Examining Travel Patterns and Characteristics of Transit Users in New York State

Ho-Ling Hwang, Ph.D.[1], Daniel Wilson[1], Tim Reuscher[1], Rob Taylor[1], S.M. Chin, Ph.D.[1], and Angel Canales, P.E.[2]

[1] Center for Transportation Analysis, Oak Ridge National Laboratory

[2] New York State Department of Transportation

BACKGROUND

This study, conducted by Oak Ridge National Laboratory (ORNL) researchers in support of the New York State Department of Transportation, aimed at using the 2009 National Household Travel Survey (NHTS) data, in conjunction with related spatial data sets, to examine characteristics and travel patterns of transit users within New York State (NYS). The study also intended to identify any specific differences between transit users and non-users, as well as variations between the New York City metro area (NYMTC) and the Rest of NYS.

Along with NHTS data, this study utilized NYS transit system General Transit Feed Specification (GTFS) data in a Geographic Information System (GIS) for analysis and visualization purposes. To measure the significance of transit systems within NYS, available GTFS data were spatially analyzed against the LandScan population dataset to determine the proportion of NYS population within selected distances from available transit stations. Note that LandScan contains the finest population distribution data available at 30 arc-second resolution, allowing more precise estimates of population within selected radii of transit stations. This effort led to the creation of several NYS transit sheds (1, 2.5, and 5 miles).

MAJOR DATA SOURCES

- ❑ 2009 NHTS NYS Add-On Data
- ❑ NYS GTFS Network Data – Public and Private
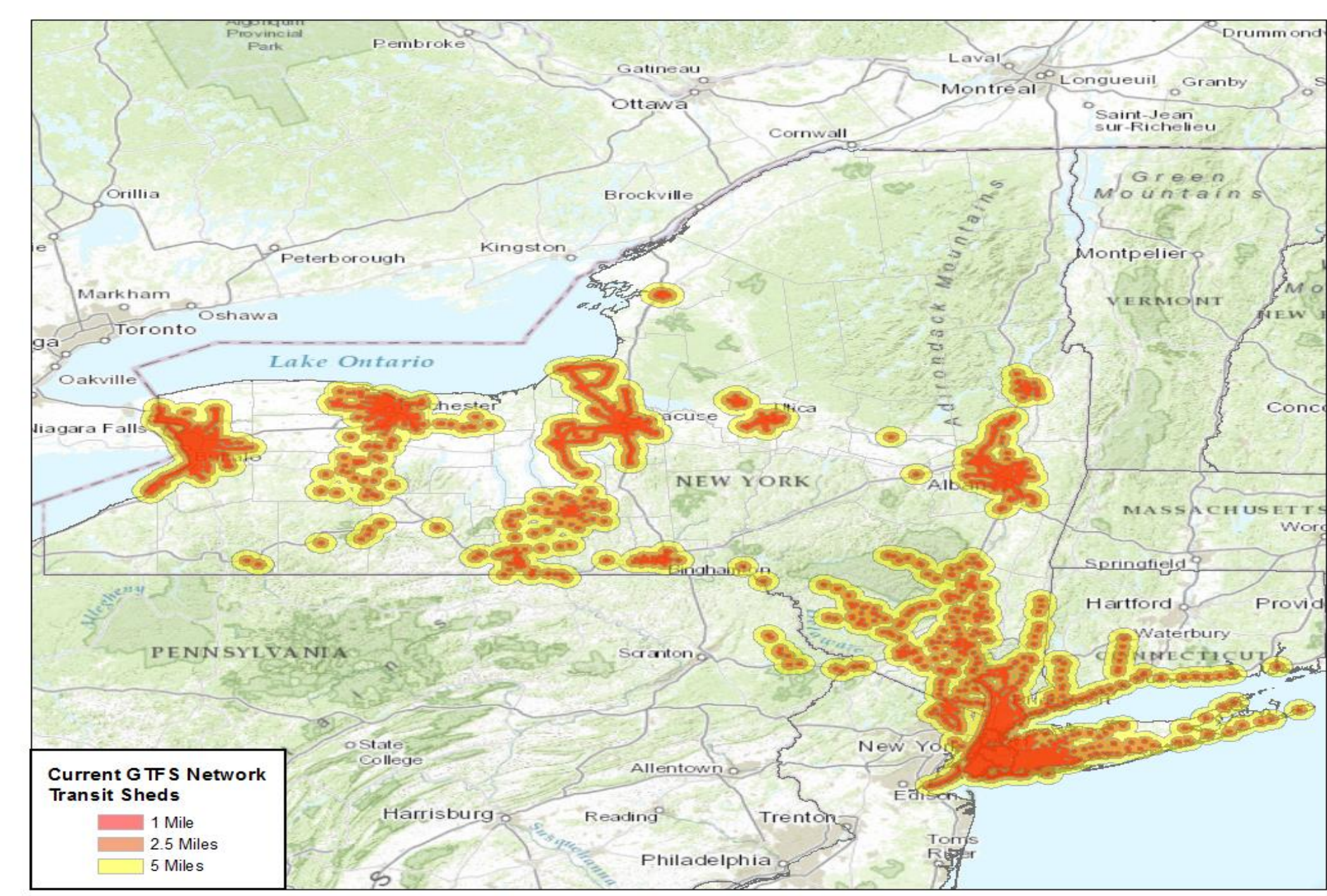- ❑ 2011 LandScan Data

