DRAFT: MEASURING THE EFFECT OF SMART GROWTH POLICIES IN MARYLAND USING LEHD AND OTHER DATA

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Abstract

- Discover how longitudinal employer-household dynamics data and quarterly census of employment and wages data can be combined with other generally available data sources to measure smart growth policy successes.

What is LEHD?

- LEHD stands for Local Employer-Household Dynamics, data created by the Census Bureau.
- It uses "modern statistical and computing techniques to combine federal and state administrative data on employers and employees with core Census Bureau censuses and surveys while protecting the confidentiality of people and firms that provide the data."
- LEHD includes data on the origins and destinations (O-D) of workers on the block level.
- It is not yet available for <u>Washington, D.C.</u>, Massachusetts, or New Hampshire

LEHD Data: Key Points

- LEHD data locates areas where people live in close proximity to their workplaces
- Census block-based geography allows the examination of small, specific areas
- Confidential QCEW data allows point location of services, allowing for service aggregations to be located
- Aggregating types of services together protects the confidentiality of surveyed firms
- Data on workplace/residence and services together create a base layer for smart growth study

LEHD Data Analysis Using O-D Data

- To measure distance, Census block centroid to centroid air distance was calculated.
  - In future, air distance will be changed to road network distance
    - Though the road network doesn't exactly measure walkability
- Block data also includes:
  - Total number of workers by origin-destination block
  - A breakdown of three categories of age, industry, and occupation.

EPA's Smart Growth Principles

- Mix land uses
- Take advantage of compact building design
- Create a range of housing opportunities and choices
- Create walkable neighborhoods
- Foster distinctive, attractive communities with a strong sense of place
- Preserve open space, farmland, natural beauty, and critical environmental areas
- Strengthen and direct development towards existing communities
- Provide a variety of transportation choices
- Make development decisions predictable, fair and cost effective
- Encourage community and stakeholder collaboration in development decisions

http://www.epa.gov/smartgrowth/pdf/whtissg4v2.pdf

Measuring Smart Growth Implementation

- Some aspects of smart growth are difficult to measure:
  - I.e. fostering "distinctive, attractive communities with a strong sense of place"

- Other aspects can be measured . . .
  - . . . as long as the required data is available

Basic Smart Growth Factors

- Neighborhood Walkability:
  - Can people walk?
    - Proximity to work and walkable infrastructure (easier to measure)
  - Do people walk?
    - Measuring behavior requires survey data (harder/more expensive)
- Commuting:
  - Can people work close to home?
    - Proximity of jobs to people (jobs-housing balance)
  - Do they work close to home?
    - Need data on commuting patterns
  - Can they walk or take transit? Do they?
    - "Can" is related to proximity, while "do" is behavior.
- Amenities:
  - Do people live near services and amenities?

Creating a Smart Growth "Base Layer"

- Walkability:
    - Measured through intersection density and road type
    - Answers question "can people walk," not "do people walk"
- Housing Unit Density
    - Measures how close people live to one another
- Access to employment
    - Measured using LEHD employment data by block
    - Number of workers residing in block vs. number of jobs in block
- Commute length
    - Measured using block-block LEHD origin-destination data
- Access to transit
    - Measured using LEHD and transit route data by block
- Access to services
    - Measured using LEHD employment data by block

Mapping "Walkable Nodes"

- Street node junctions for Maryland were extracted from MD SHA road network
- Most node junctions connecting only to highways were dropped
  - Not considered walkable
  - Highway = SHA classification 1
  - Ramps were also excluded
- Junctions connecting only to the same road were also dropped
  - Mostly tracked curb cuts or sharp corners
- No "ground truthing" of walkability yet
  - No consistent data on sidewalk quality

Included and Excluded SHA Junctions

Highway and inline junction nodes were excluded from the analysis.
All other junction nodes are included.

(1) Defining "Walkability"

- Walkable nodes were mapped in ArcGIS 10
- A point density raster layer was created in Spatial Analyst
  - Output cell size 25, circular neighborhood, radius of 200 meters (656 feet), scale in sq. mi.
- Walkable areas: Densities of 100 or more "walkable nodes" per square mile
  - 100 to 400: Somewhat walkable
  - 400 to 800: Walkable
  - 800 to 1,608: Very walkable

