

MWCOG Analysis of Transportation Inequities in Disadvantaged Communities



TPB Technical Committee

April 5, 2024

Agenda

- **Introductions & Overview**
- **Disadvantaged Communities Analysis (Task 2)**
- **Examination of Unmet Mobility & Accessibility Needs (Task 3)**

Analysis Overview

Disadvantaged Communities Analysis

- Identify “traditionally disadvantaged” communities
 - Review other screening tools
- Compare Equity Emphasis Areas and Justice40 Disadvantaged Communities
- Analyze travel characteristics of “traditionally disadvantaged” communities

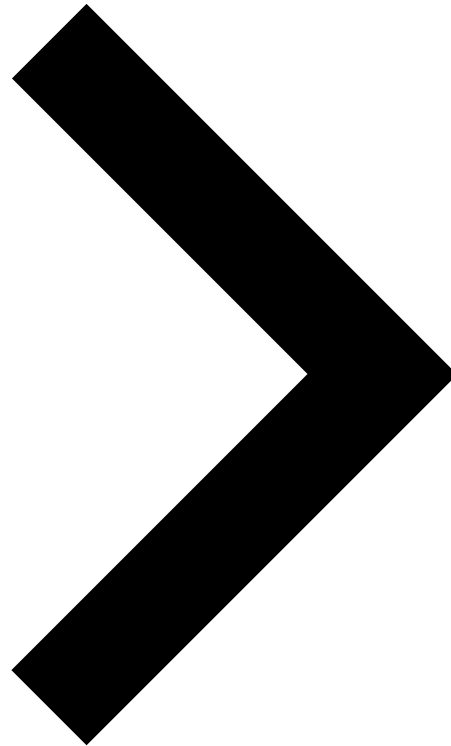
Examination of Unmet Mobility and Accessibility Needs

- Leverage Task 2 findings to identify unmet regional mobility needs
- Across traditionally disadvantaged and non-disadvantaged populations, compare access to:
 - Transportation
 - Jobs
 - Destinations
 - Impact of congestion
- Develop a mobility and affordability index



Disadvantaged Communities Analysis

Disadvantaged Geographies



- TPB Equity Emphasis Areas
- CEQ Climate and Economic Justice Screening Tool
- DOT Equitable Transportation Community Explorer
- DOE Energy Justice Mapping Tool

Overview

	TPB EEA	CEQ CEJST	DOT ETCE	DOE EJMT
Climate Change		✓	✓	✓
Economic	✓	✓	✓	✓
Education		✓	✓	✓
Employment		✓	✓	✓
Energy		✓		✓
Environment		✓	✓	✓
Health		✓	✓	
Housing		✓	✓	✓
Race/Ethnicity	✓			
Transportation		✓	✓	✓

