PERFORMANCE BASED PLANNING & PROGRAMMING

System Performance – Performance Measures: Travel Time Reliability, Congestion

Eric Randall, TPB Transportation Engineer
Jan-Mou ("James") Li, TPB Transportation Engineer
Matthew Gaskin, TPB Transportation Planner

TPB Technical Committee
February 2, 2018

Agenda Item 6

National Capital Region
Transportation Planning Board

Contents of Presentation

- PBPP briefing to the board: February 20 meeting
  - Review of target-setting and agreement requirements
  - Timeline of upcoming briefings and actions
- System Performance (NHS, Freight, CMAQ Program) measures
  - Overview of measures
  - Provide illustrations of potential forecasting techniques, utilizing different methodologies
- CMAQ Program: Non-SOV performance measure
  - Presentation of the data that has been collected.
  - Forecasting and target-setting alternatives
- Availability of Data for congestion measures (NMPRDS)
- CMAQ Program: Traffic Congestion measure (PHED)
- NHS and Freight performance measures (TTR & TTTR)

PBPP and the Board

Completed PBPP actions:

- June 2017 – approved Transit Asset Management (TAM) targets
- January 2018 – approved Highway Safety targets

Upcoming board activities:

- February 2018 – brief board on overall PBPP requirements: target-setting and regional coordination. Provide timeline of upcoming briefings and approval dates.
- April 2018 – brief on draft CMAQ Program targets (traffic congestion, mode share, emission reductions)
- May 2018 – approve CMAQ Program targets
- June 2018 – brief on draft Highway Asset (pavement and bridge condition) targets, highway System Performance (travel time reliability, freight reliability) targets
- July 2018 – approve Highway Asset and highway System Performance targets

PBPP Letters of Agreement (LOAs)

Briefed to Technical Committee at January 5 meeting

- Draft "template" for generally applicable LOA, with possible customization to meet any specific local requirements
- Comments requested by January 29
- Questions received on: applicability, content, signatory official, level of legal review required

TPB staff are reviewing and anticipate finalizing a new template LOA by end of February

- Collaborative review in March to finalize for each signatory
- Collect signatures in April, ahead of May 27 deadline

System Performance: Highway and Freight

	Performance Measures
National Highway System	(1) **Interstate Travel Time Reliability (TTR)** - Percent of person-miles traveled on the Interstate System that are reliable
	(2) **NHS (Non-Interstate) Travel Time Reliability (TTR)** - Percent of person-miles traveled on the non-Interstate NHS that are reliable
	(3) **Greenhouse Gas Emissions** - Percent Change in Tailpipe CO2 Emissions on the NHS

	Performance Measures
Freight Movement	(4) **Freight Reliability (TTTR)** - Percent of the Interstate System Mileage providing for Reliable Truck Travel Times

- State DOTs – set Targets by May 20, 2018
  - GHG Emissions not until September 28, 2018
- TPB – set Targets by November 15, 2018 (GHG: March 27, 2019)

Travel Time Reliability (TTR) Measures

- Measurement of travel time reliability on the Interstate and non-Interstate National Highway System (NHS)
  - State DOTs must establish 2- and 4-year targets (2019 and 2021 respectively) for the Interstate, but only a 4-year target for the non-Interstate NHS, by May 20, 2018.
- Measurement to assess freight movement on the Interstate System: Truck Travel Time Reliability (TTTR).
  - State DOTs must establish 2- and 4-year targets by May 20, 2018
- All TTR targets will be reported in the State's baseline performance period report due by October 1, 2018.
- MPOs must either support the State targets or establish their own quantifiable 4-year targets within 180 days of the State target establishment.

System Performance: CMAQ Program
(Congestion Mitigation and Air Quality)