(1) Walkable Areas in Maryland by Intersection Density

Intersection Density
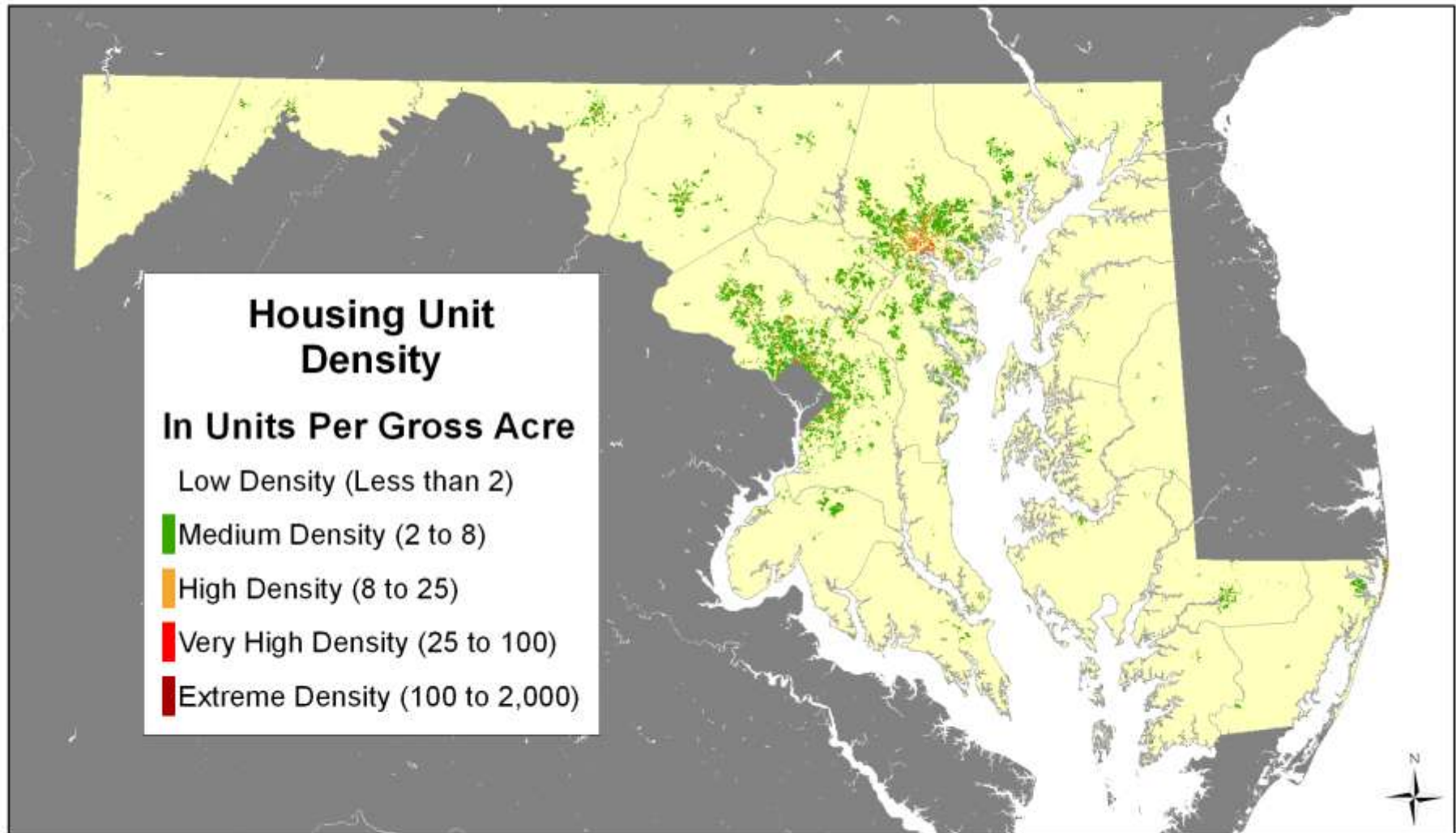
Per Square Mile

0 - 100
100 - 400
400 - 800
800 - 1,155
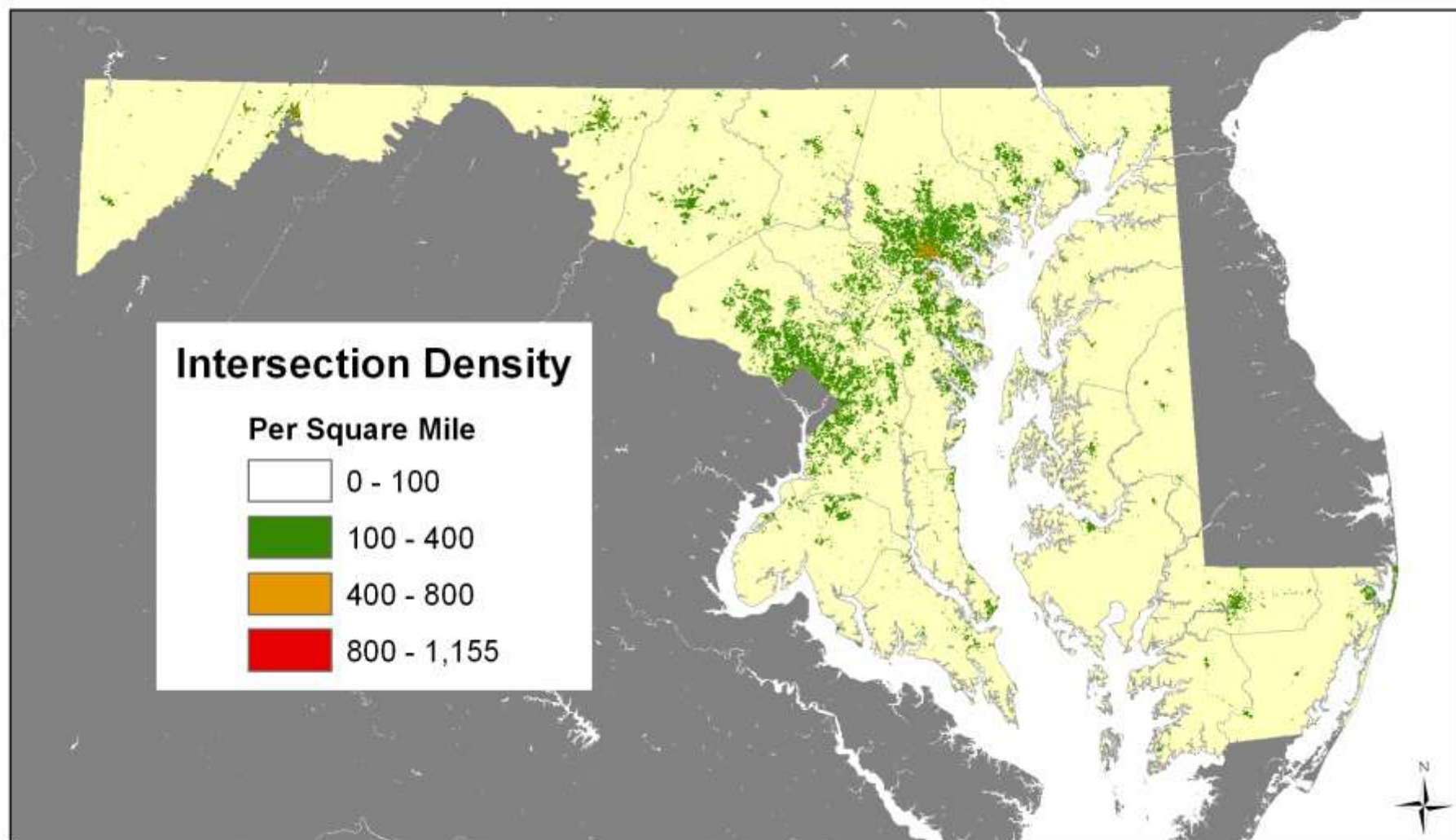
(2) Housing Unit Density

- Housing unit density is another important factor in measuring smart growth
- Census block level data from Census2010 was used to measure density
  - Density was measured per acre
  - Census block area was divided by the count of housing units per block

2. Housing Unit Density by Census Block in Maryland, 2010

Housing Unit Density

In Units Per Gross Acre

Low Density (Less than 2)

Medium Density (2 to 8)

High Density (8 to 25)

Very High Density (25 to 100)

Extreme Density (100 to 2,000)