Equity Emphasis Areas

364 TRACTS

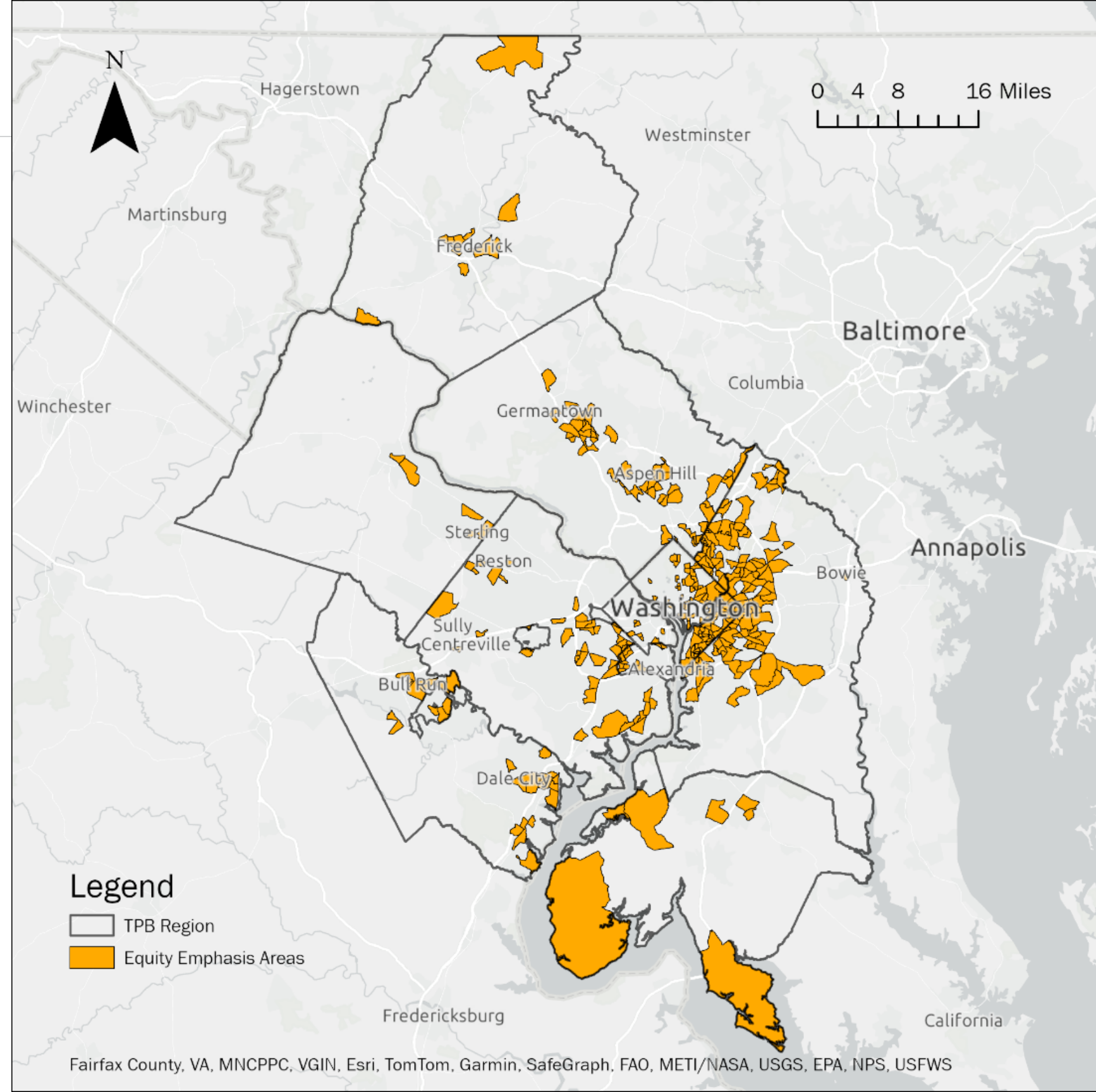
27.6% of TPB Region

1.54M PEOPLE

27.2% of TPB Region

402 MI²

11.5% of TPB Region



CEQ CEJST

197 TRACTS

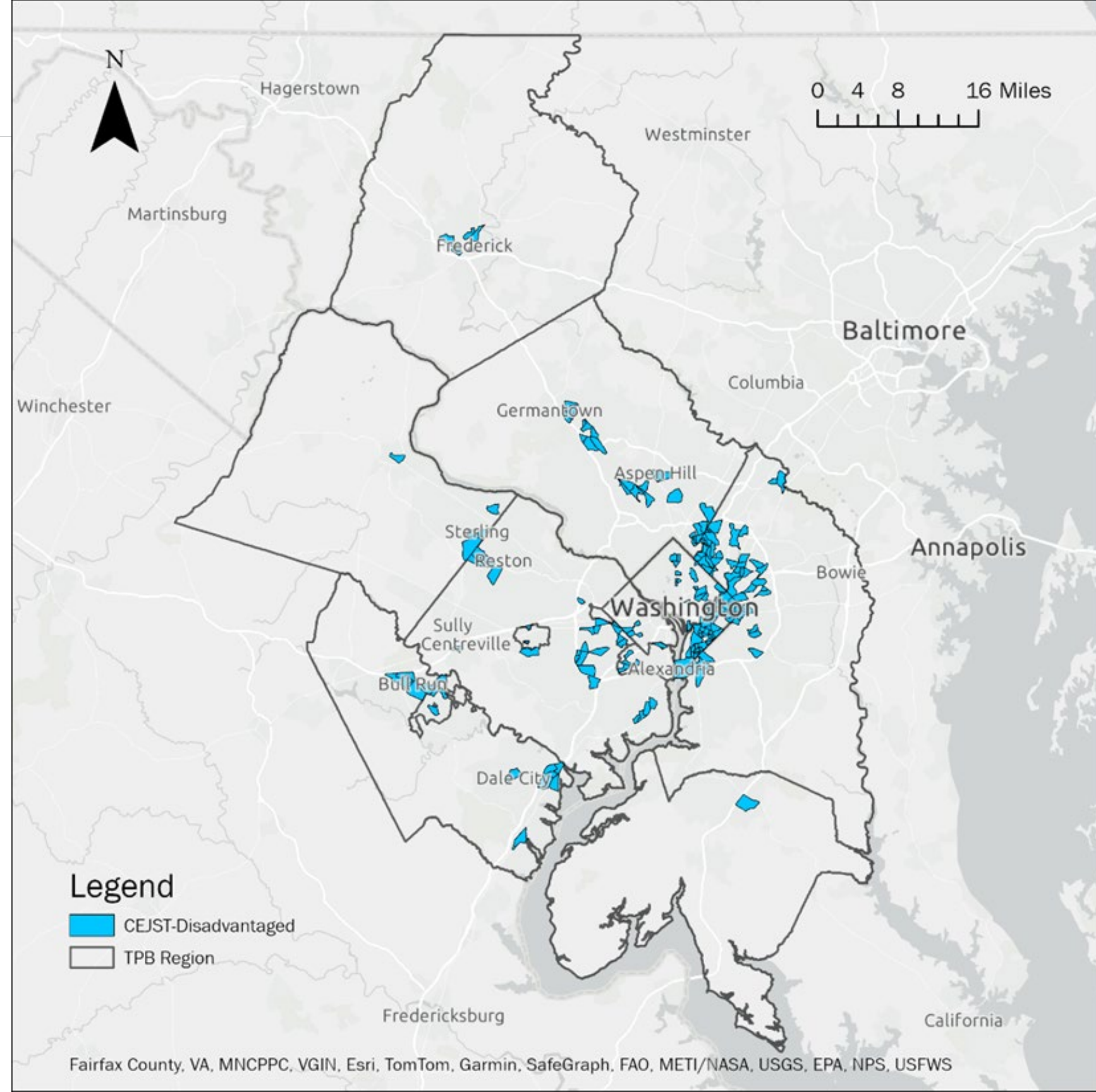
16.1% of TPB Region

881K PEOPLE

15.6% of TPB Region

113 MI²

3.2% of TPB Region



DOT ETCE

195 TRACTS

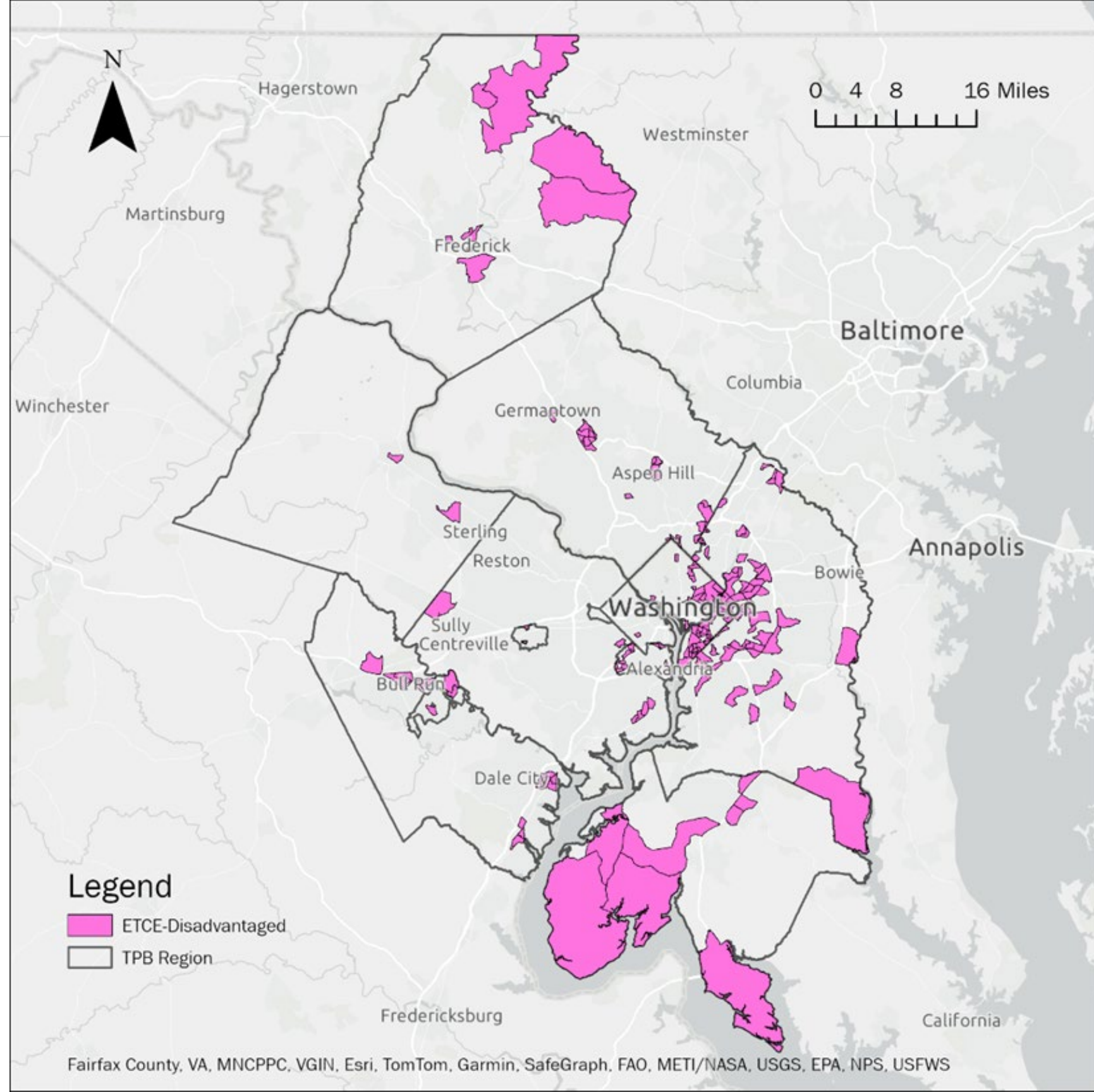
14.8% of TPB Region

750K PEOPLE

13.2% of TPB Region

490 MI²

14% of TPB Region



DOE EJMT

146 TRACTS

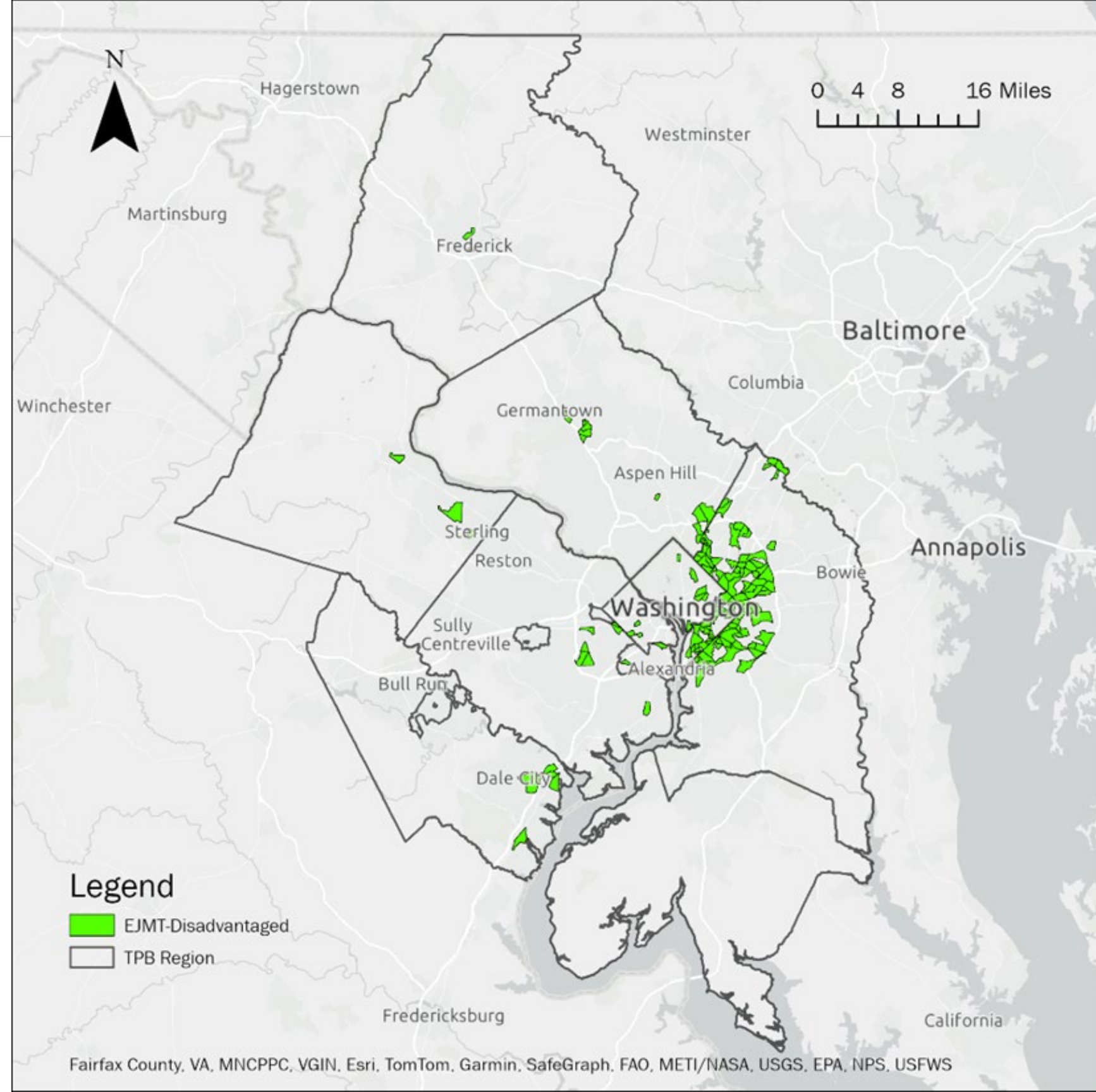
11.9% of TPB Region

612K PEOPLE

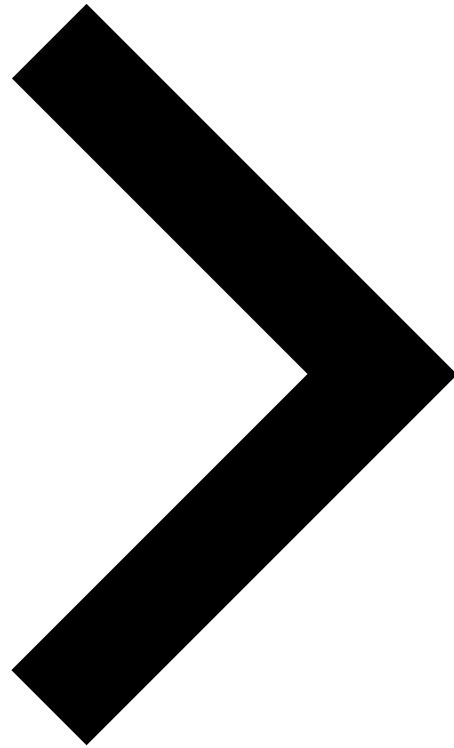
10.8% of TPB Region

85 MI²

2.4% of TPB Region



Socioeconomic Characteristics



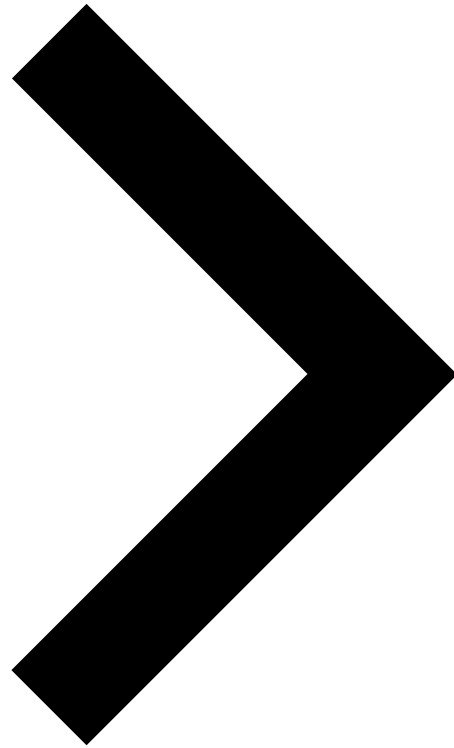
- Income
- Race/Ethnicity
- English Ability
- Disability Status
- Older Adults
- Vehicle Availability
- Educational Attainment
- Employment Status

Overview

	"Disadvantaged"	TPB Region	EEA Tracts	CEJST Tracts*	ETCE Tracts	EJMT Tracts*
Income	Persons below 200% of federal poverty limit	17.4%	33.0%	36.7%	35.9%	36.7%
Race/ Ethnicity	Persons other than "White alone (not Hispanic or Latino)"	59.8%	80.2%	84.2%	83%	89.1%
English Ability	Persons 18 years and older who have limited English ability	12.8%	20.0%	24.8%	17.0%	22.0%
Disability Status	Persons with a disability	8.8%	10.3%	10.3%	12.1%	11.4%
Older Adults	Persons 65 years or older	13.5%	11.3%	10.6%	13.0%	12.4%
Vehicle Availability	Households with no vehicle available	11.0%	17.9%	20.9%	21.3%	22.0%
Educational Attainment	Persons whose highest education completed is less than a bachelor's	44.9%	64.1%	68.1%	69.0%	73.1%
Employment Status	Persons unemployed	4.9%	7.1%	7.9%	8.2%	8.5%

*As the CEJST and EJMT still use 2010 census geographies, these figures are approximate

Travel Characteristics



- Trip Purpose
- Primary Mode
- Transit Submode
- Starting Hour
- Trip Distance
- Trip Duration
- Top Work Destinations

Replica

What is it?

- Simulation of travel activity
- Based on mobile device, demographic, built environment, and economic data

What is it not?

- Does not represent actual travel activity
- Not informed by TPB data or travel model

How does it work?

- Create synthetic population
- Develop behavior models
- Run simulations to create “replica” of travel patterns
- Calibrate outputs against ground-truth data

The logo for REPLICA, featuring the word "REPLICA" in white, bold, uppercase letters inside a white rectangular border, which is centered on a solid orange background.

Why did we use it?

- TPB recently acquired a license
- Granularity
- Recency
- Geographic + demographic filters

Replica Analysis Process

1. Specify Analysis Parameters

- Region: Mid-Atlantic
- Season: Spring 2023 (March-May)
- Day: Thursday

2. Specify Analysis Geographies

- Disadvantaged Geographies
- TPB Jurisdictions (EEA vs. Non-EEA)

3. Apply Relevant Filters

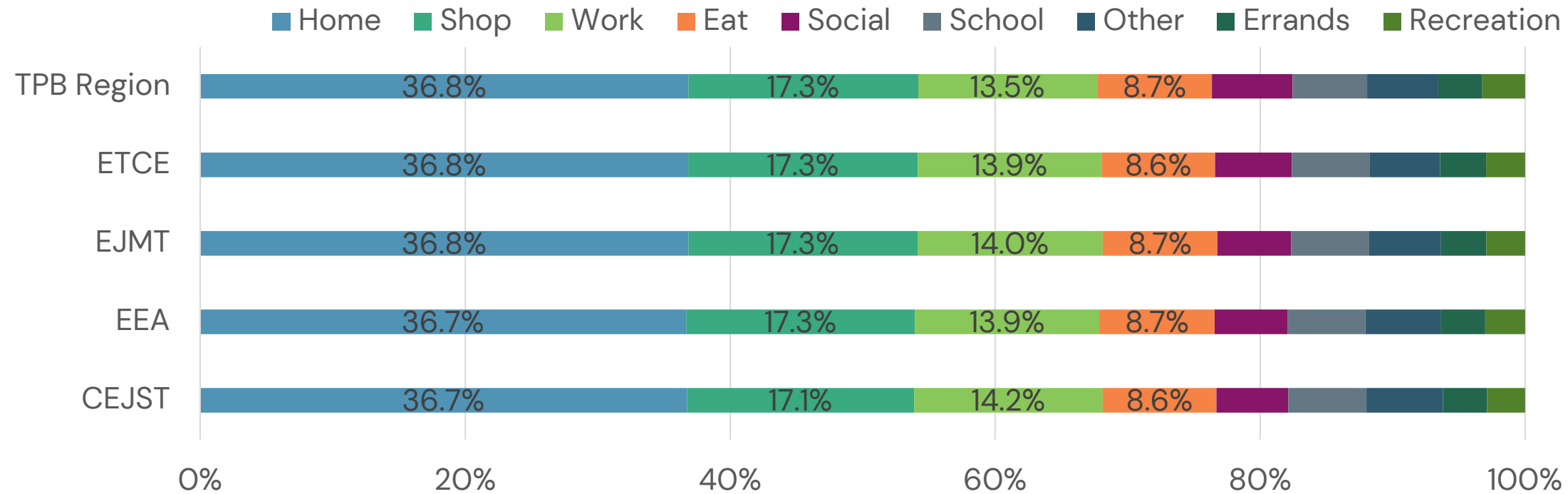
- Home Location
- Demographic Filters

4. Export & Visualize Data



Trip Purpose

Geographic Comparison



Geographies

Little variation across disadvantaged geographies or the region at large

Jurisdictions

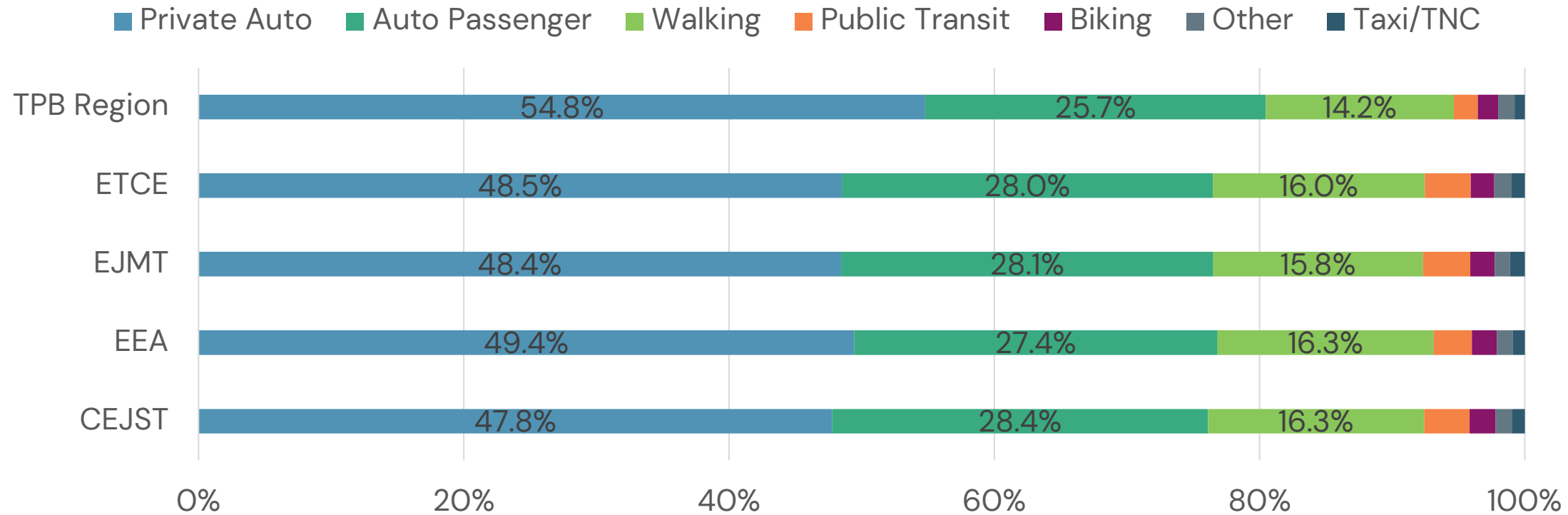
Little variation between EEA and non-EEA tracts across jurisdiction types