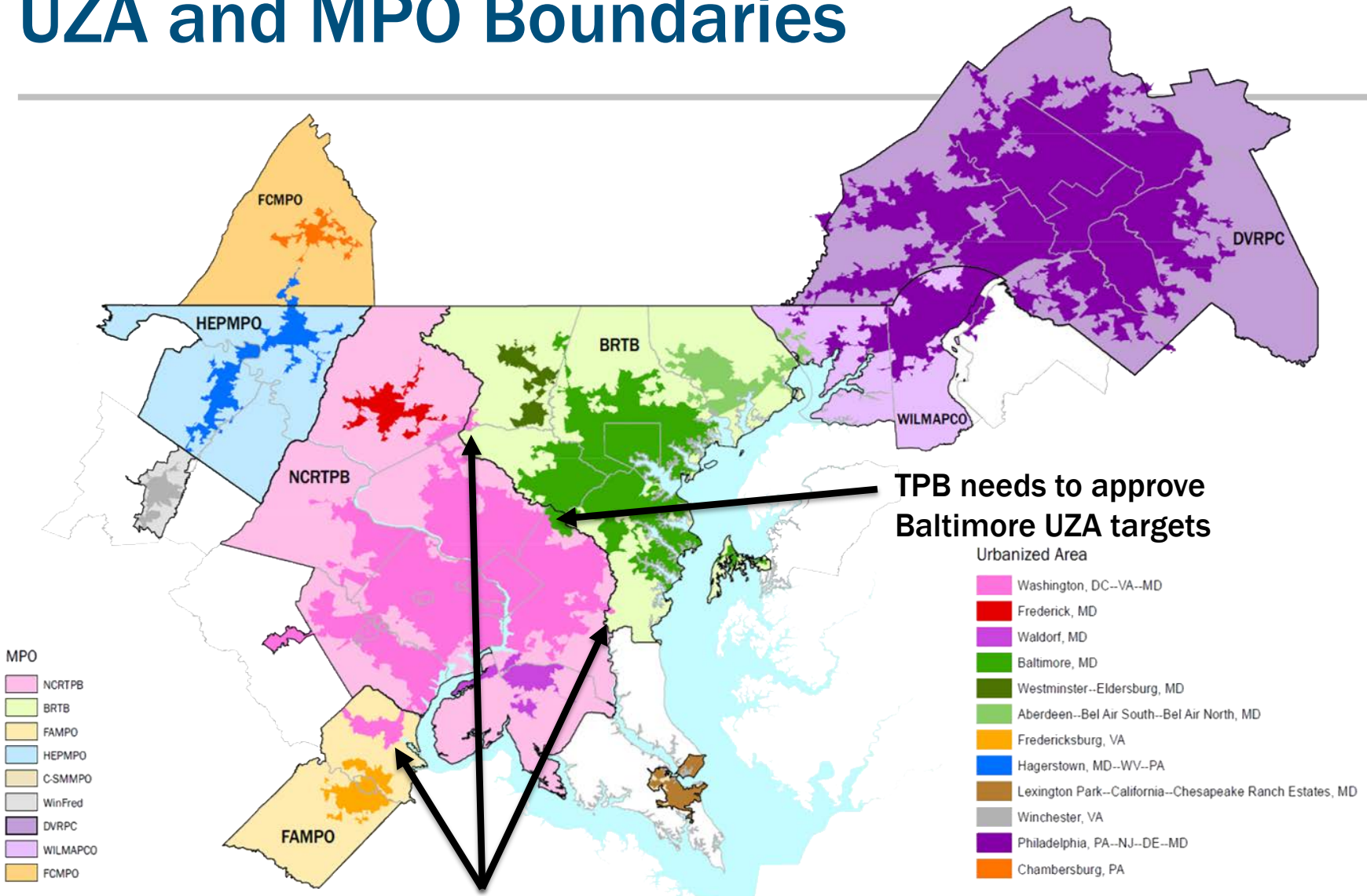
	Performance Measures
CMAQ Program: Traffic Congestion	(5) **Peak Hour Excessive Delay** – Annual hours of peak hour excessive delay per capita
	(6) **Mode Share** - Percent of non-SOV Travel on the NHS
CMAQ Program: Emissions Reduction	(7) **Emission** - CMAQ-funded projects on-road mobile source total emission reductions for each applicable criteria pollutant and precursor

- State DOTs – set Targets by May 20, 2018
- TPB (MPO) – also set Targets by May 20, 2018
  - Demonstrate State-MPO Coordination

CMAQ Program: PHED, Non-SOV, Emissions Measures

- CMAQ Program: Traffic Congestion measures (PHED, non-SOV) apply to the urbanized area (UZA)
  - Applicable State DOTs and MPOs must coordinate on and collectively establish a single, unified 2-year and 4-year target for each applicable urbanized area (>1 million people).
- CMAQ Emissions measure applies to non-attainment or maintenance areas.
  - Applicable State DOTs and MPOs must coordinate on and collectively establish a single, unified 2-year and 4-year target for each applicable pollutant and non-attainment or maintenance area.
- A baseline report for the first performance period is due October 1, 2018, and must include 2- and 4-year targets and a description of the data collection method used.