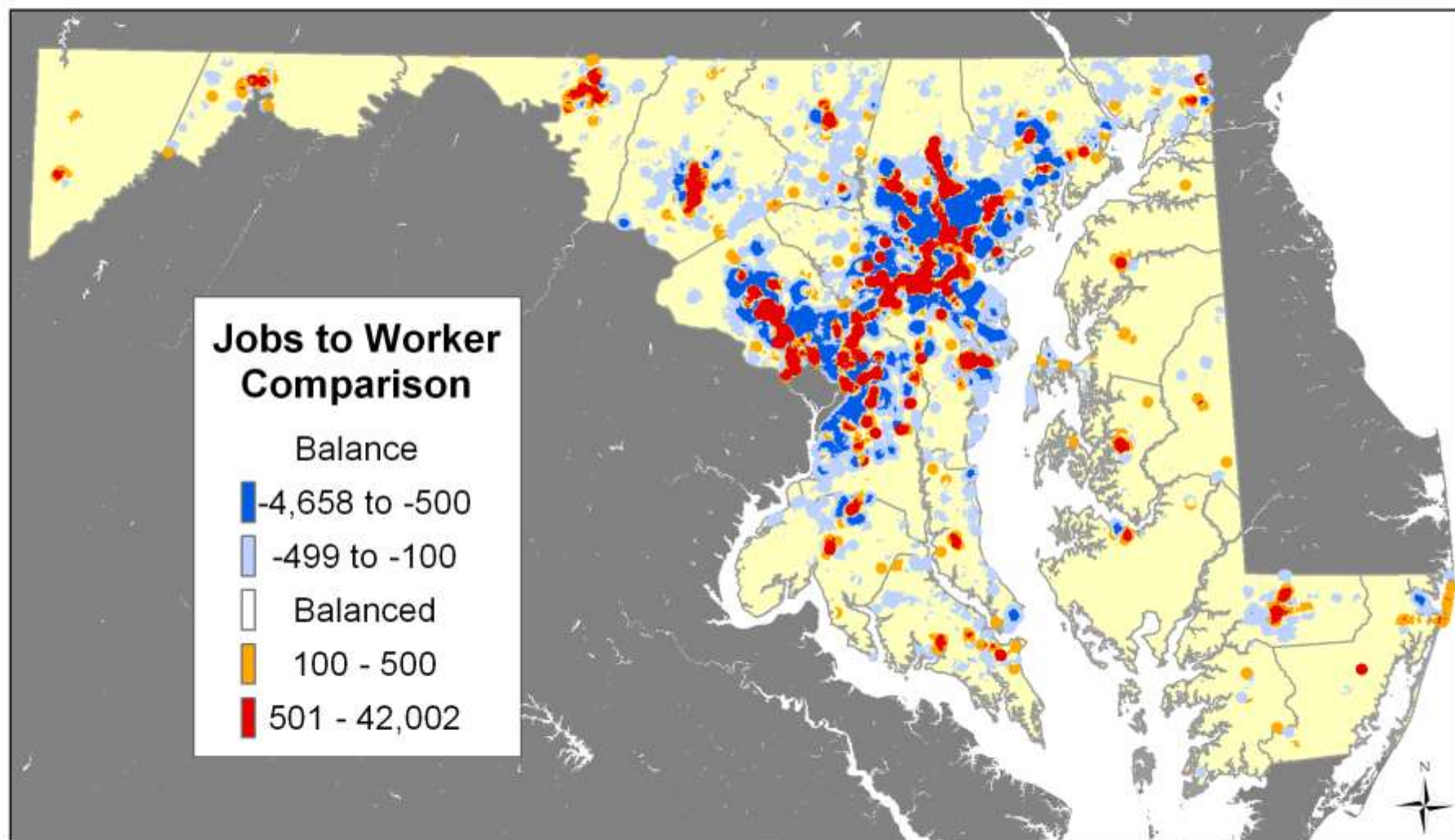# (3) Jobs/Worker Balance

- LEHD data tracks the number of jobs by Census block for NAICS supersectors
- LEHD also tracks the number of resident workers in each block
- Block centroids were extracted and both job and resident worker totals were mapped as a point density layer
  - LEHD "all jobs" data was used
- The difference between job and worker location was calculated from each map

3. Job/Worker Balance in Maryland, 2007

Jobs to Worker Comparison

Balance

- -4,658 to -500
- -499 to -100
- Balanced
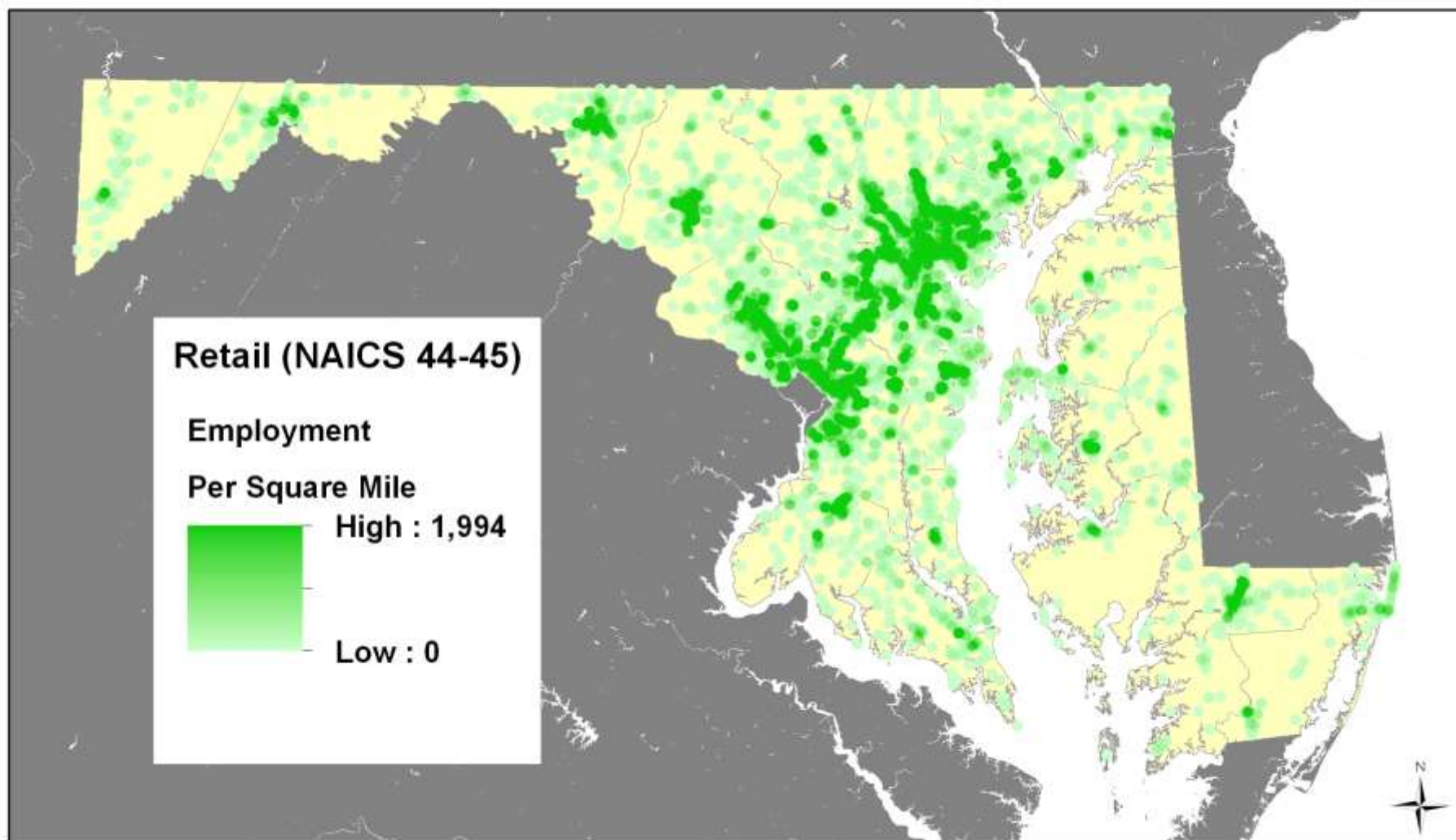- 100 - 500
- 501 - 42,002

