Limit) |
|---|---|---|---|
| BMC Region | 15.9 | 10.6 | 1,190,735 |
| Anne Arundel | 10.6 | 9.1 | 163,750 |
| Baltimore | 9.8 | 8.7 | 332,549 |
| Carroll | 16.5 | 15.4 | 61,672 |
| Harford | 15.9 | 14.8 | 95,805 |
| Howard | 10.1 | 8.5 | 81,031 |
| Baltimore City | 6.7 | 5.1 | 220,401 |

Note: Excludes Federal civilian workers

# Distance Traveled by Workers Employed in BMC Region






Note: Excludes Federal civilian workers

# Top Five Sending Counties to BMC Region, 2008



| County | Mean Distance | Median Distance | QCEW Workers |
|---|---|---|---|
| Prince George's | 24.8 | 23.4 | 53,049 |
| Montgomery | 27.9 | 28.1 | 44,633 |
| York, PA | 32.4 | 32.5 | 21,374 |
| Frederick | 37.5 | 39.0 | 17,197 |
| Cecil | 31.7 | 31.9 | 10,726 |

Note: Excludes Federal civilian workers

# Transit-Oriented Development (TOD)

- The Maryland Department of Planning created fact sheets for the Maryland Department of Transportation highlighting information for areas around transit stops
- LED/LEHD data was used to measure characteristics of employed persons living and working around each stop
- Results are published on the Internet

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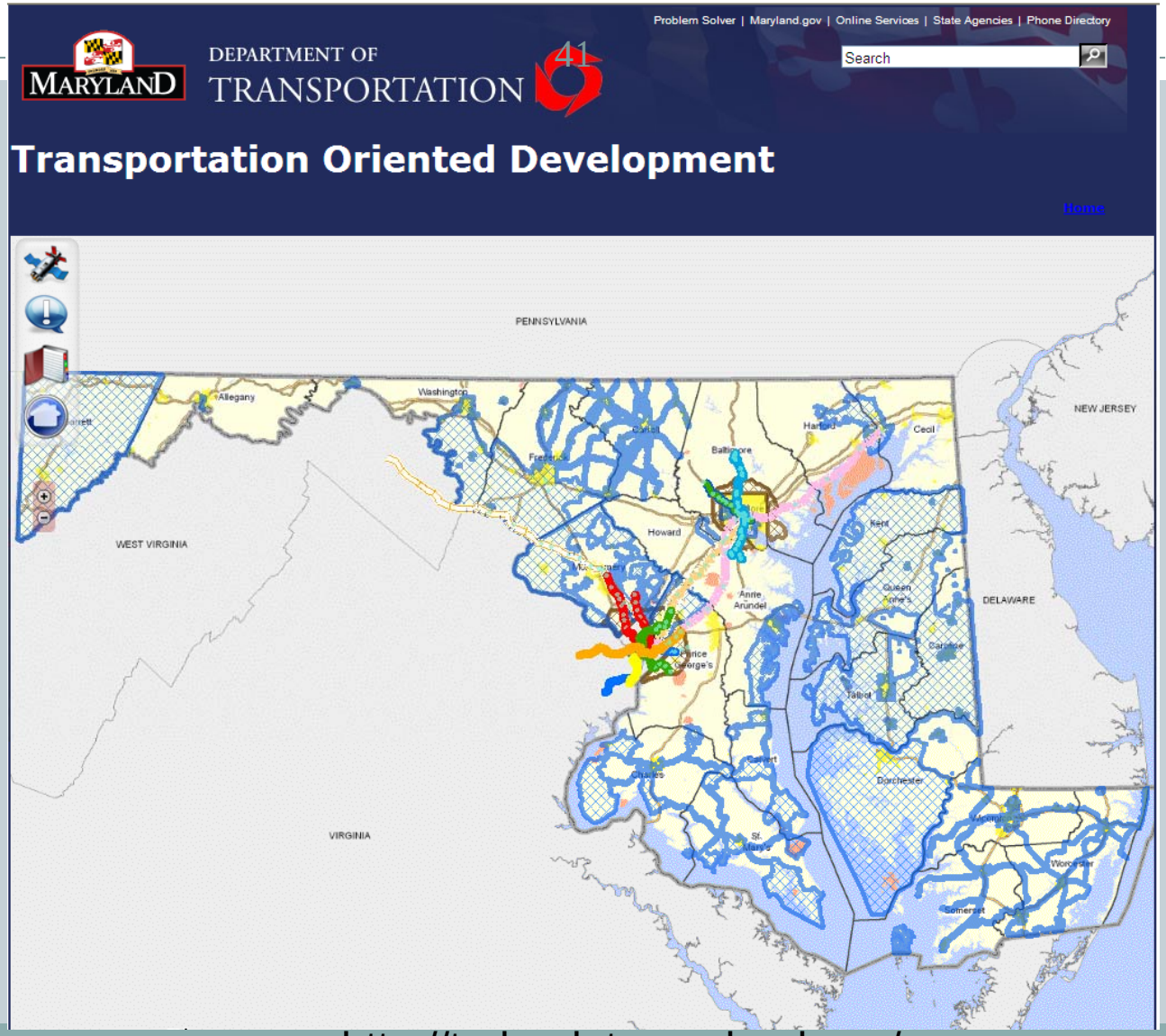
# Transit-Oriented Development