UZA and MPO Boundaries

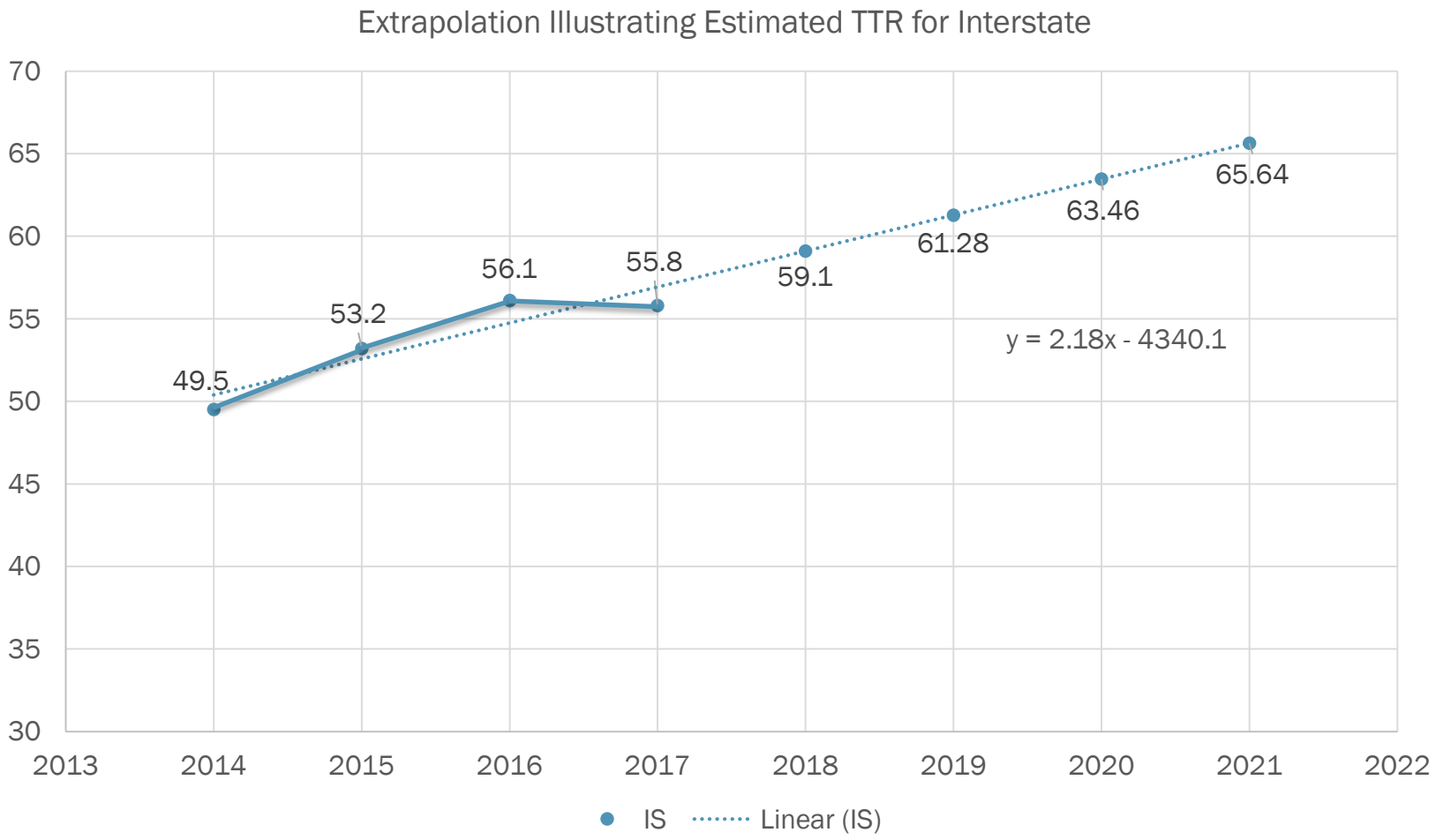


Methodology for Forecasting

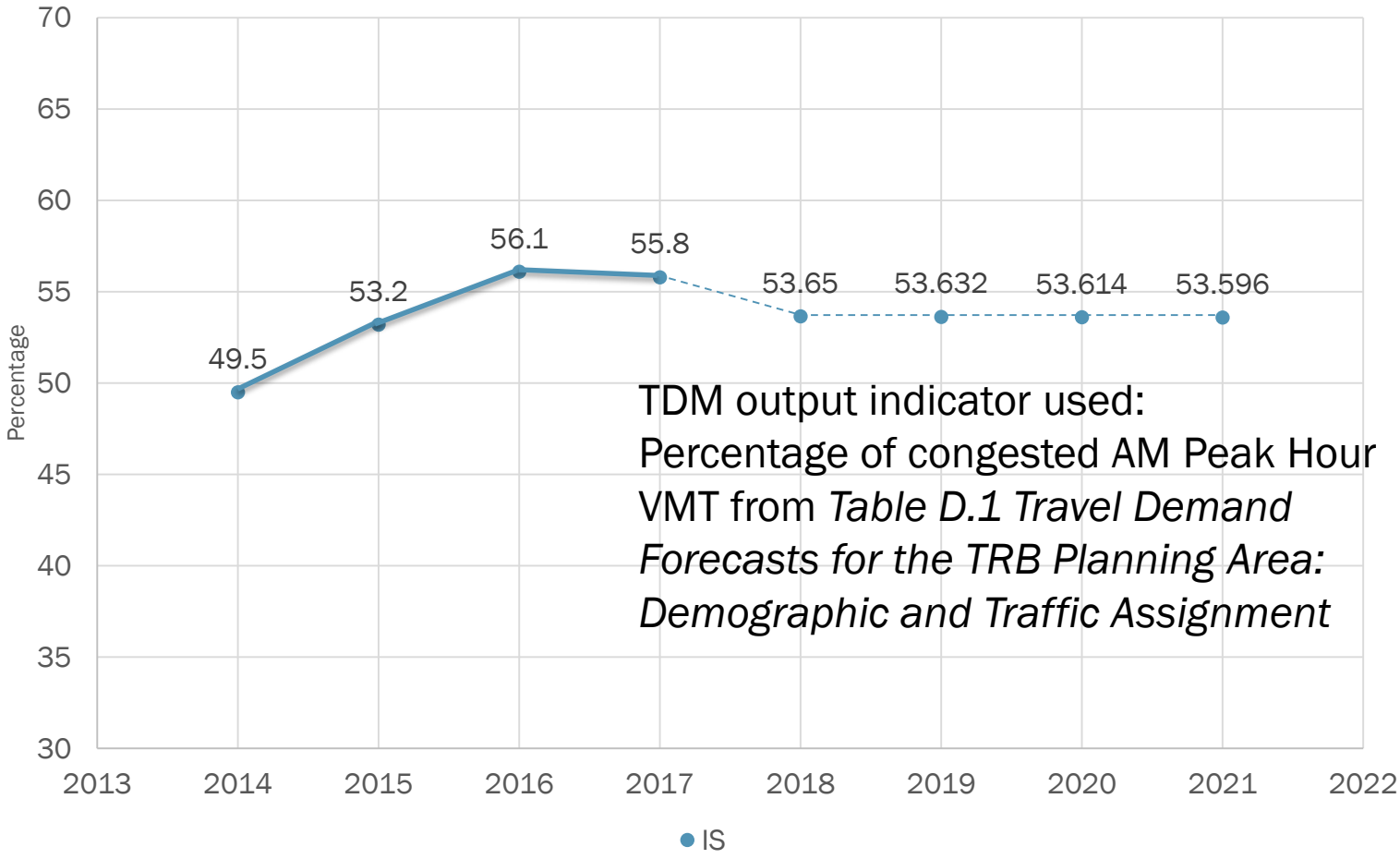
- Staff have identified two basic methods that can be used for forecasting future performance
  1. **Extrapolation** of current data
     - Use a trend line (straight or best fit curve) and extend into the future.
     - Captures existing trends of actual performance.
  2. **TDM Outputs** - Use outputs from the TPB Travel Demand Model to forecast future performance
     - Use a similar or related indicator to forecast, including effects of population and employment growth and completion of projects and programs.

- Staff anticipates using Method #2 - Travel Demand Model Outputs for near-term performance forecasts and proposed targets.

Method 1: Extrapolation



Method 2: Travel Demand Forecasting



TDM output indicator used:
Percentage of congested AM Peak Hour VMT from *Table D.1 Travel Demand Forecasts for the TRB Planning Area: Demographic and Traffic Assignment*

Next Steps

- CMAQ Program: PHED, Non-SOV, Emissions (due May 20)
  - Coordinate with DOTs on data, measures, forecasting methodology, and targets.
  - Brief TPB on measures and draft targets at April 18 meeting.
  - TPB adopt targets at May 16 meeting.