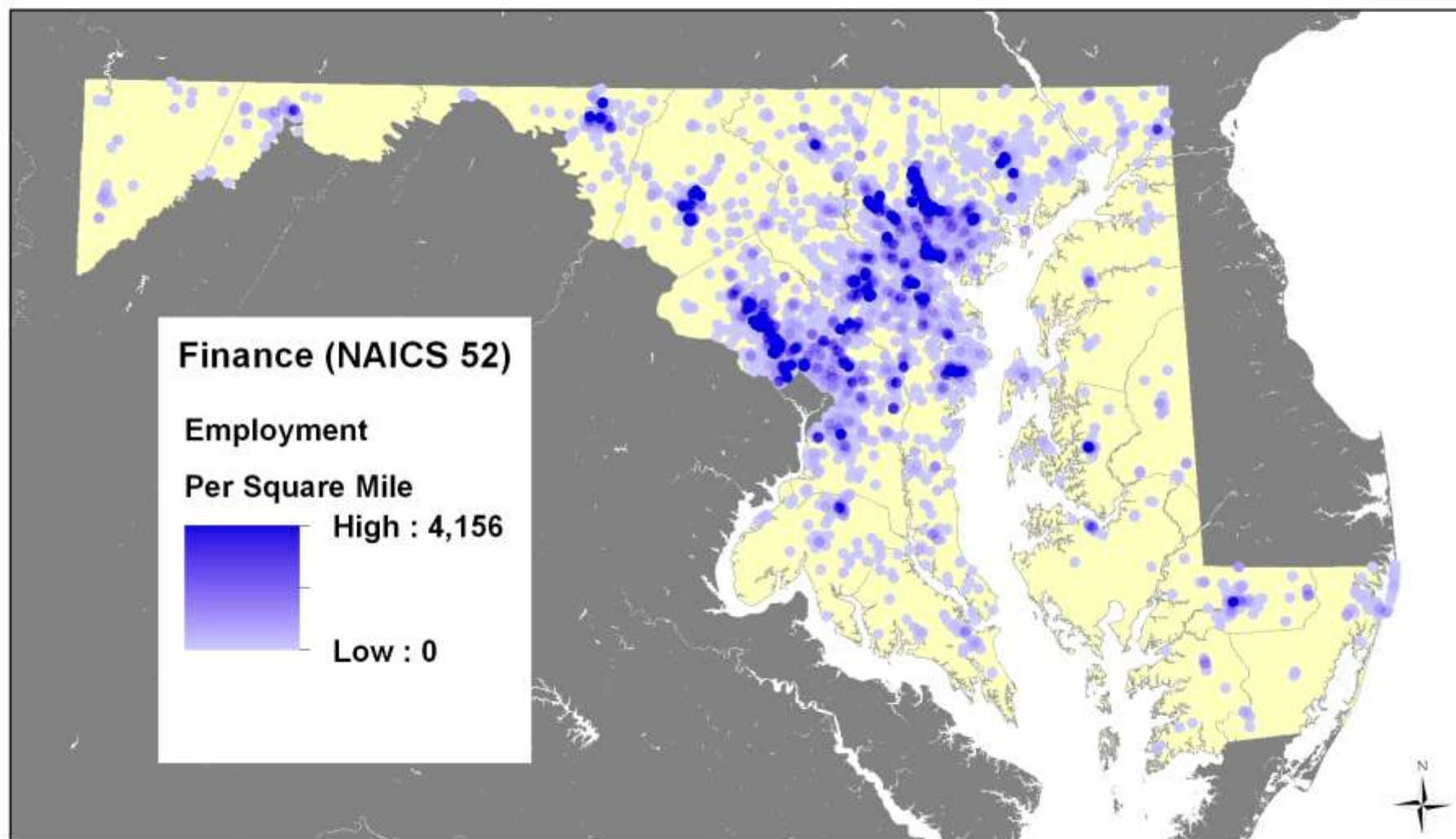Presented May 3, 2011 to WMCOG

(4) Density of Services and Amenities

- LEHD data on the following NAICS supersectors was used as a proxy for access to services and amenities:
  - (4A) NAICS 44-45: Retail Trade
  - (4B) NAICS 52: Finance and Insurance (Banks)
  - (4C) NAICS 61: Educational services (Schools)
  - (4D) NAICS 71: Arts, Entertainment, and Recreation
  - (4E) NAICS 72: Accommodation and Food Services (Restaurants)
- See sidebar on the comparison of using LEHD data as an alternative to the Walk Score methodology
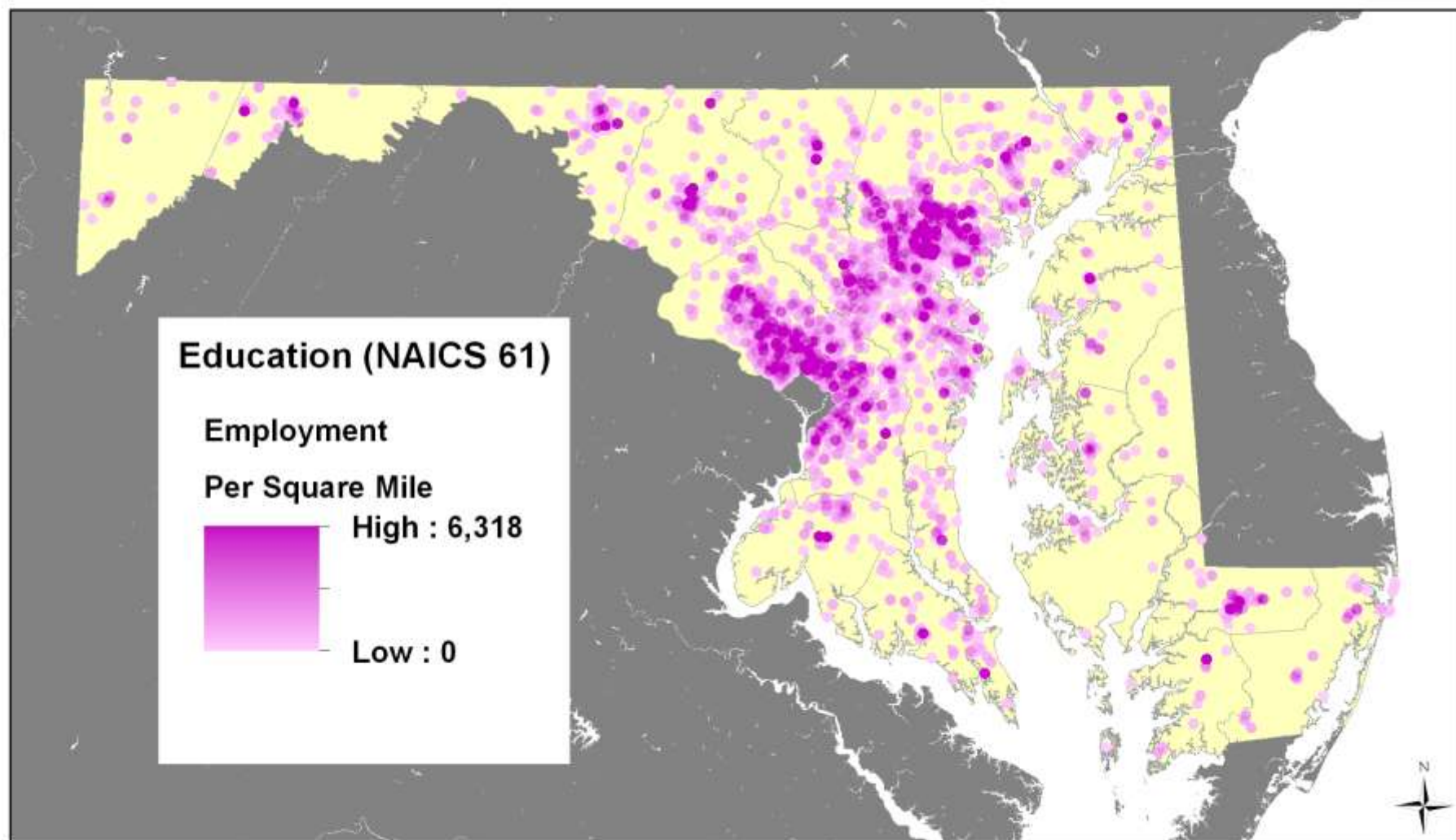
(4A) Retail Employment by Place of Work, LEHD 2007


Retail (NAICS 44-45)

Employment

Per Square Mile

High : 1,994

Low : 0

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(4B) Finance and Insurance Employment, LEHD 2007

Finance (NAICS 52)

Employment

Per Square Mile

High : 4,156

Low : 0

(4C) Education Employment, LEHD 2007

Education (NAICS 61)

Employment

Per Square Mile

High : 6,318

Low : 0

(4D) Arts, Entertainment, and Recreation Employment, LEHD 2007

Arts, Entertainment, and Recreation (NAICS 71)