STUDY AREA
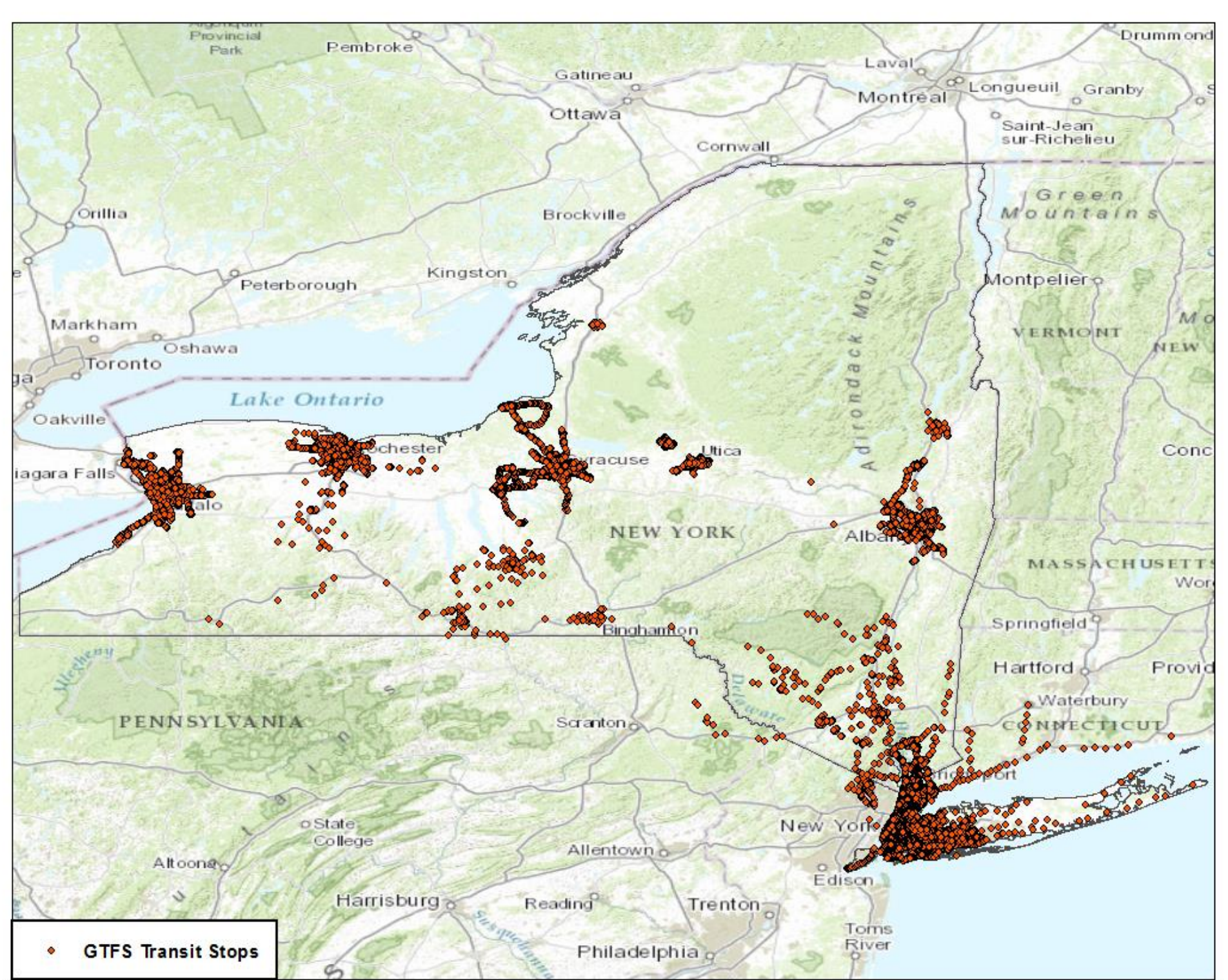
GTFS transit stop locations of New York State based transit providers