- Highway and Freight Congestion: TTR Measures
  - Preferred forecasting methods identified by March 2018.
  - DOTs set initial targets by May 20, 2018.
  - Brief TPB in June and adopt targets in July for incorporation into Visualize 2045 long range plan.

CMAQ Program: Traffic Congestion

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Mode Share: Non-Single Occupancy Vehicle (Non-SOV) Performance Measure

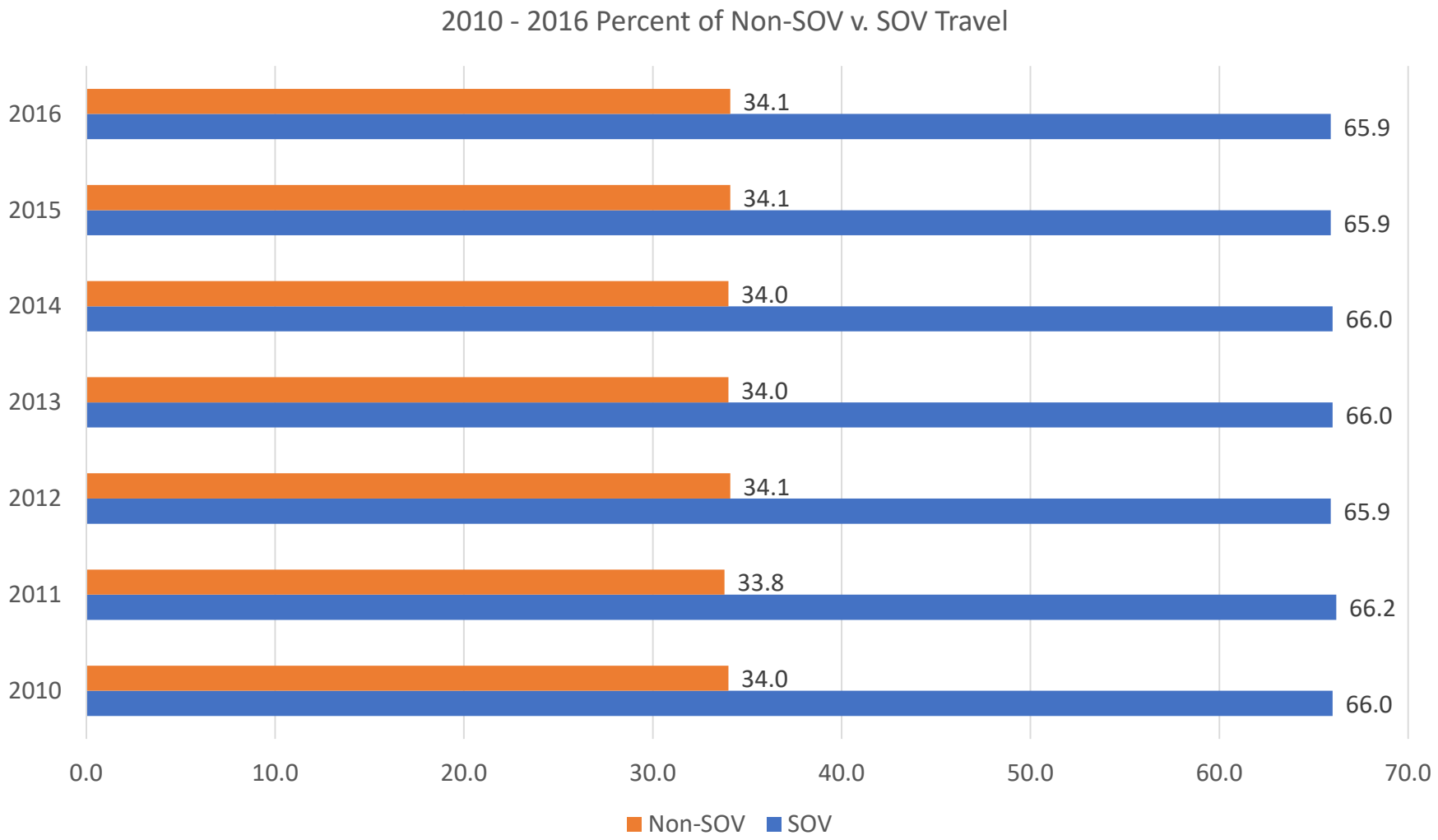
Non-Single Occupancy Vehicle (Non-SOV)