Employment

Per Square Mile

High : 1,034

Low : 0
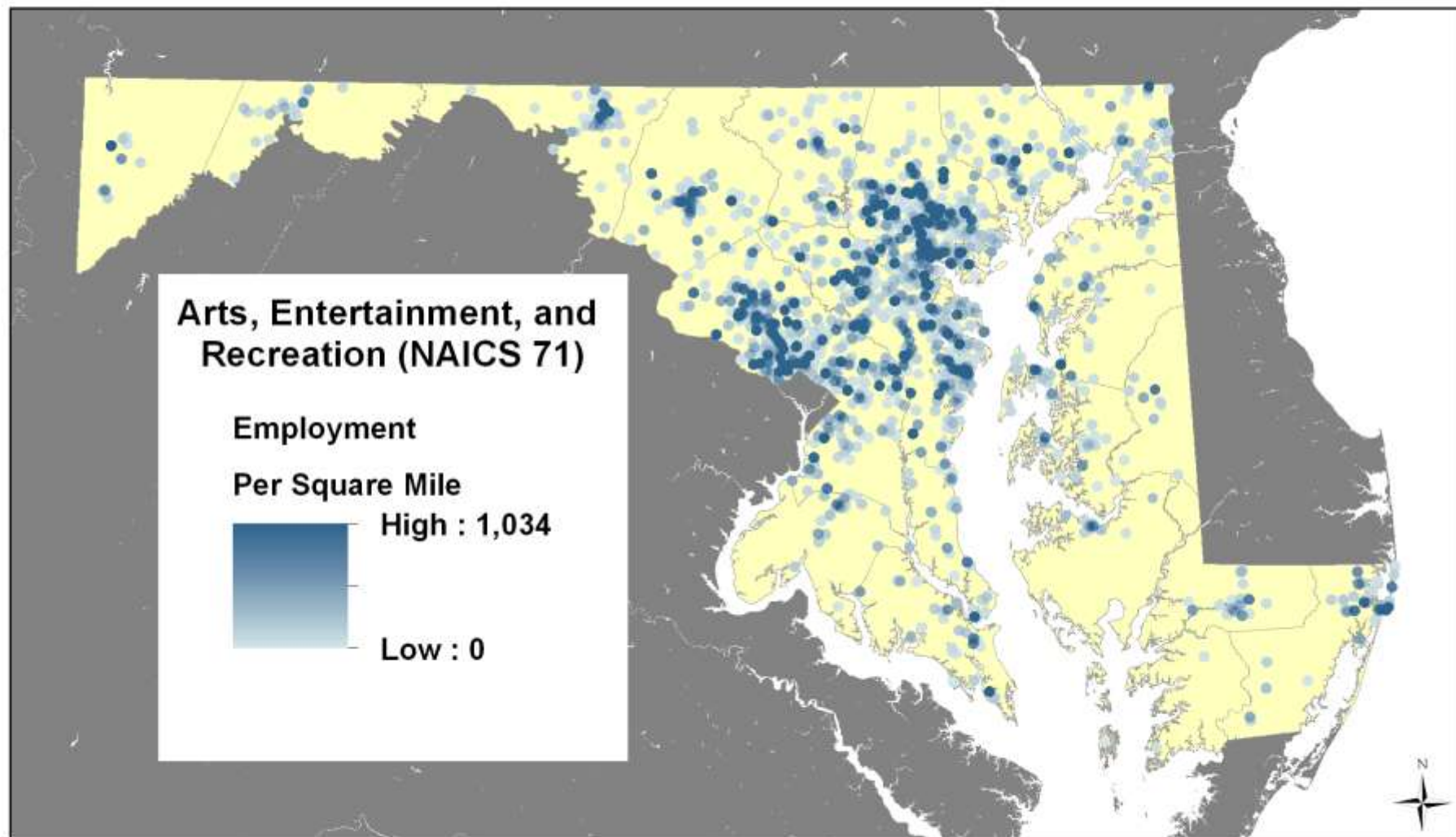
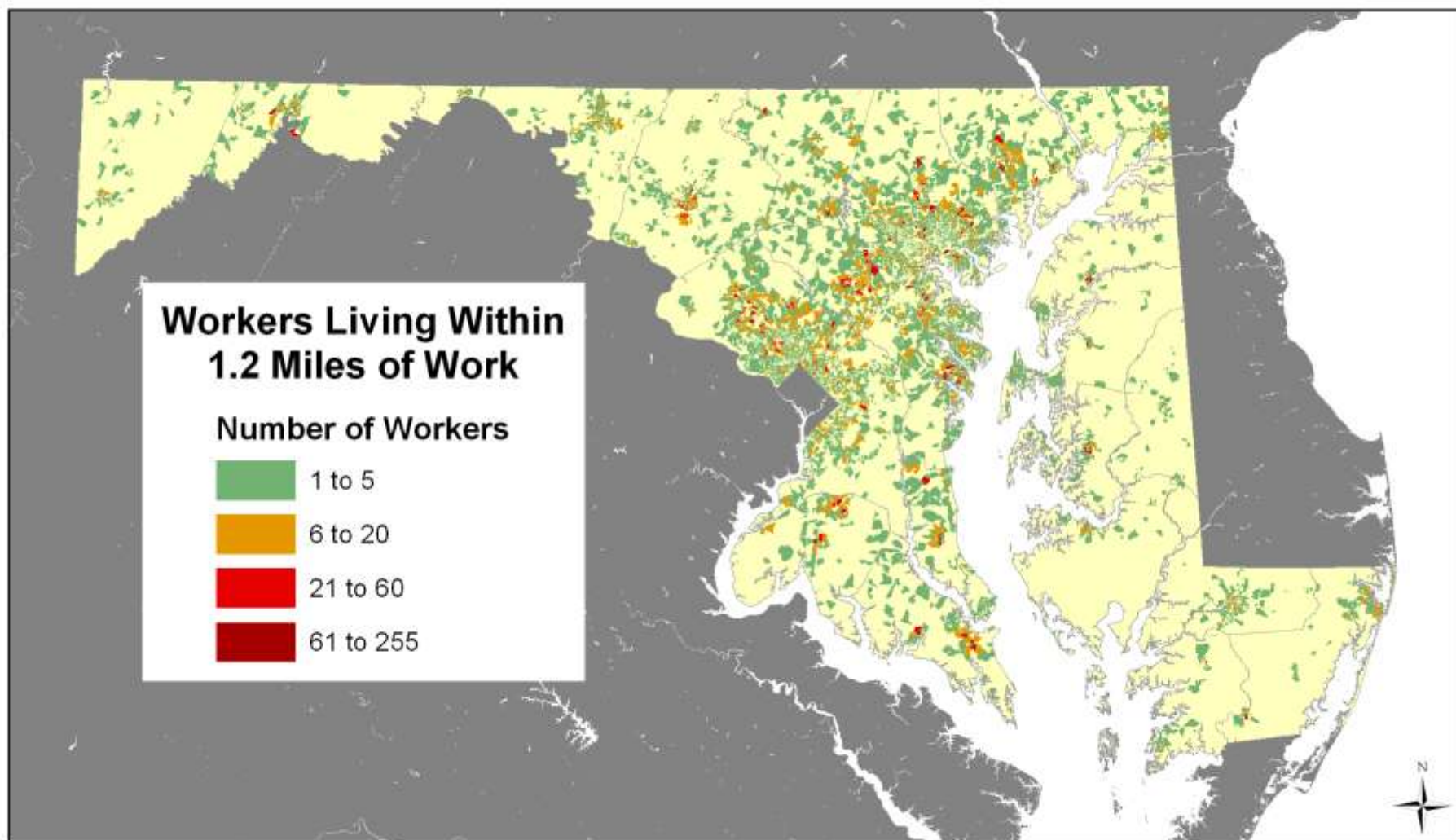# (4E) Accomodation