NEW YORK STATE GTFS TRANSIT SYSTEMS INCLUDED

- ➢ New York City
  - • Metro-North (rail)
  - • MTA (bus/rail)
  - • NYCT (bus)
- ➢ Albany (bus)
- ➢ Rochester (bus)
- ➢ Westchester (bus)
- ➢ Buffalo (bus)
- ➢ Rockland (bus)
- ➢ Coach USA (bus)
- ➢ CTRAN (bus)
- ➢ Glens Falls (bus)
- ➢ Warwick Transit (bus)
- ➢ Watertown Citibus (bus)

- ➢ Long Island
  - • Nassau Inter-County Express (bus)
  - • Long Island (bus/rail)
- ➢ Central NY (CENTRO)
  - • Syracuse (bus)
  - • Oswego (bus)
  - • Auburn (bus)
  - • Rome (bus)
  - • Utica (bus)
- ➢ Broome County (bus)
- ➢ Middletown (bus)
- ➢ Newburgh (bus)
- ➢ TCAT (bus)
- ➢ UCAT (bus)

TRANSIT SHEDS

GTFS Transit Stop Locations were used to create 1-, 2.5-, and 5-mile transit sheds. These sheds allow further examinations of transit use by populations, households, trip origins, and trip destinations within the selected areas.

1, 2.5, & 5 mile NYS transit sheds

NYS TRANSIT COVERAGE

- ➢ Proportion of NYS population with "access to transit" is defined by measuring the population within a given distance to transit stations/stops (i.e., transit sheds)
- ➢ 2011 LandScan population of NYS is 19.3 million
- ➢ Using LandScan population data to examine NYS population covered within the GTFS transit sheds
  - ▪ 1 mile: 15.3 million (79%)
  - ▪ 2.5 miles: 16.9 million (88%)
  - ▪ 5 miles: 17.7 million (92%)
- ➢ NYS population mainly concentrated in urban areas where transit systems were available
- ➢ Population of NYMTC accounted for approx. 60% of the total NYS population, but only 4% of the state's total area