Demographics

Some variation in work (unemployed people) and school (older adults, low education)

Primary Mode

Geographic Comparison



Geographies

Consistent across disadvantaged geographies (auto modes predominate)

Jurisdictions

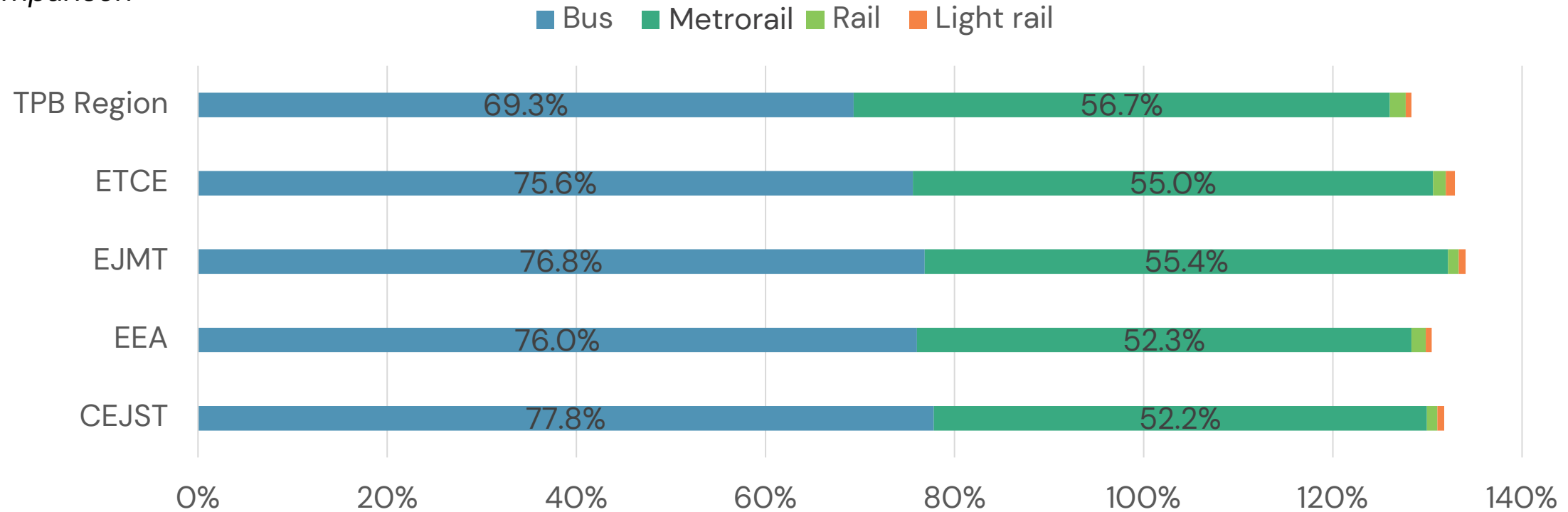
Slightly smaller auto and larger alternative mode share in EEA than non-EEA tracts

Demographics

Zero-vehicle households have much higher alternative mode shares

Transit Submode

Geographic Comparison



Geographies

Higher share of transit trips involve a bus, lower share involve Metrorail than region at large

Jurisdictions

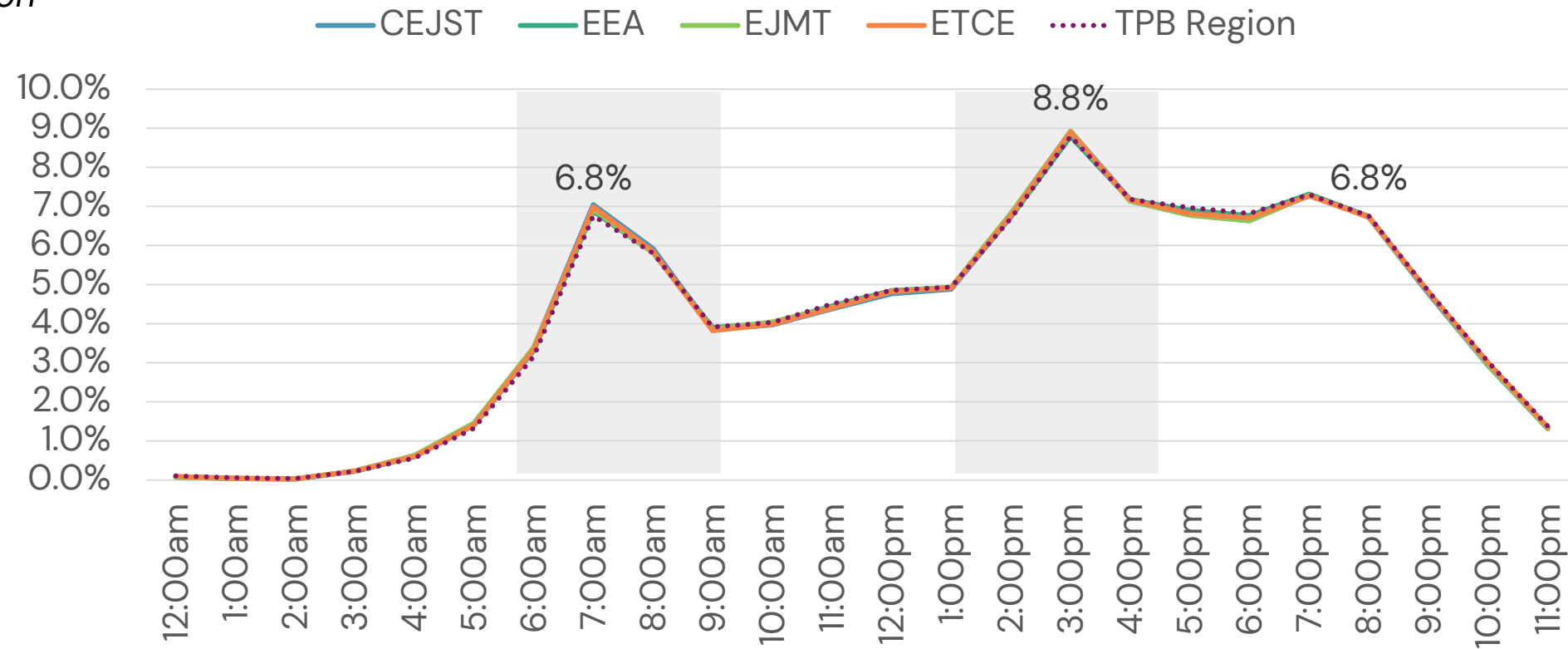
Same pattern between EEA and non-EEA tracts

Demographics

Similar for disadvantaged demographics except unemployed people

Starting Hour

Geographic Comparison



Geographies

Very similar across disadvantaged geographies and the region at large

Jurisdictions

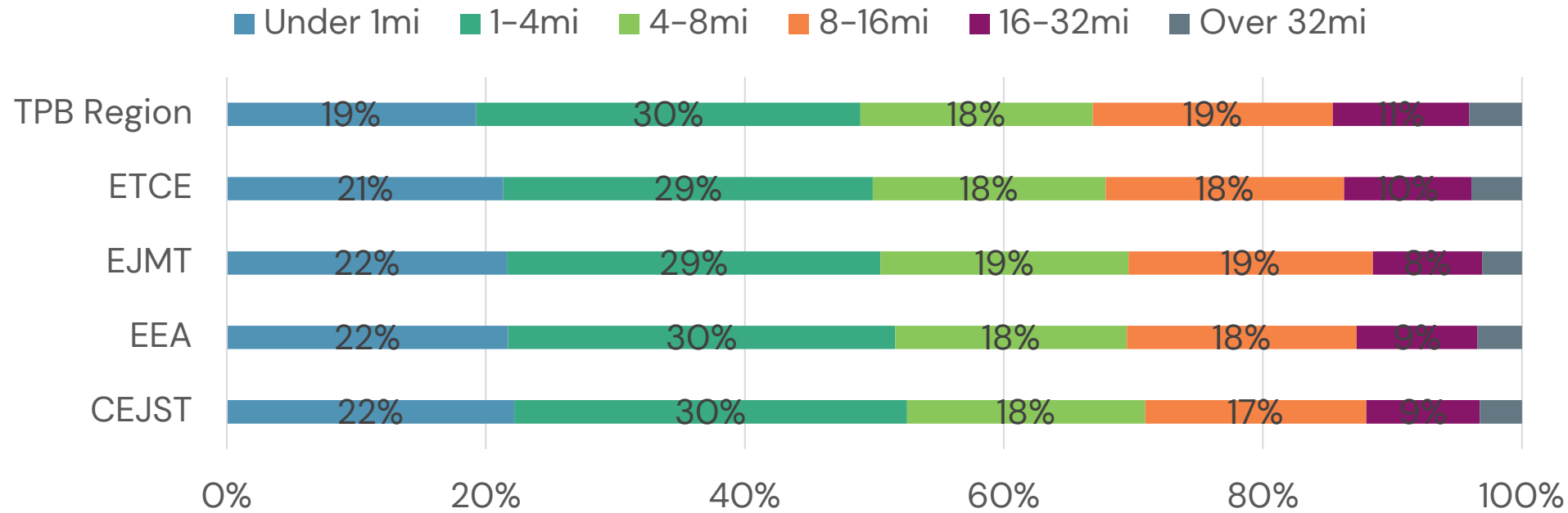
Very similar between EEA and non-EEA tracts

Demographics

Varies among disadvantaged demographics

Trip Distance

Geographic Comparison



	Average (miles)	Median (miles)
CEJST	8.6	3.6
EEA	9.0	3.7
EJMT	8.5	3.9
ETCE	9.3	4.0
TPB	10.2	4.1

Geographies

Shorter in disadvantaged geographies than region at large

Jurisdictions

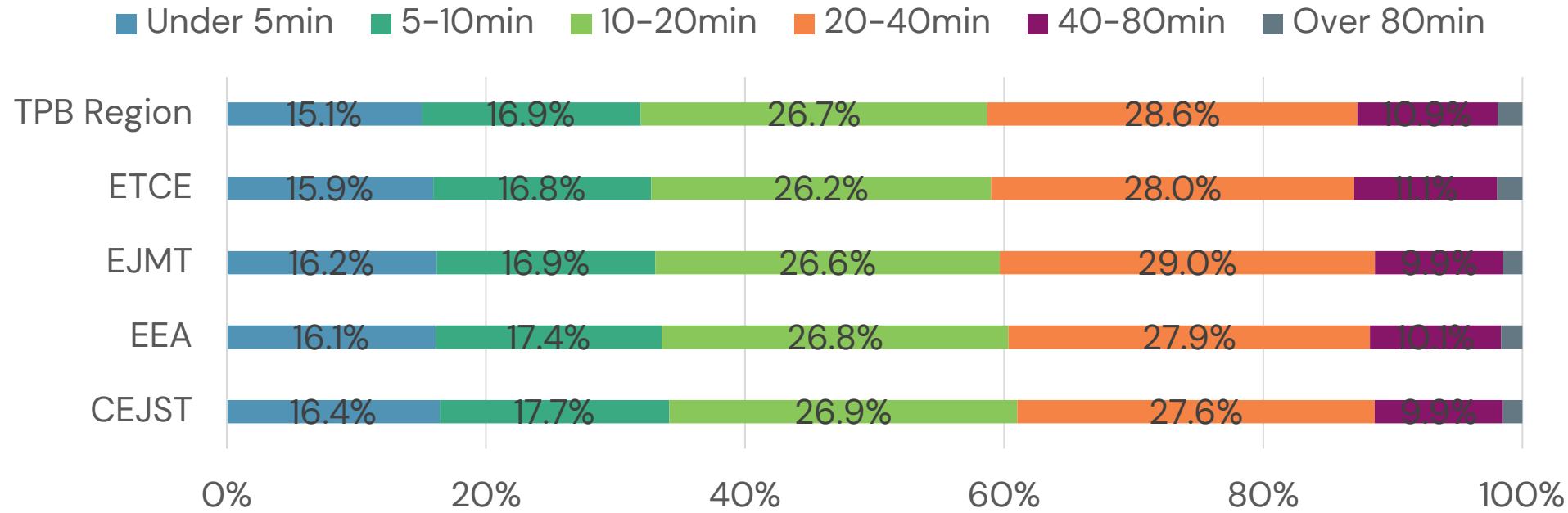
Generally shorter in EEA than non-EEA tracts

Demographics

Longer for people over 65 and people with low educational attainment

Trip Duration

Geographic Comparison



	Average (minutes)	Median (minutes)
CEJST	21.3	15
EEA	21.8	15
EJMT	21.5	16
ETCE	22.5	16
TPB	23.1	16