and Food Services Employment, LEHD 2007
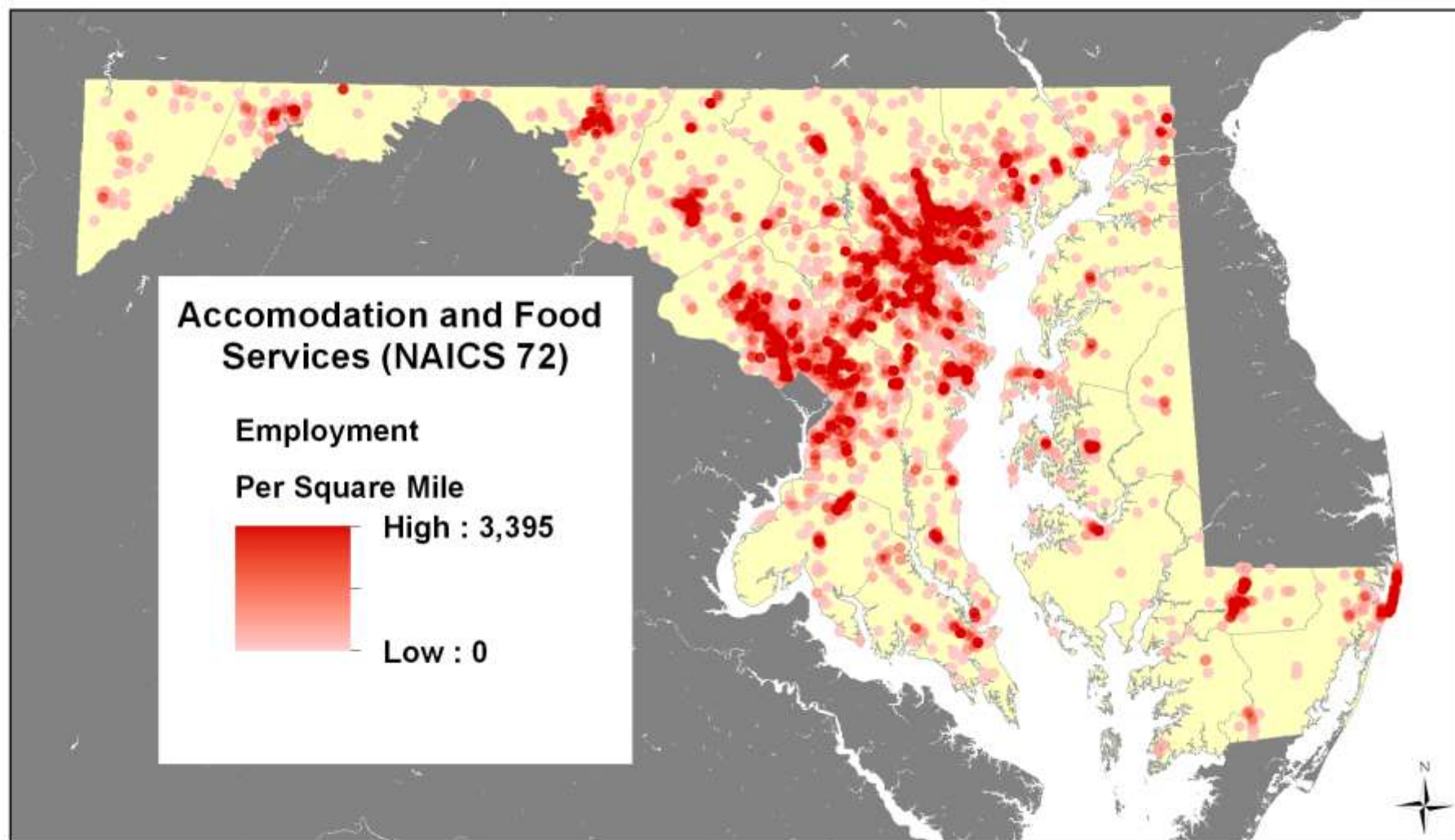
(5A) Workers with Walkable Commutes