2011 LandScan estimated population for NYS
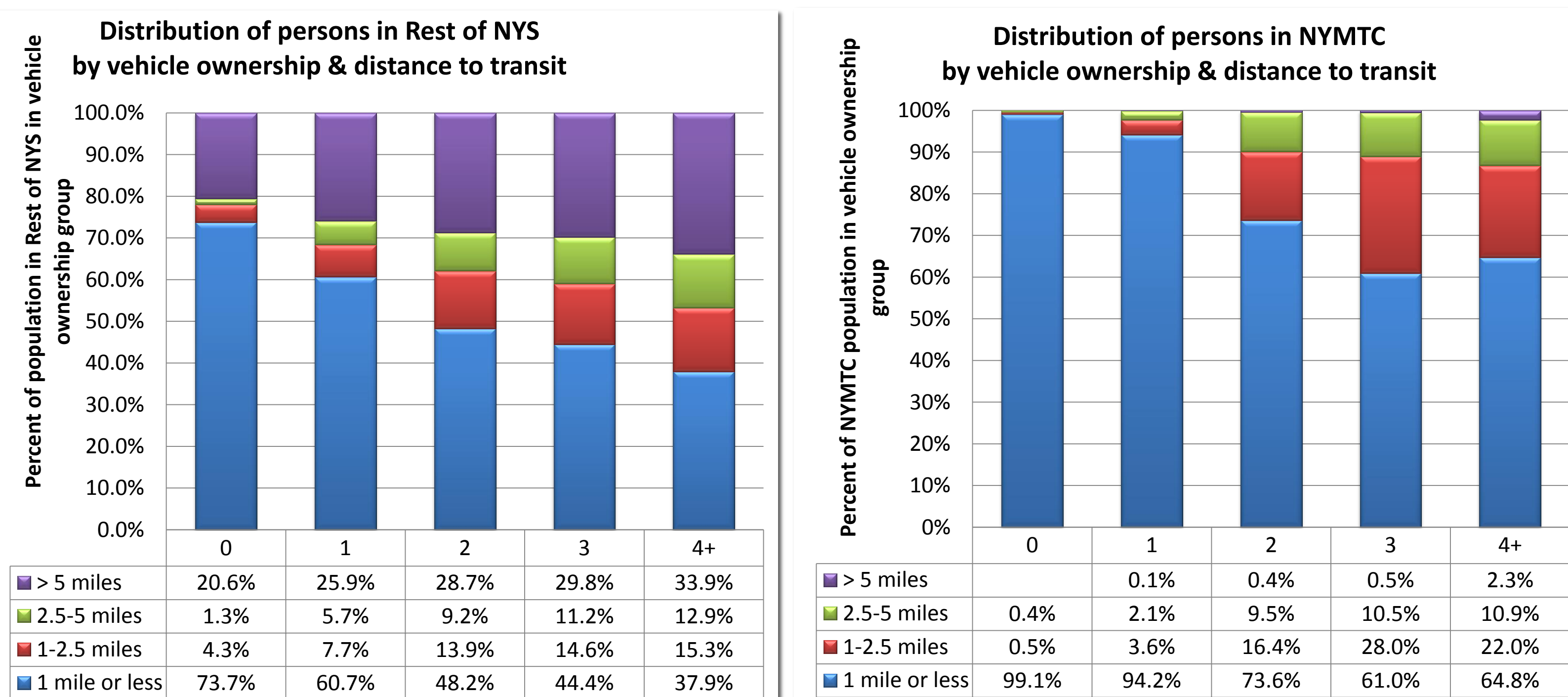
TRANSIT TRAVEL STATISTICS

Specific issues addressed in this study include: Are there demographic differences between travelers who used/did not use transit? How does transit usage compare with the population at large? What are the regional or spatial differences (e.g., living in or outside of a specific transit shed)? Are there any unique travel characteristics or patterns that exist for transit users? Potential influence of New York City metro area (NYMTC) transit systems and population on statewide analysis was also considered in this study.

Statistics for the shares of trips made by Transit Users, measured by PT, PMT, VT, and VMT, and by trip origin location in NYS (within 1, 2.5, & 5 miles of transit sheds)

Expectedly, major differences were presented between NYMTC and Rest of NYS

Share of Transit Usage (%)				
	PT	PMT	VT	VMT
Origins within 1-mile Transit Shed				
NYMTC	36.58	33.53	8.11	11.69
Rest NYS	3.55	3.46	0.81	1.46
Origins within 2.5-mile Transit Shed				
NYMTC	33.80	29.54	7.06	9.98
Rest NYS	3.20	3.18	0.77	1.37
Origins within 5-mile Transit Shed				
NYMTC	32.53	28.19	6.61	9.39
Rest NYS	3.01	2.95	0.74	1.26
All trips				
NYMTC	31.41	24.38	6.37	8.59
Rest NYS	2.43	2.56	0.61	0.99