http://tod.mdot.maryland.gov/

# Potential Future Research Projects

- Analysis of TOD areas using origin-destination data
- Analyze spatial mismatch between unemployed or underemployed workers with limited education and entry-level jobs
- Detailed review of extreme commuters
- Geocoding check using BMC and MDP data

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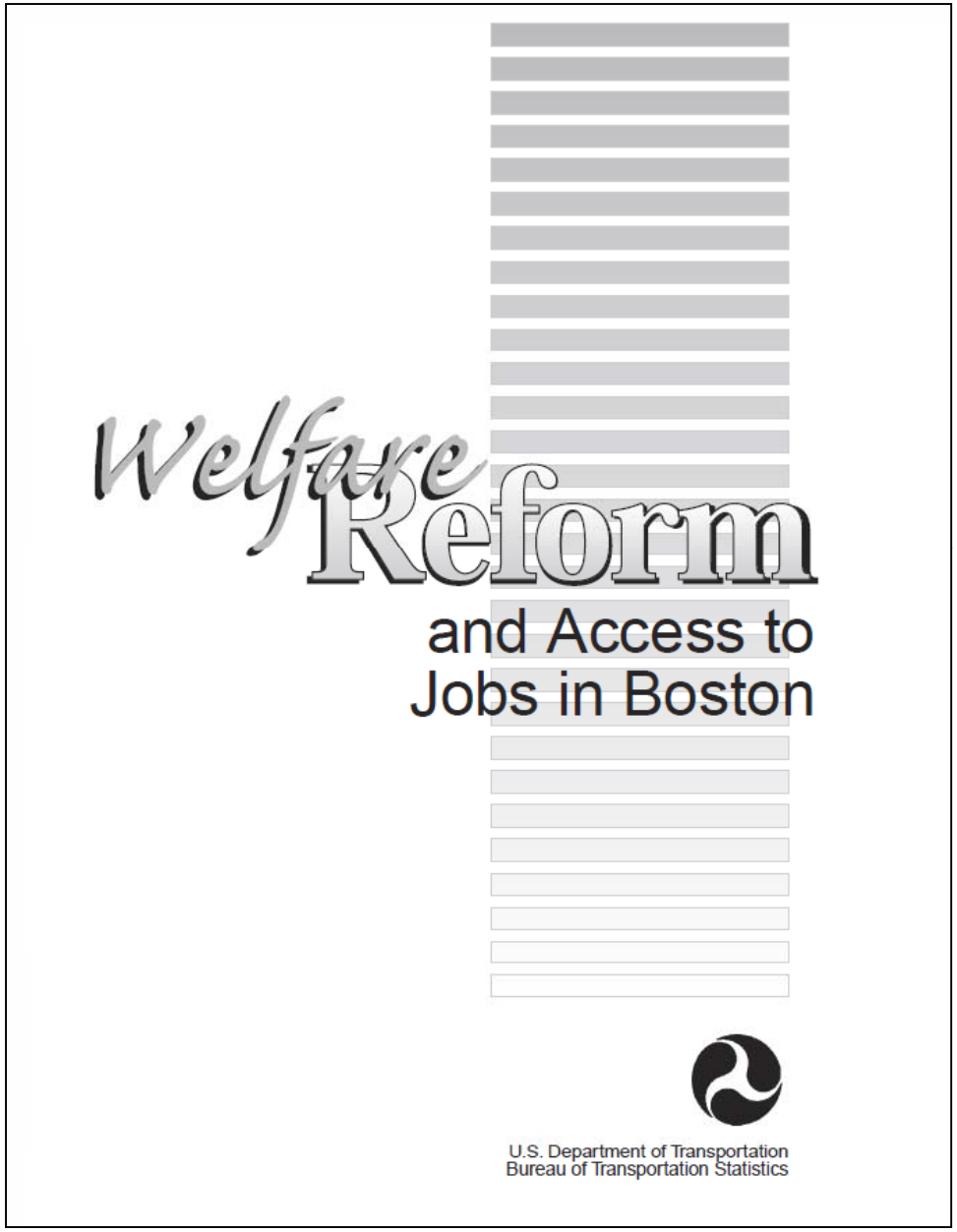


- 1998 report from BTS
- Data sources were confidential ES-202 data and confidential address data of TANF recipients
- LED data contains destinations for industries with entry-level jobs (via BLS industry-occupation matrix)
- Would require synthetic data for origin blocks

# Questions?



- Contact information:

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