Geographies

Shorter in disadvantaged geographies than region at large

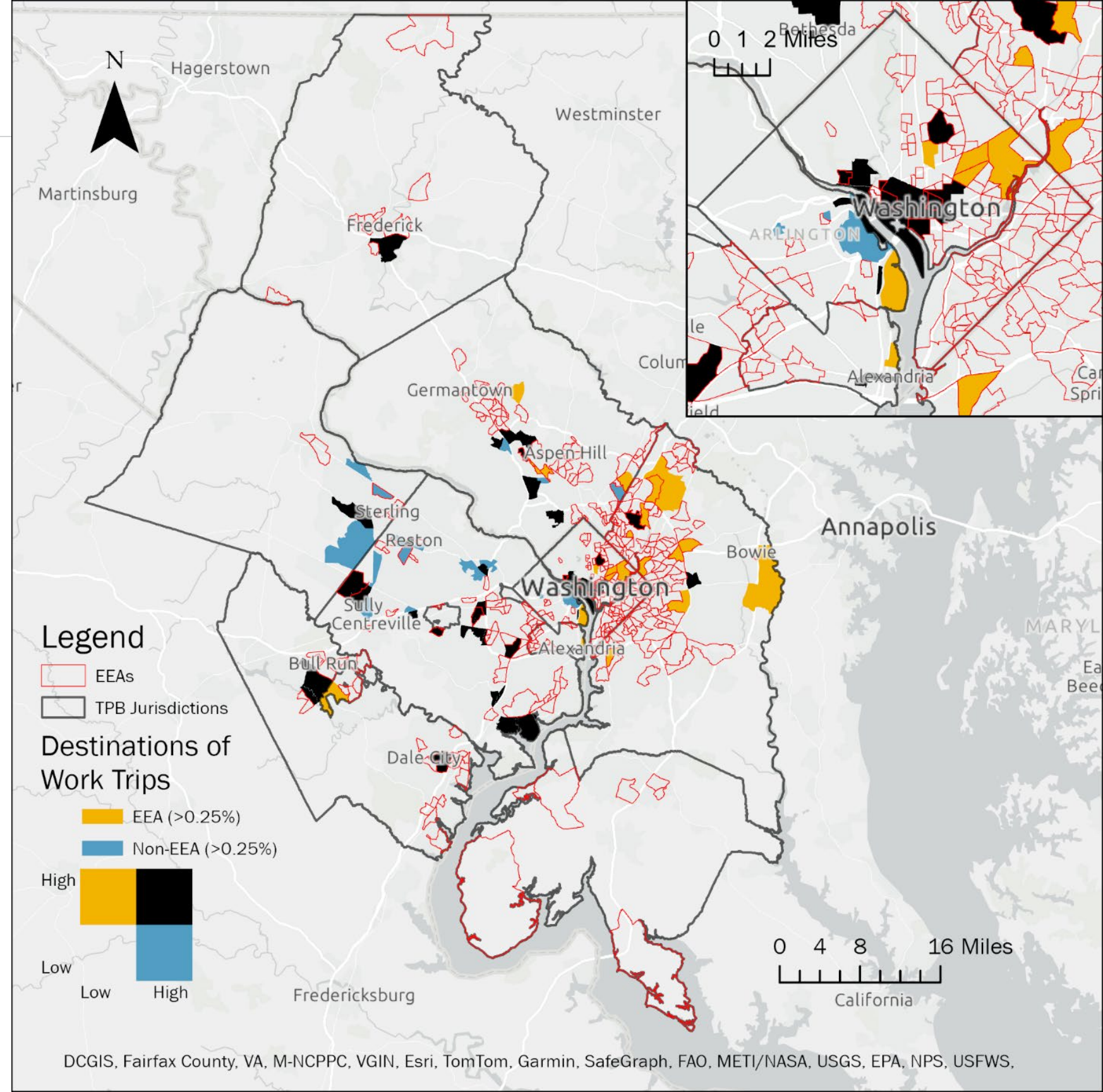
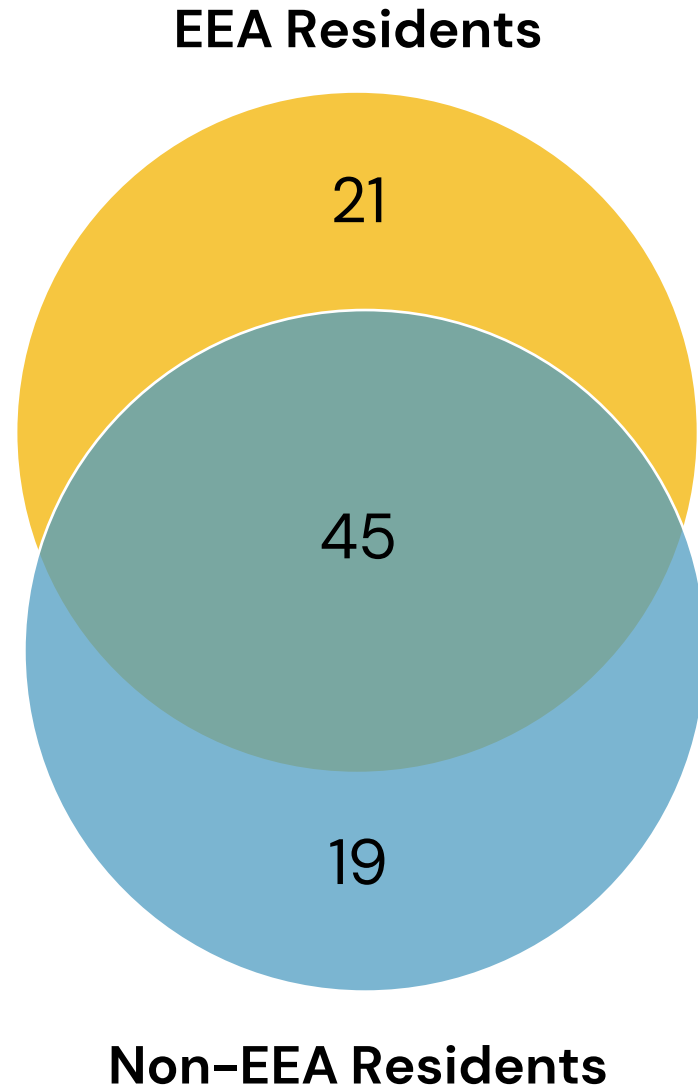
Jurisdictions

Generally shorter in EEA than non-EEA tracts

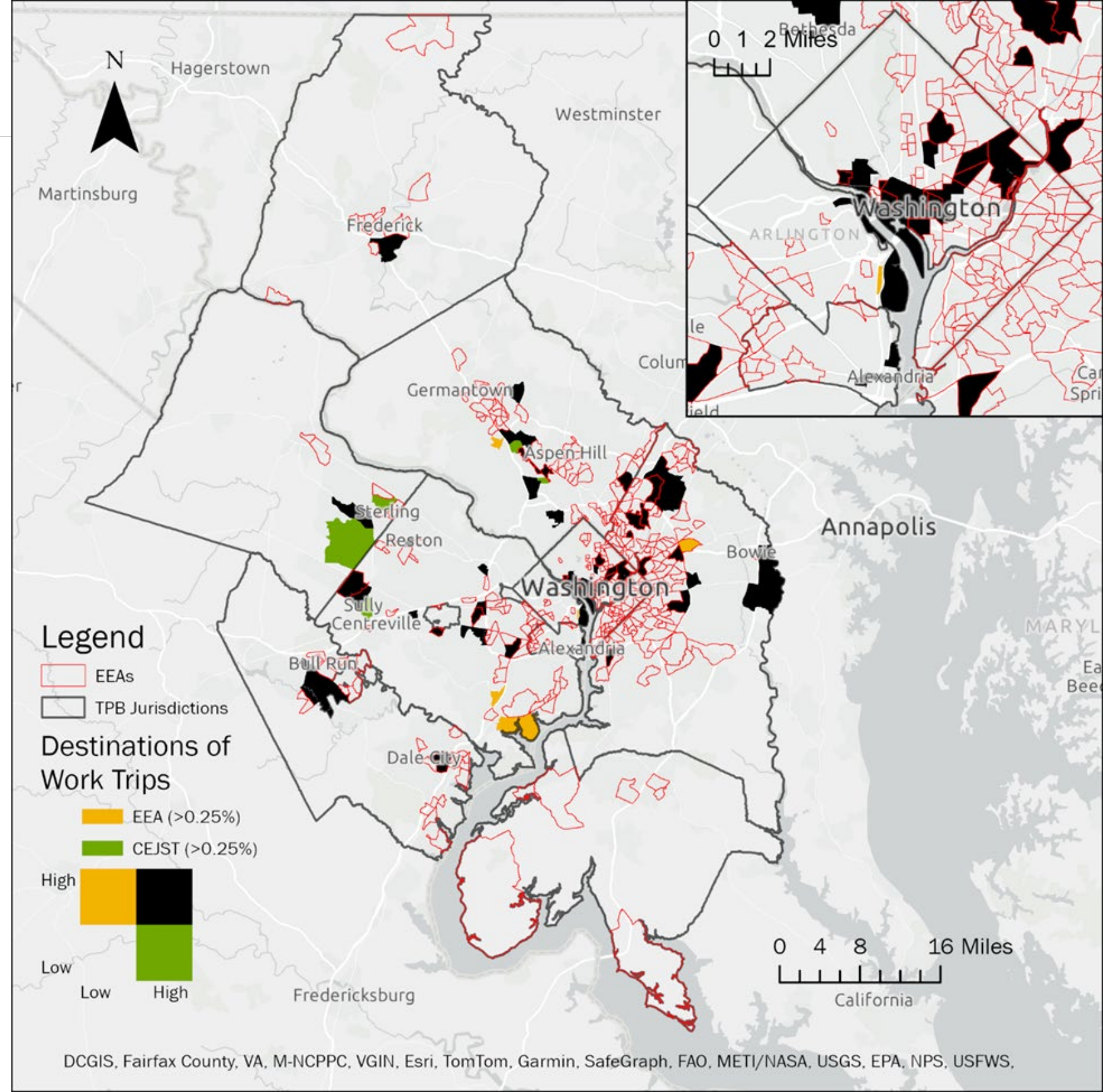
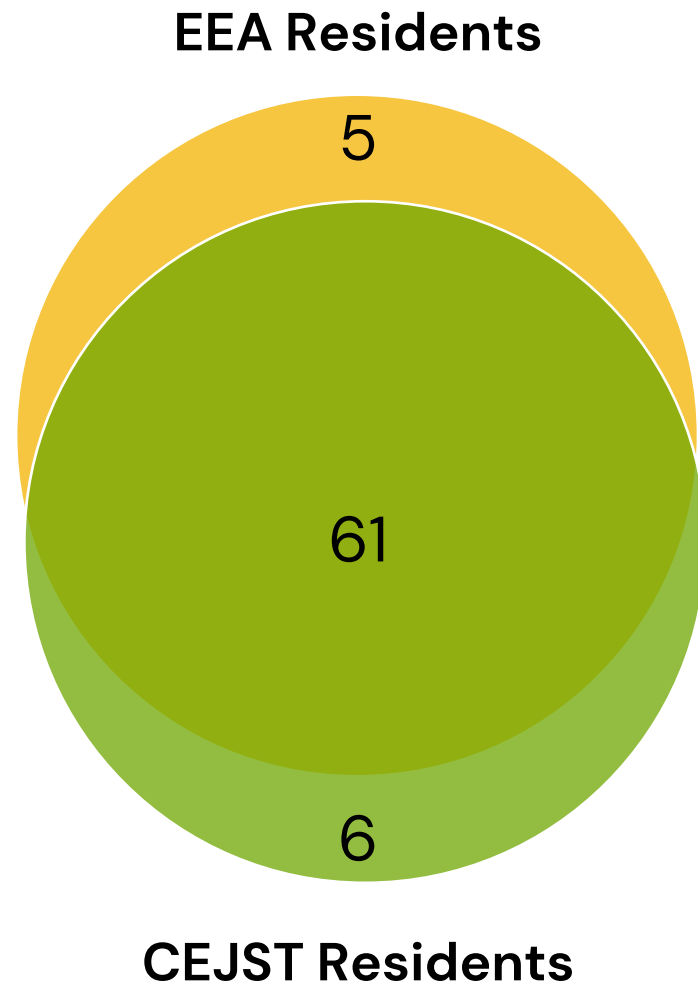
Demographics

Longer for people over 65 and people with low educational attainment

Top Work Destinations (EEA/Non-EEA)



Top Work Destinations (EEA/CEJST)



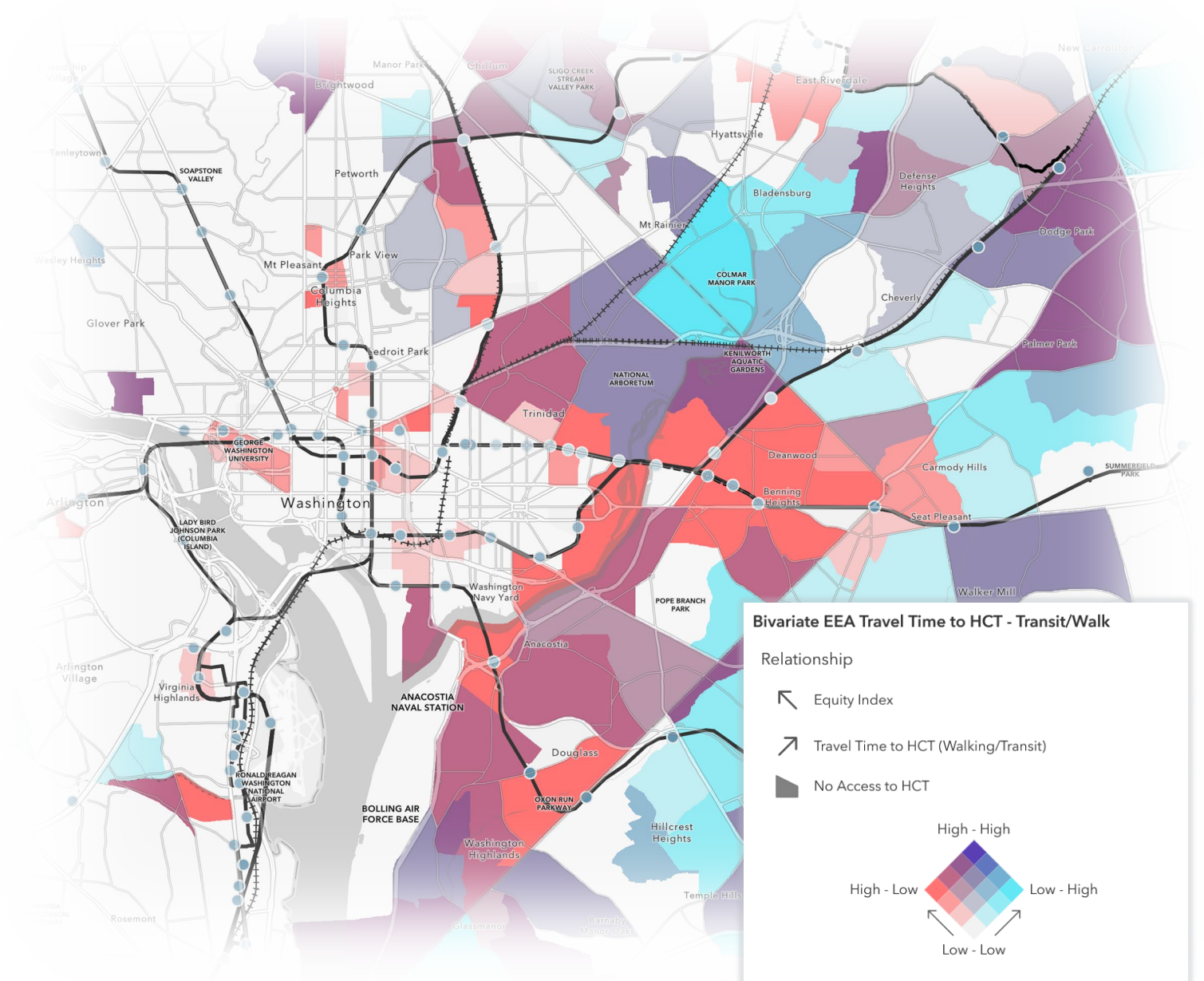


Examination of Unmet Mobility & Accessibility Needs

Examination of Unmet Mobility and Accessibility Needs

Examine the differences between travel characteristics for traditionally disadvantaged and non-traditionally disadvantaged populations to identify unmet mobility and accessibility needs based on:

- Accessibility
- Congestion
- Mobility and affordability

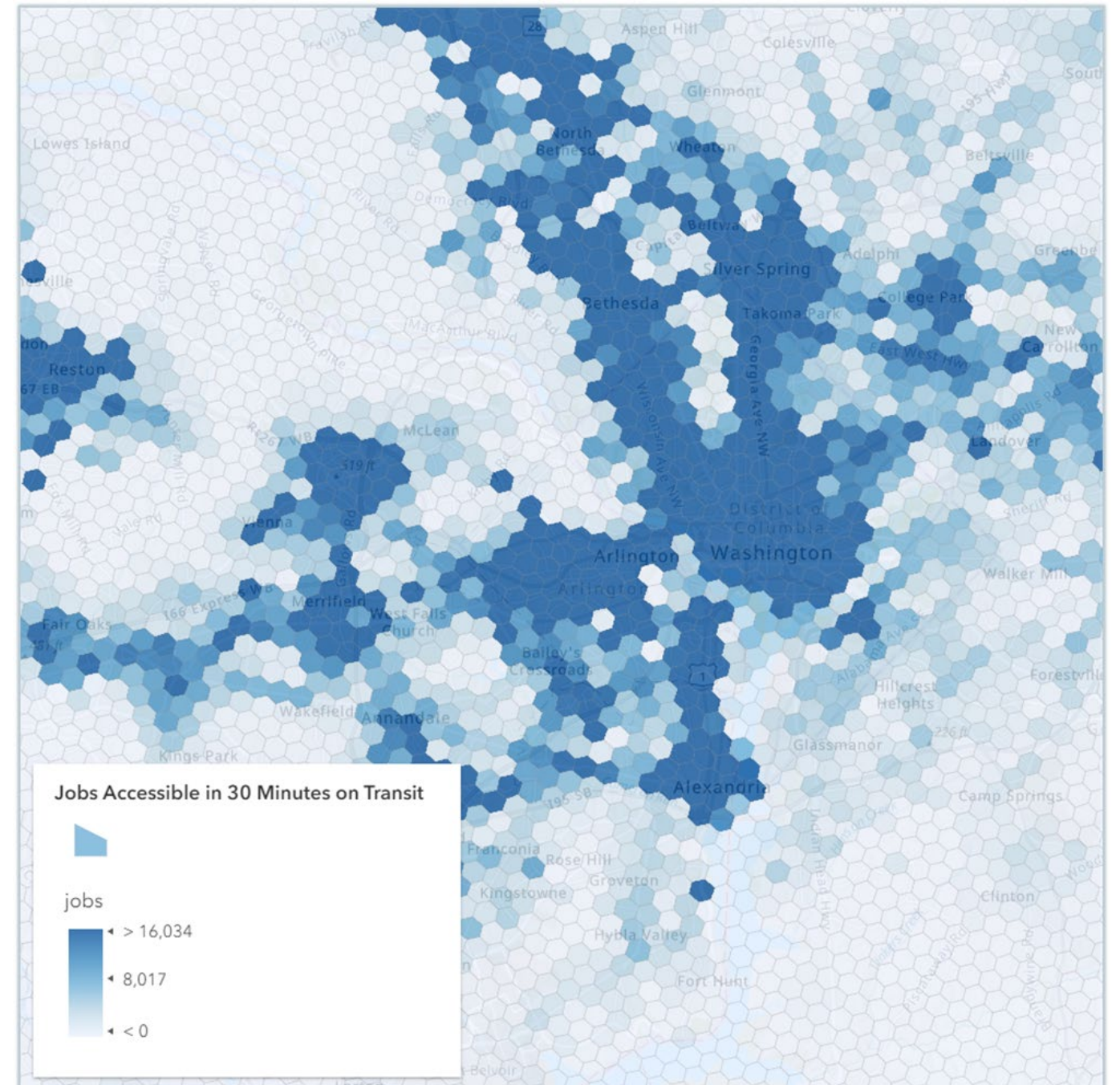


Accessibility

Compare access to jobs and destinations across traditionally disadvantaged and non-traditionally disadvantaged geographies.

Methodology

- 30-minute travel-time matrix, based on a regional transportation network developed for R5 analyses
 - Streets and shared-use paths
 - GTFS
 - All providers in the TPB region (May 26, 2023; 8:00 a.m.)
- Index access to people, jobs, and points of interest
 - Population: 2022 ACS
 - Jobs: 2021 LEHD
 - Points of interest: [Homeland Infrastructure Foundation-Level Data \(HIFLD\)](#)

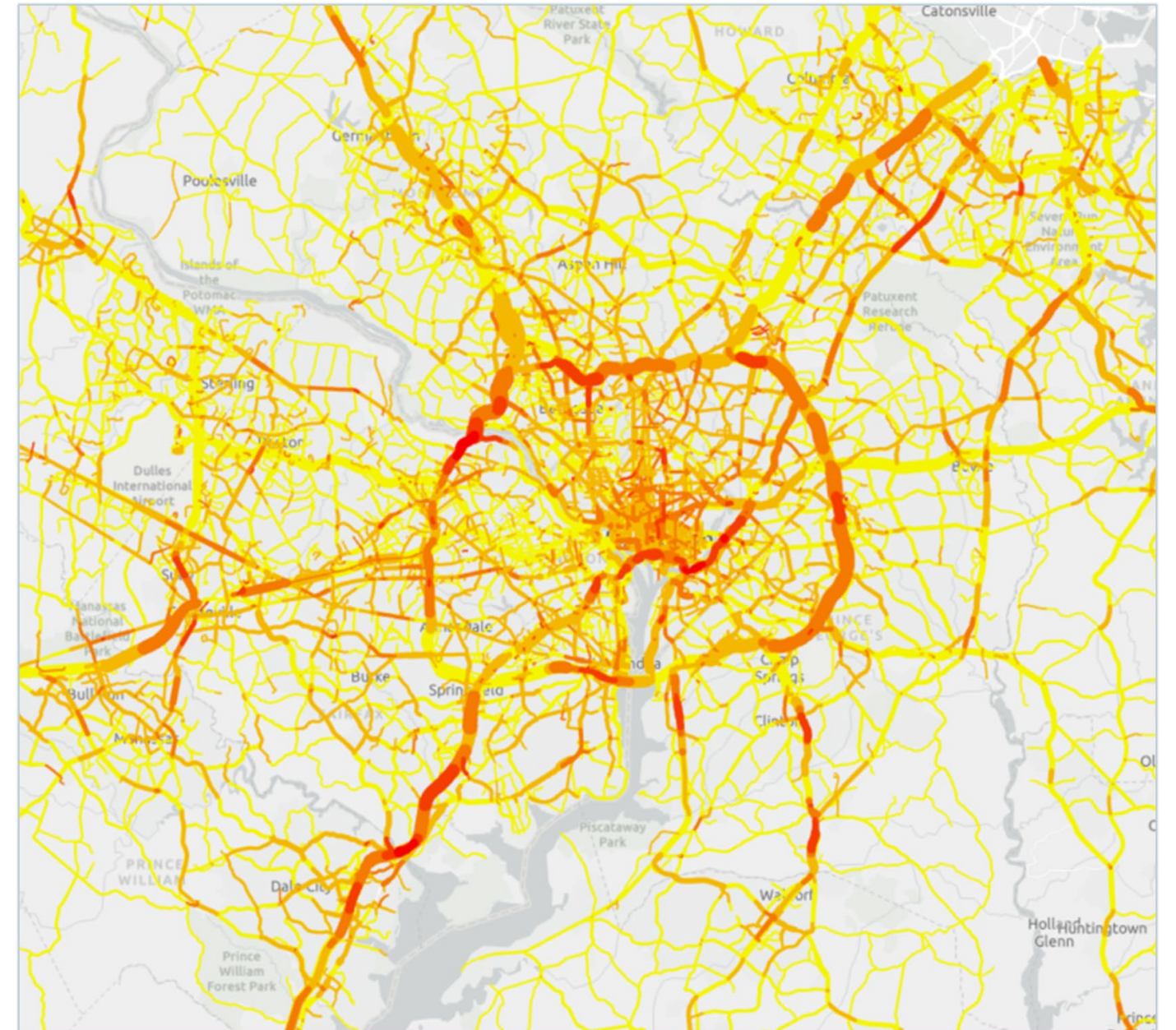


Congestion

Compare the impact of congestion across traditionally disadvantaged and non-traditionally disadvantaged geographies.

Methodology

- Congestion score index, based on the difference between congested and free flow speeds, weighted by traffic volume
 - Congestion speeds based on two-hour window (3:00 – 5:00 p.m.) with greatest discrepancy between realized speed and free flow speed
- Speed and average annual daily traffic based on Replica segment profiles
 - Provide 15-minute snapshots of average volume and travel speed for each segment throughout the region



Mobility and Affordability

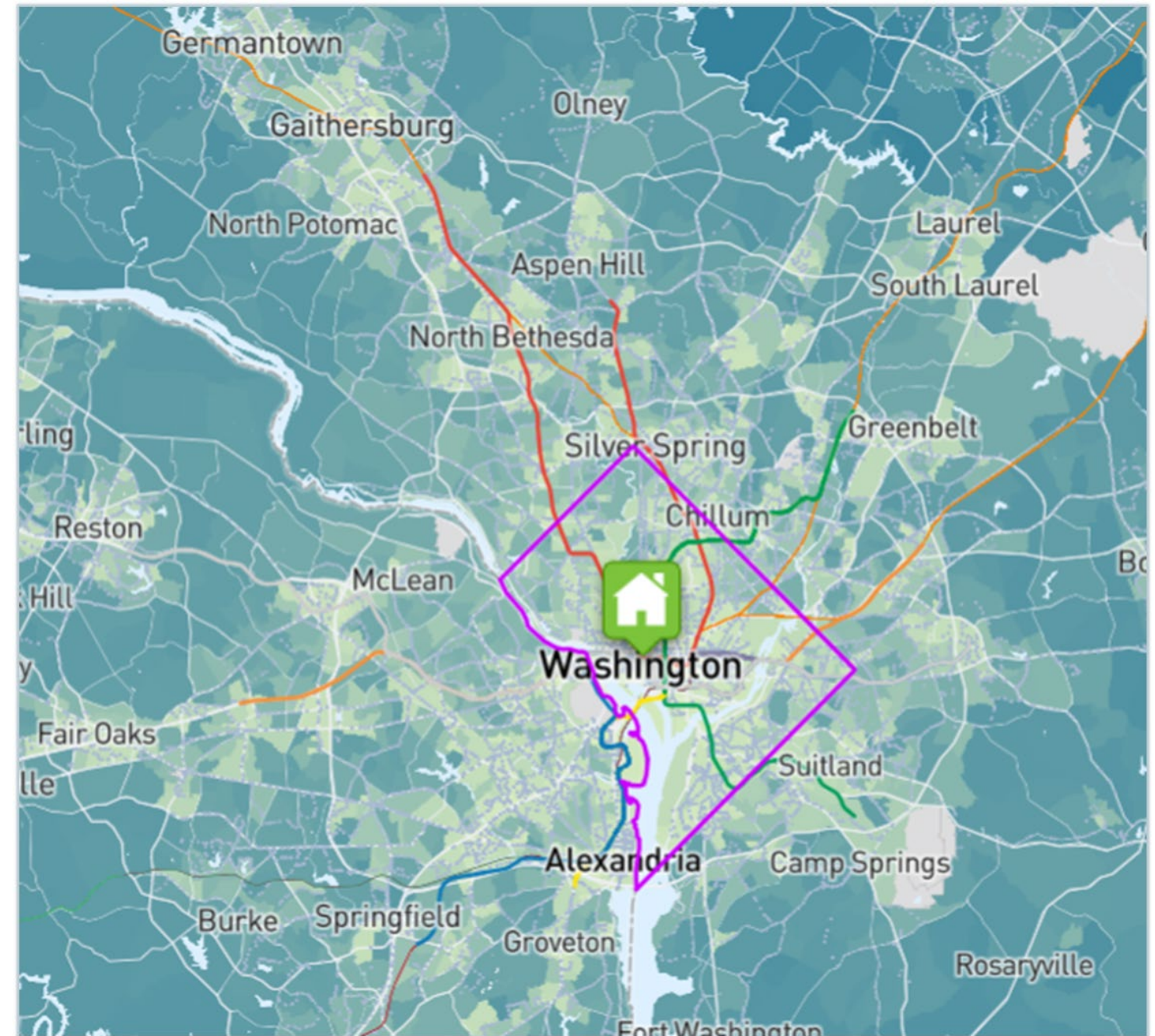
Where would mobility enhancements generate the largest returns?

Compare mobility and affordability (based on household income and household transportation costs) to identify geographies where residents experience:

- Limited access to jobs and destinations **AND**
- High transportation costs as a percentage of income

Methodology

- Bivariate index of:
 - Transportation cost as a percentage of income
 - Center for Neighborhood Technology [Housing and Transportation Cost Index](#)
 - Accessibility
 - Index of multimodal job/destination scores



Final Deliverables

ArcGIS Hub Site, consolidating:

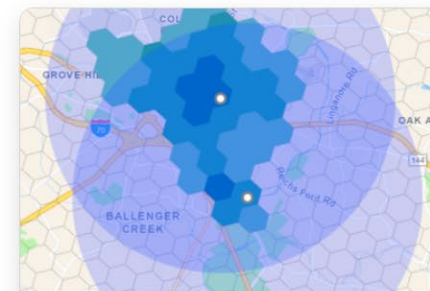
- Methodology
- Findings
- Data

Intended to serve as a planning tool, the Hub Site will include:

- Interactive maps
- Supplementary data, useful for contextualizing regional mobility needs and helping COG's jurisdictions identify transportation improvements



This site includes a web application with map layers for high-capacity transit station accessibility and regional context, a dashboard for exploring station profiles, and documentation for analysis methodology.