- LEHD data does *not* have information on commuting mode
- "Walkable" is defined as the *ability* to walk to work based on commute distance
- Distances are measured by block centroid-centroid distance
  - Centroid-centroid commute distance is in "air miles"
  - Workers whose air mile commute was one mile or less were considered to live within walking distance
- For reporting purposes, air distances were adjusted by a 1.2 multiplier to account for the local road network
  - Actual walking distance is a maximum of 1.2 miles
- LEHD Data compares well with other sources
  - According to 2005-09 ACS Data, 70,410 (+/-2,206) Maryland commuters walked to work, and an additional 7,524 (+/-770) rode a bicycle
  - LEHD shows that 76,339 workers lived within 1.2 miles of work
  - Though this is an apples-to-oranges comparison, it is interesting

(5A) Number of Workers With Commutes of 1.2 Miles or Less by 2000 Census Block, LEHD 2007

Workers Living Within 1.2 Miles of Work

Number of Workers

- 1 to 5
- 6 to 20
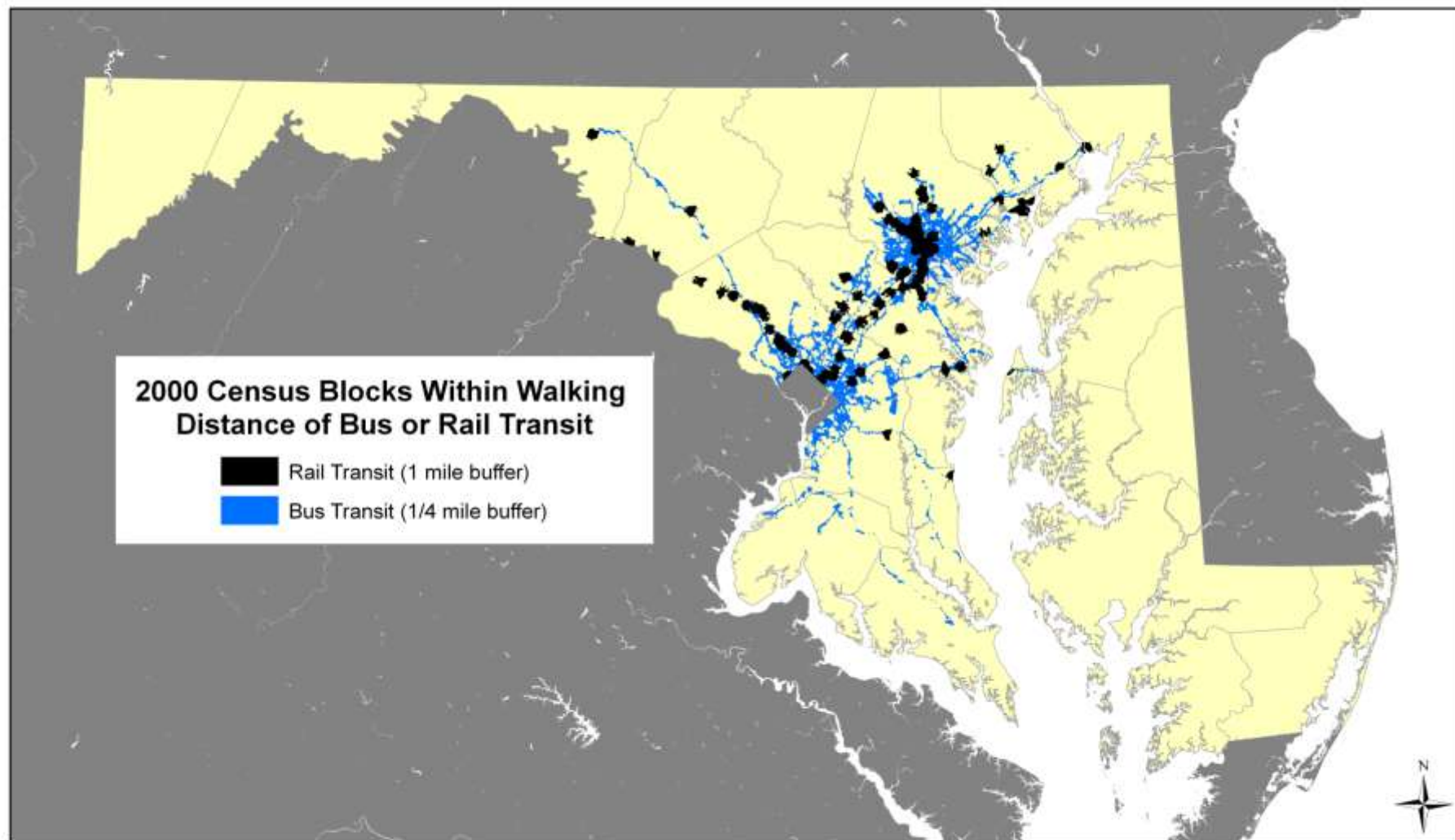- 21 to 60
- 61 to 255