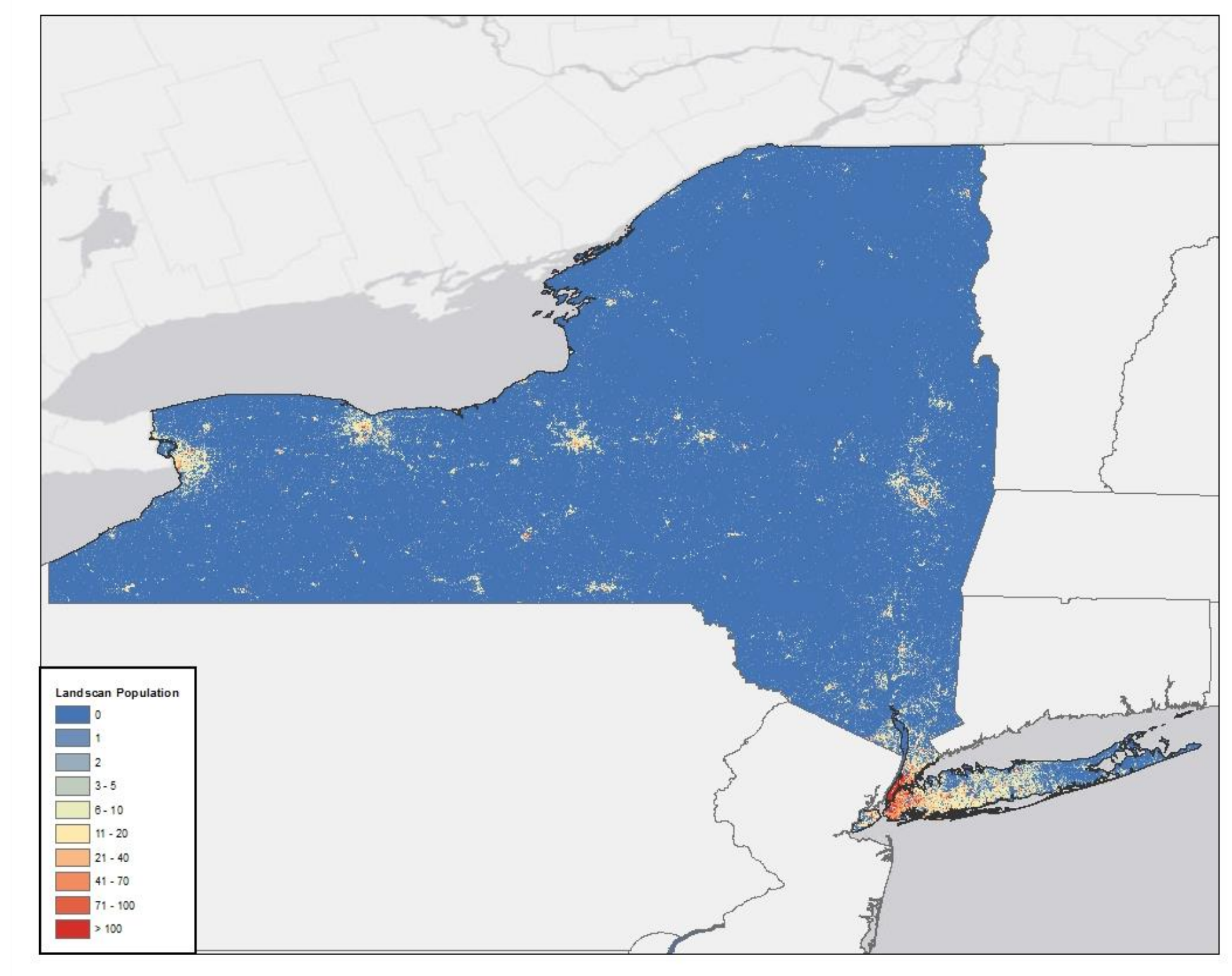| All NYS Households								
	Transit Users				Non-Users			
	PT	PMT	VT	VMT	PT	PMT	VT	VMT
NYMTC	4.2	18.8	0.4	3.69	3.4	22.0	2.7	20.1
Rest NYS	4.4	43.7	0.8	12.2	3.7	34.0	3.1	28.1
NYS Households within 1 Mile of Transit								
NYMTC	4.2	18.0	0.3	3.24	3.3	19.8	2.5	17.4
Rest NYS	4.5	39.3	0.8	10.0	3.6	32.3	3.1	26.4

Trip rates for all NYS households vs. NYS households within 1 mile of transit, between NYMTC and Rest of NYS, were consistent. Note: PT & PMT were per-person based, while VT &VMT were per driver-based.

Percent of Persons within 1 Mile of Transit by Transit Usage

Household Size

Number of Vehicles

Household Income

Vehicle ownership by distance to transit - NYMTC & Rest of NYS

Distribution of persons in Rest of NYS by vehicle ownership & distance to transit

	0	1	2	3	4+
> 5 miles	20.6%	25.9%	28.7%	29.8%	33.9%
2.5-5 miles	1.3%	5.7%	9.2%	11.2%	12.9%
1-2.5 miles	4.3%	7.7%	13.9%	14.6%	15.3%
1 mile or less	73.7%	60.7%	48.2%	44.4%	37.9%

Distribution of persons in NYMTC by vehicle ownership & distance to transit

	0	1	2	3	4+
> 5 miles		0.1%	0.4%	0.5%	2.3%
2.5-5 miles	0.4%	2.1%	9.5%	10.5%	10.9%
1-2.5 miles	0.5%	3.6%	16.4%	28.0%	22.0%
1 mile or less	99.1%	94.2%	73.6%	61.0%	64.8%

POTENTIAL FUTURE RESEARCH

- ➢ Investigate impacts on transit usage due to the level of transit service availability, e.g., considering transit frequency
- ➢ Examine NHTS transit trips by origin and destination region pairs, e.g., transit route

ACKNOWLEDGEMENTS

CONTACTS

Angel Canales, P.E., M.B.A.

(518) 457-4326, angel.canales@dot.ny.gov

Ho-ling Hwang, Ph.D.

(865) 946-1224, hwanghl@ornl.gov