Methodology

Read how station-level needs related to HCT connectivity were identified...

Explore



Station Profiles Dashboard

Explore accessibility and recommendations for individual HCT stations...

Explore



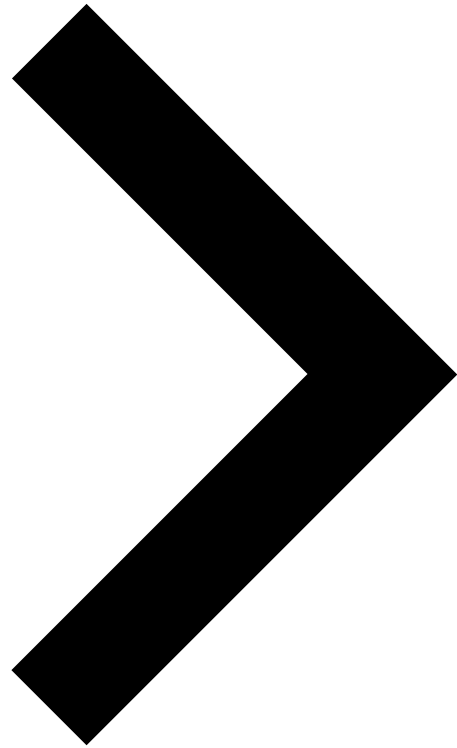
Web Application

View map layers for HCT accessibility and connectivity, transit, and...

Explore

Next Steps

- Incorporate input from Tech Committee
- Review the timeline and process for unmet mobility and accessibility needs analysis
- Develop ArcGIS Hub Site and interactive maps

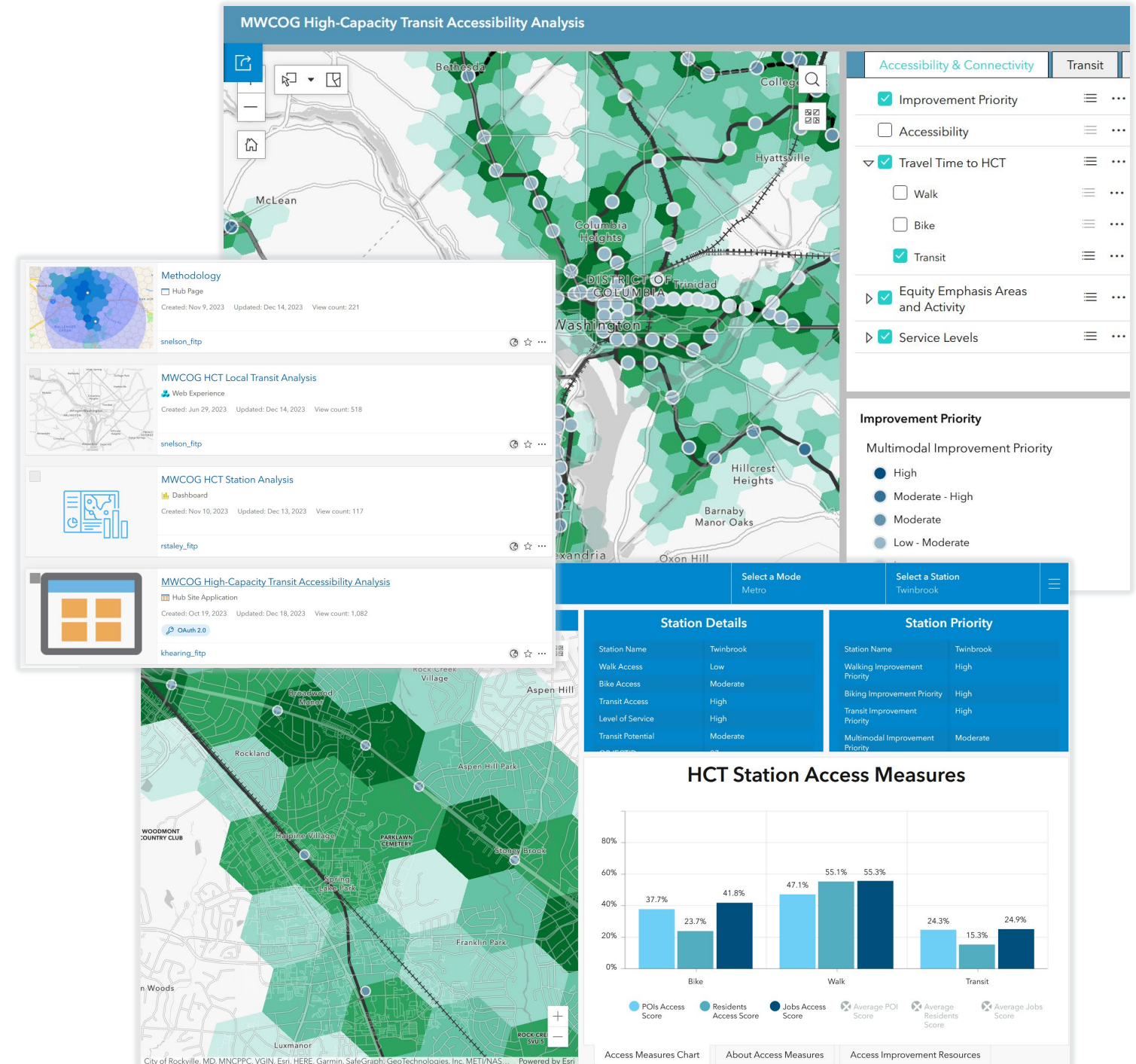


Appendix

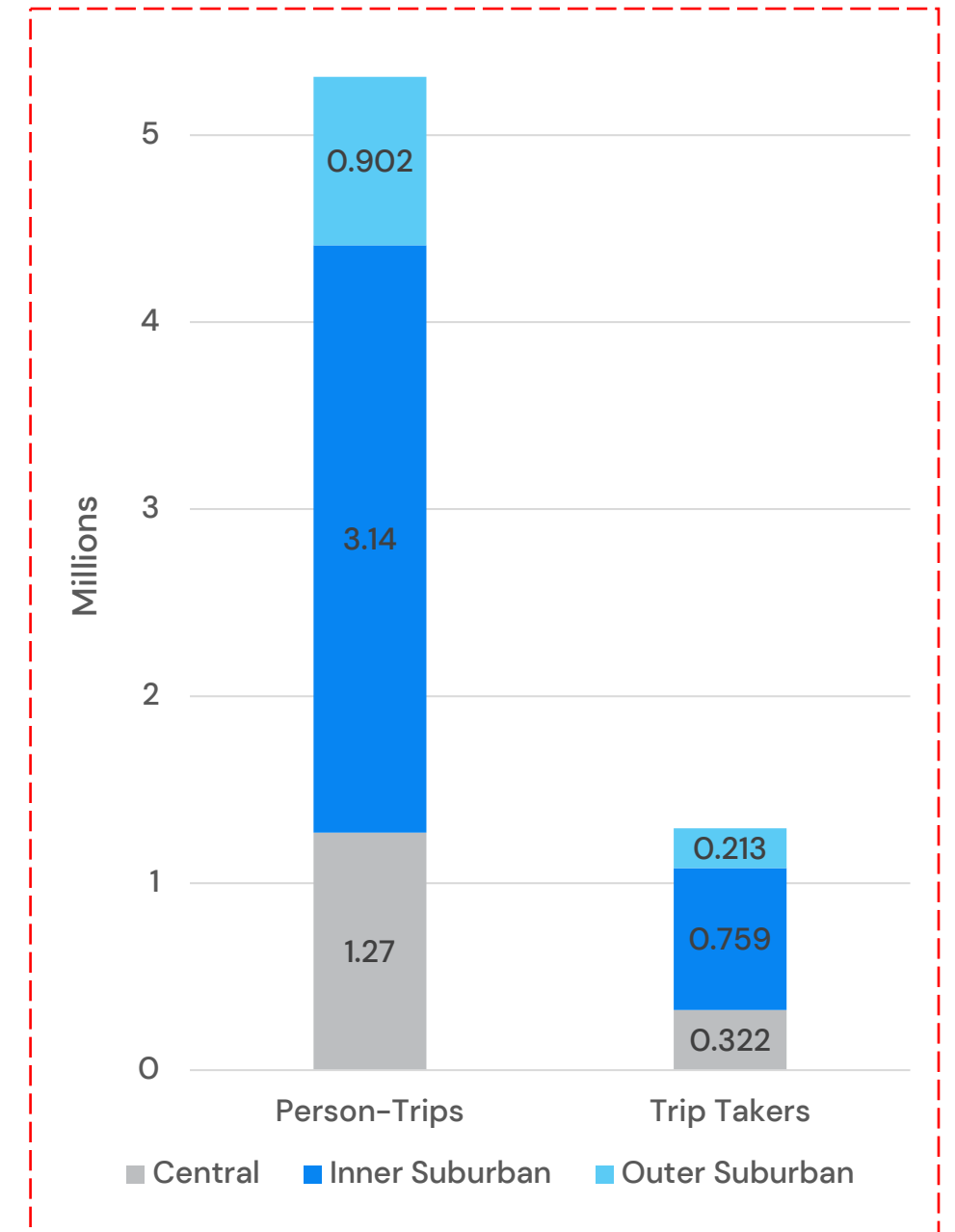
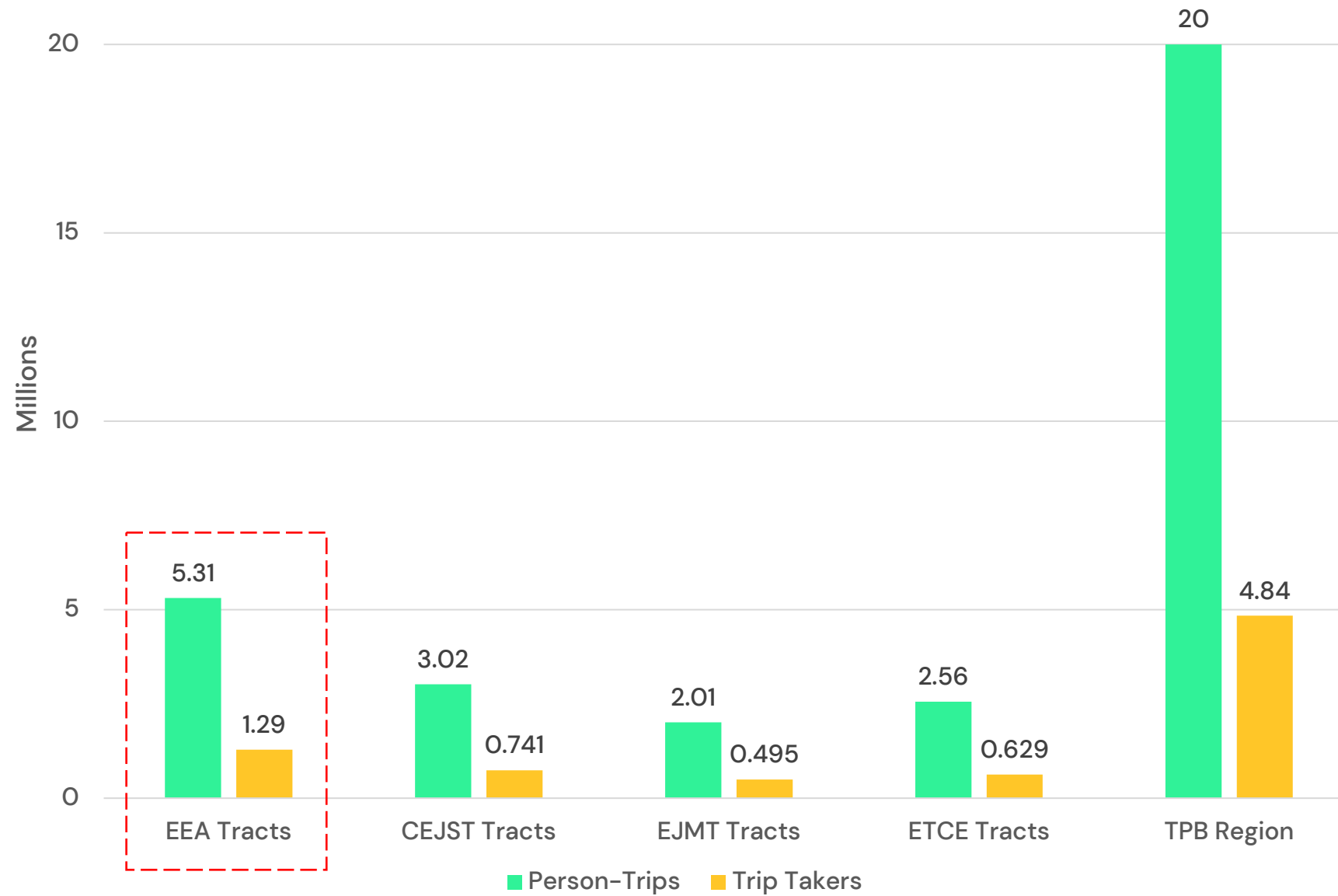
Task 3: Examination of Unmet Mobility and Accessibility Needs

Primary deliverables:

- Draft and Final Technical memorandum, to include:
 - Incorporation of technical memorandum prepared under Task 2, adding analysis of unmet mobility and accessibility needs listing the data and measures considered, those selected, and analysis
 - Recommendations for local, regional, and state transportation agencies to consider as they develop projects, programs, and policies as part of their planning programs.
 - ArcGIS Hub elements (e.g., data layers, maps, and explanatory text)
- PowerPoint slide deck summarizing Task 3 analysis and methodology
- Up to two presentations to TPB Committees



Replica Synthetic Model Size



Demographic Filters & Thresholds

	Filter	Description	Category/Threshold
Low-income	Household Income	"The annual income of households"	Below \$125,000/year
Non-white	Race and Ethnicity	"The category of people's race and ethnicity"	American Indian or Alaska Native Non-Hispanic/Latino, Asian Non-Hispanic/Latino, Black Non-Hispanic/Latino, Hispanic or Latino Origin, Native Hawaiian or Other, Pacific Islander Non-Hispanic/Latino, Other Non-Hispanic/Latino, Two races Non-Hispanic/Latino
Non-English Speaking	Language	"The language of the household"	Spanish, Asian Pacific, Indo European, Group Quarters Language, Other
Disability Status	N/A	N/A	N/A
65 or older	Age	"The number of people in each age group"	65 or older
No Vehicle	Private Auto Availability	"The total number of vehicles the person's household has access to"	No vehicles
Low Education	Education; Age	"The education level of a person"	No schooling, K-12 education, High school diploma, Some college; 25 or older
Unemployed	Employment Status	"The employment status of the person"	Unemployed