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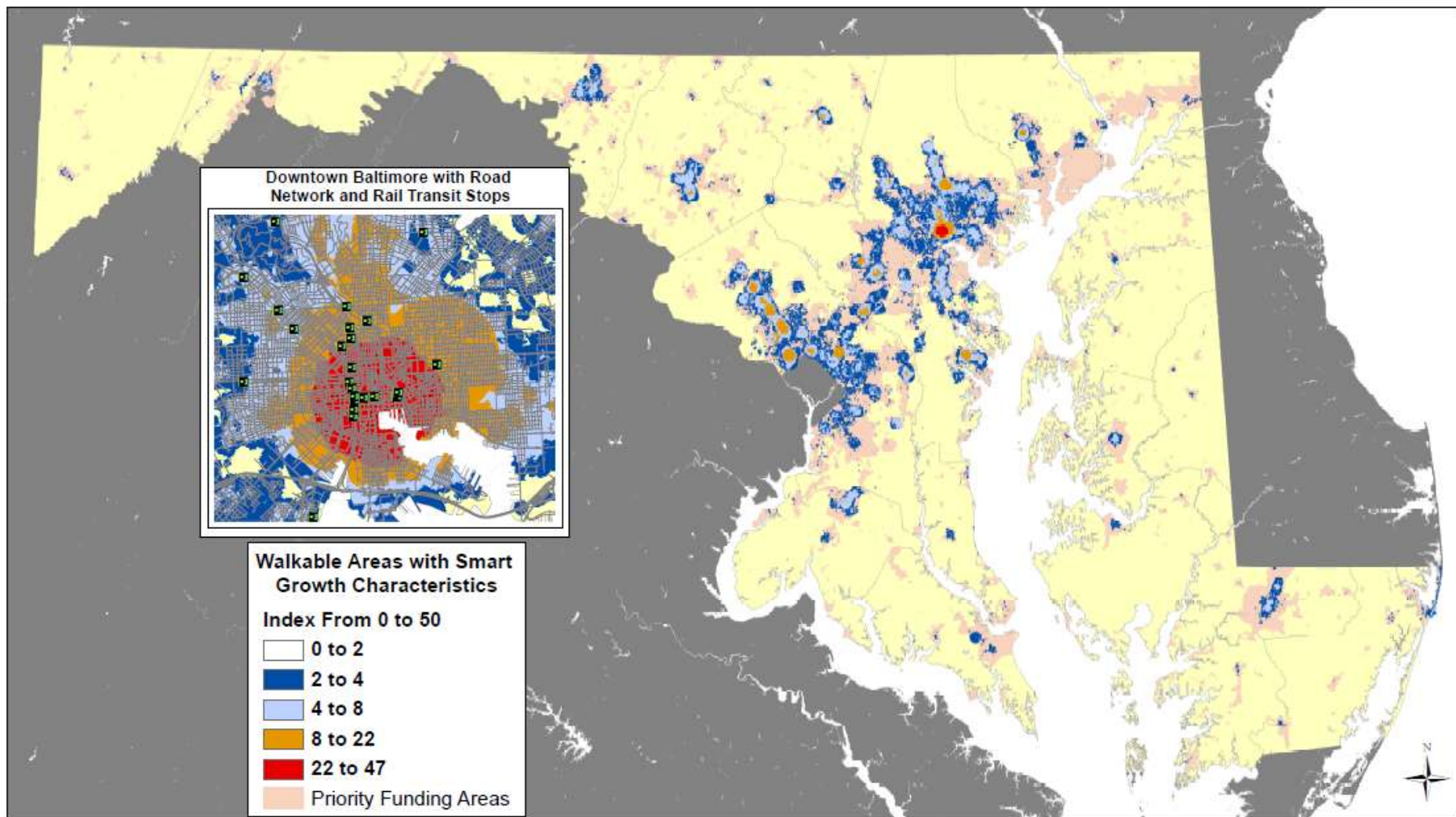
(5B) Workers with Transit-Friendly Commutes

- Like walkable commutes, we have no information on actual commute mode, only access to transit
- Workers whose start and end point are both within one mile of a rail transit stop were tallied
  - Stops were buffered, and commutes to-from block centroids falling within the buffer were counted
- Station locations are available for:
  - Maryland Transit Authority
    - Light Rail
    - Metro (Subway)
    - MARC (Commuter Rail)
  - WMATA
    - Metro (Subway)
- Bus route data is problematic
  - Bus routes were surrounded by a ¼ mile buffer
  - Routes are lines, not station stops
  - Commuter bus station locations were also not available
    - Unlike local buses, commuter buses have few station stops, so location matters

(5B) Areas Accessible to Transit by 2000 Census Block

2000 Census Blocks Within Walking Distance of Bus or Rail Transit

- Rail Transit (1 mile buffer)
- Bus Transit (1/4 mile buffer)

Areas Exhibiting Smart Growth Characteristics in Maryland, 2007 (Draft)

Downtown Baltimore with Road Network and Rail Transit Stops

Walkable Areas with Smart Growth Characteristics

Index From 0 to 50
- 0 to 2
- 2 to 4
- 4 to 8
- 8 to 22
- 22 to 47
- Priority Funding Areas

Next Steps: LEHD Data Improvement

- LEHD data is under constant improvement and will add new features the coming two years. Most importantly for Maryland:
  - Federal civilian employment will be added (excluding civilians who work for DoD and the Post Office)
    - 5.7% of all QCEW jobs in MD in 2009 were Federal
    - 9.6% of all MD residents had federal jobs in 2007-09
  - Data for Washington, D.C. will be added
    - 10.4% of all MD workers commuted to Washington, DC in 2007-09
  - In 2012, base geography is scheduled switch from Census 2000 to Census 2010
    - This change should take place for all years of data
  - In 2013, geocoding improvements are scheduled be applied to data for previous years
    - Currently, block level changes may be due to geocoding changes
    - Block data should become truly longitudinal back to 2002 for most states

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Next Steps: Improved Analysis

- Fine-tuning LEHD employment data
  - Should there be upper or lower limits to the employment values included in the analysis? What should those limits be?
- Sensitivity Testing:
  - How sensitive is the analysis to different assumptions about walkability and density?
- Comparisons across time
  - Road network changes
  - New housing unit construction
- Sidewalk quality data
  - Does it exist?
- Data overlays
  - What other data can be added to the analysis?