Income

Persons below 200% of the federal poverty limit:

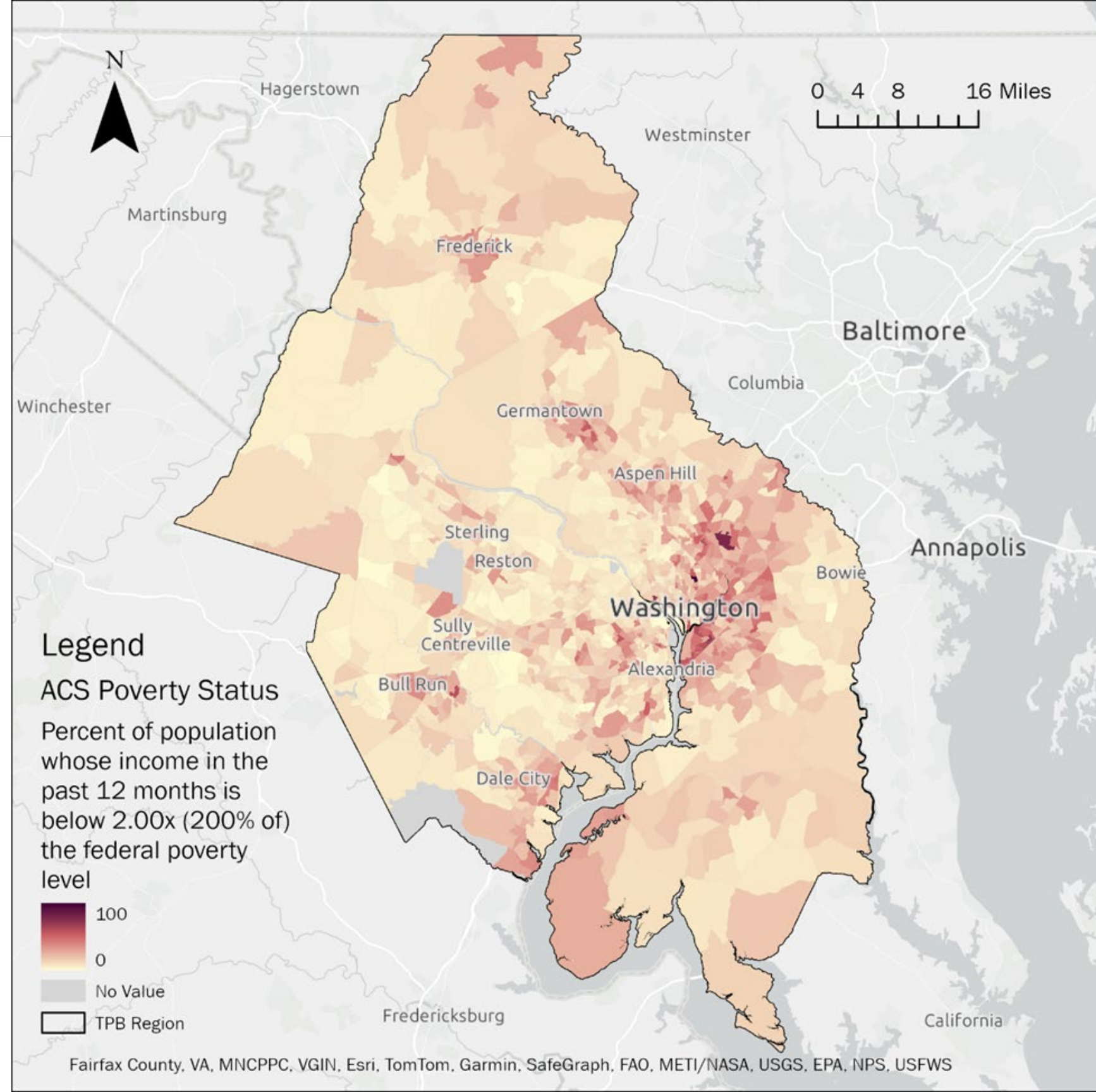
17% TPB Region

33% EEA Tracts

37% CEJST Tracts

36% ETCE Tracts

37% EJMT Tracts



Race/Ethnicity

Persons other than "White alone (not Hispanic or Latino)":

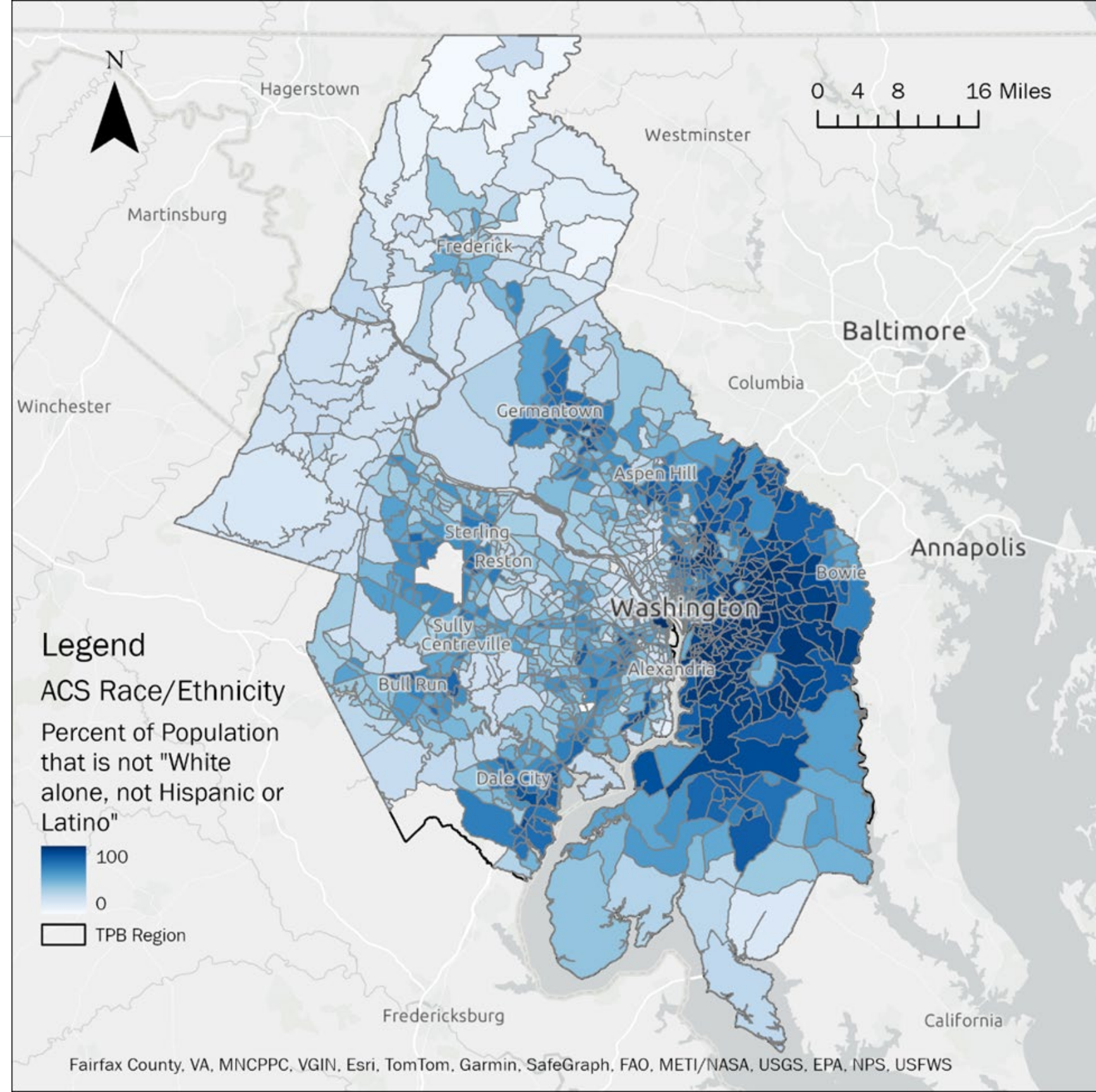
60% TPB Region

80% EEA Tracts

84% CEJST Tracts

83% ETCE Tracts

89% EJMT Tracts



English Ability

Persons 18 years and older who have limited English ability:

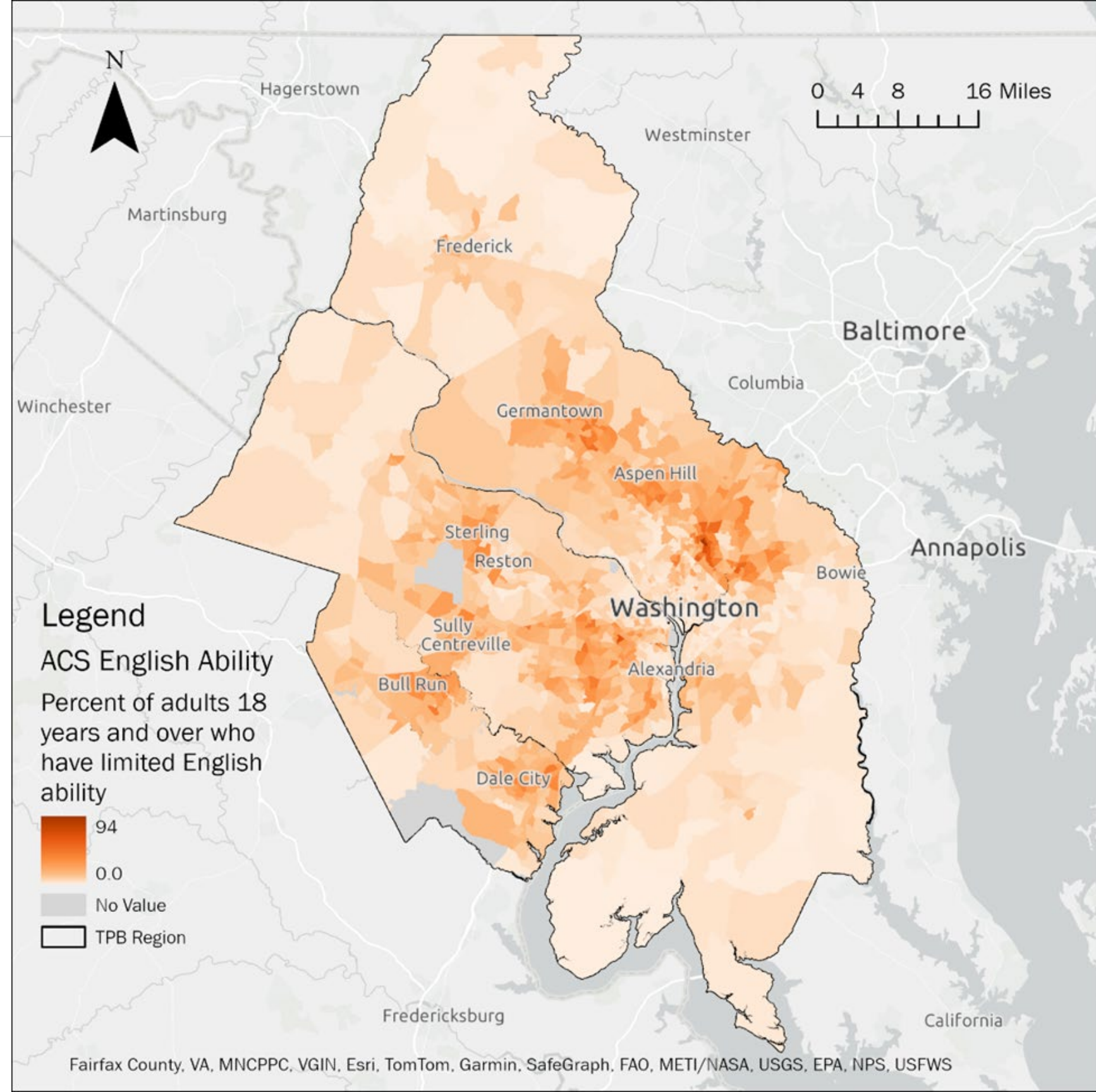
13% TPB Region

20% EEA Tracts

25% CEJST Tracts

17% ETCE Tracts

22% EJMT Tracts



Disability Status

Persons with a disability:

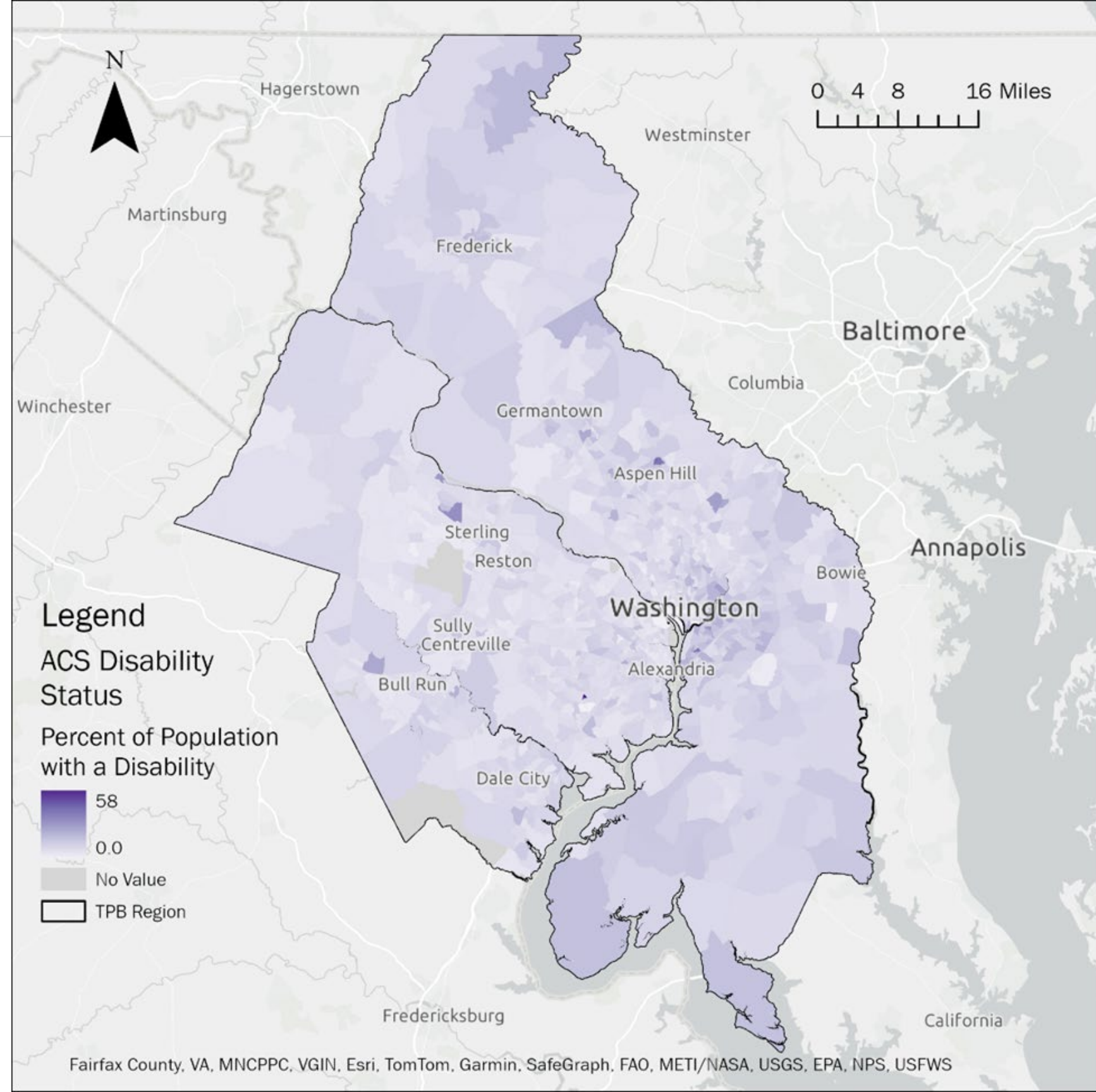
9% TPB Region

10% EEA Tracts

10% CEJST Tracts

12% ETCE Tracts

11% EJMT Tracts



Older Adults

Persons 65 years or older:

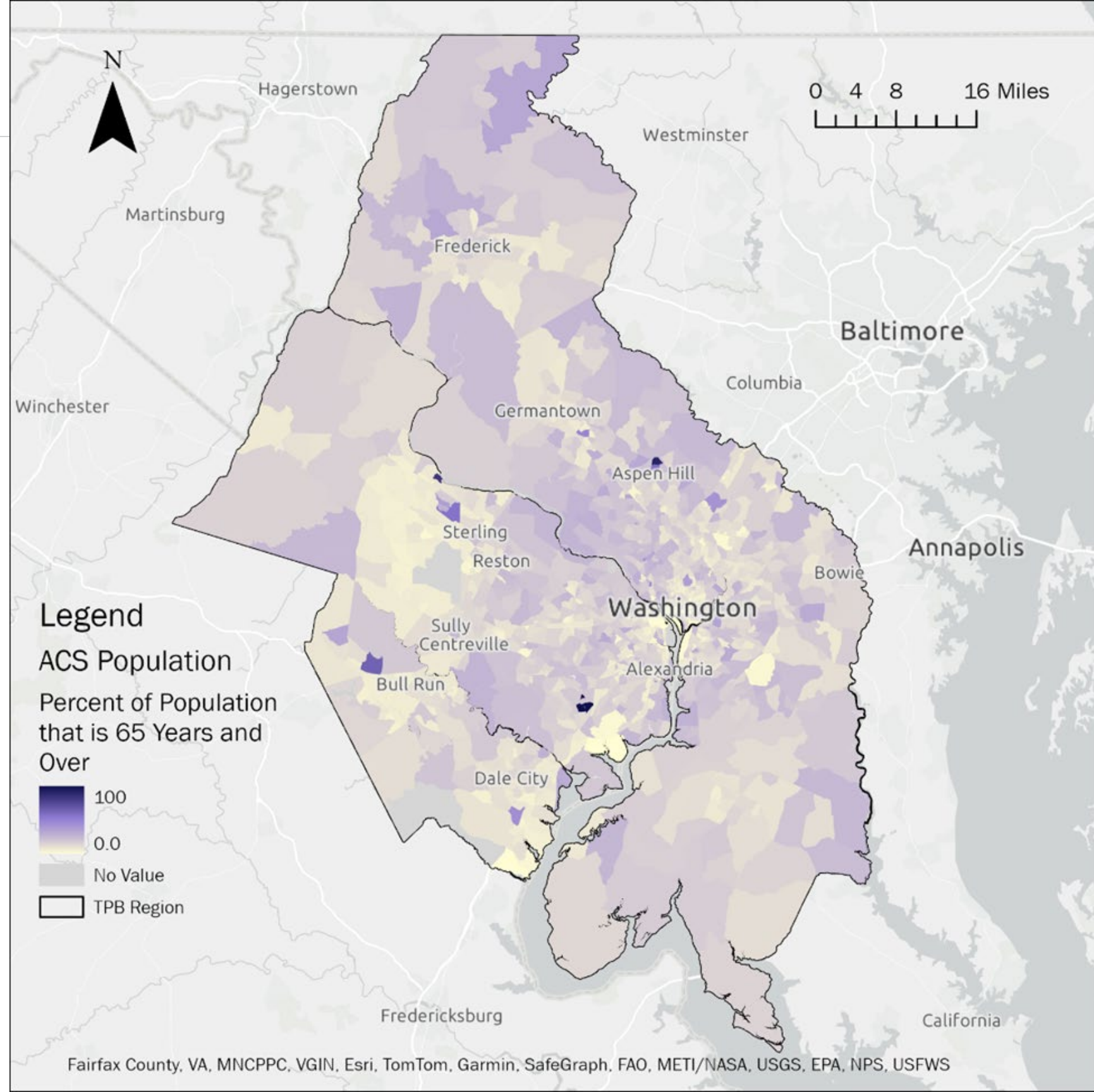
14% **TPB Region**

11% **EEA Tracts**

11% **CEJST Tracts**

13% **ETCE Tracts**

12% **EJMT Tracts**



Vehicle Availability

Households with no vehicle available:

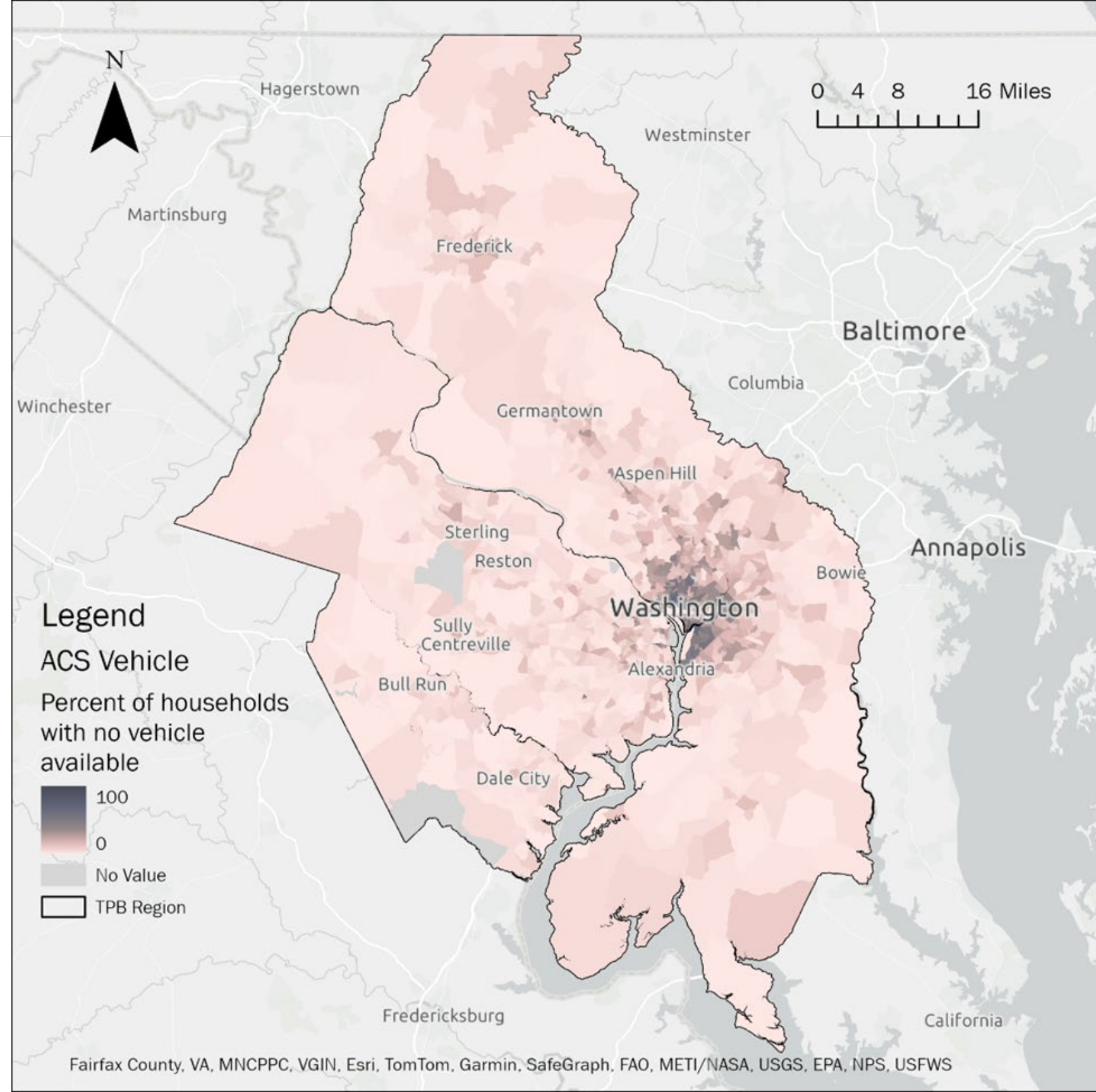
11% TPB Region

18% EEA Tracts

21% CEJST Tracts

21% ETCE Tracts

22% EJMT Tracts



Educational Attainment

Persons whose highest education completed is less than a bachelor's:

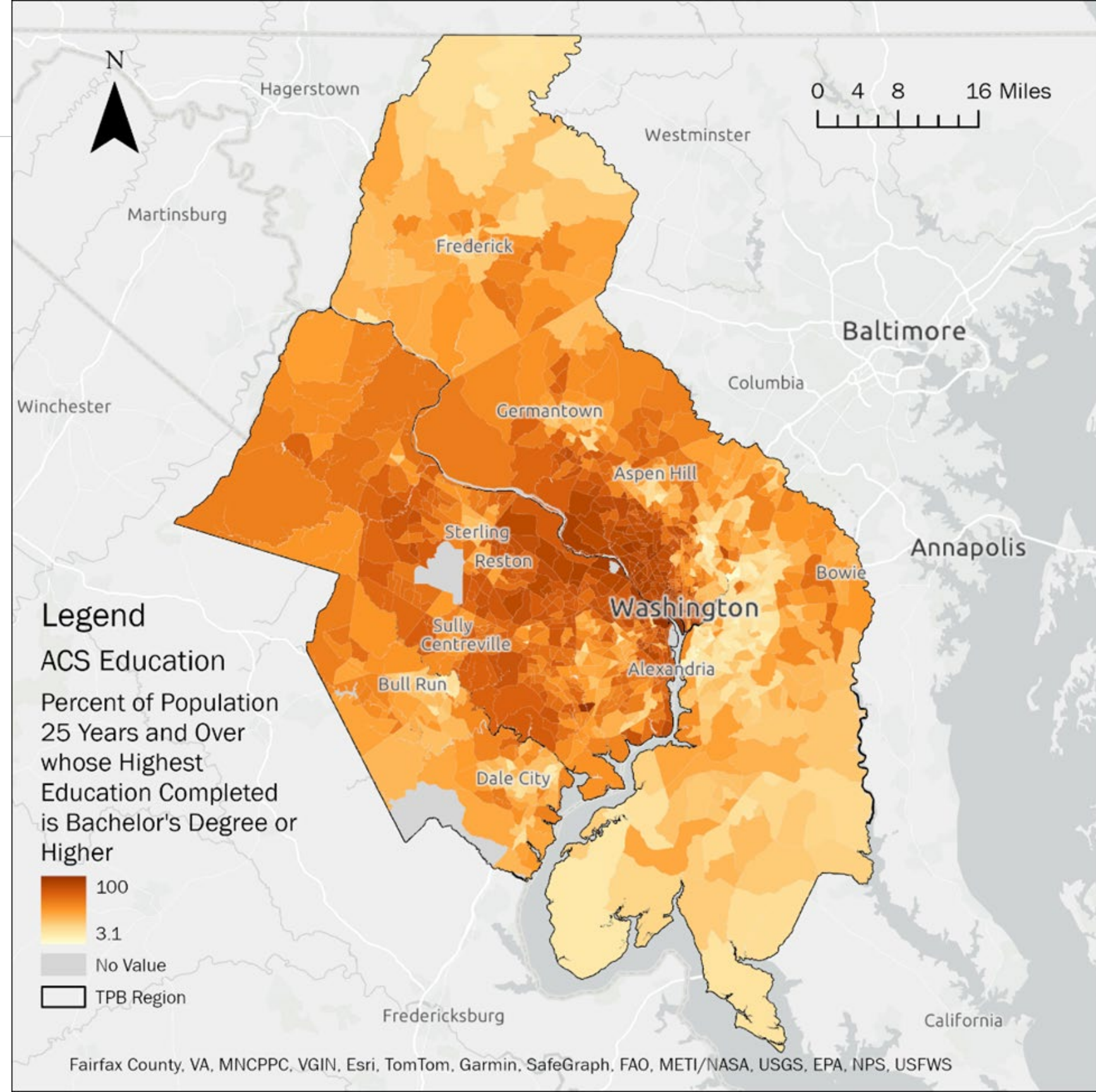
45% TPB Region

64% EEA Tracts

68% CEJST Tracts

69% ETCE Tracts

73% EJMT Tracts



Employment Status

Persons unemployed:

5% TPB Region

7% EEA Tracts

8% CEJST Tracts

8% ETCE Tracts

9% EJMT Tracts