- Measurement of Non-SOV travel in specific urbanized areas
- States and MPOs within an applicable urbanized area (UZA) must coordinate on a single, unified target.
  - Initially, only for UZAs > 1 million people
- Applicable State DOTs and MPOs must collectively establish a single, unified 2-year and 4-year target for each applicable urbanized area for the first performance period by May 20, 2018.
- Non-SOV travel includes carpooling, using public transit, walking, biking, and teleworking

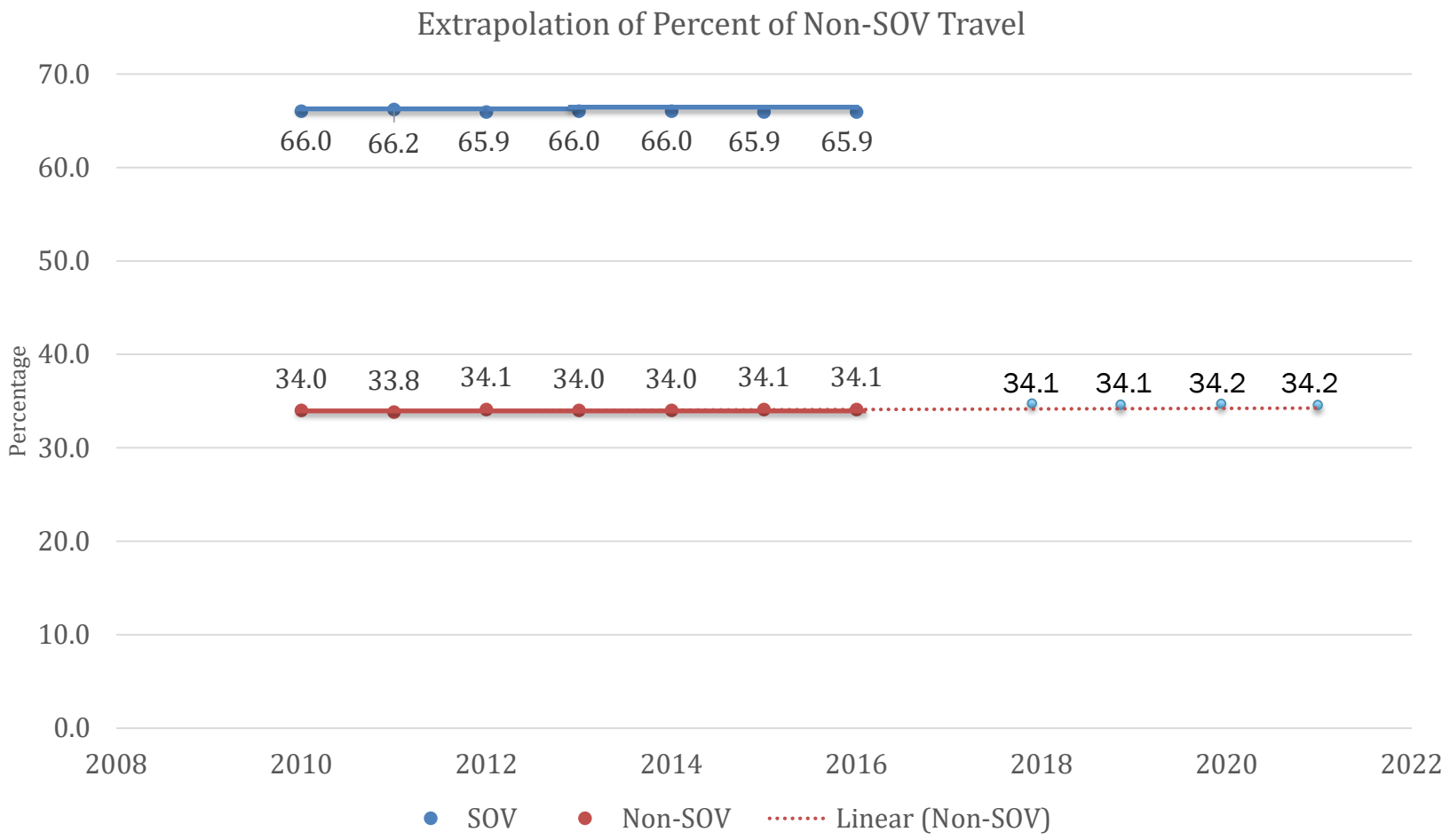
Non-SOV Measurement Options

- Three options to calculate modal share
  - Use the American Community Survey (ACS)
    - Percent of Non-SOV Travel (PNST) = 100% - percent for "Car, truck, or van-drive alone"
  - Use localized surveys (e.g., The State of The Commute)
  - Use volumetric counts for each mode of travel.

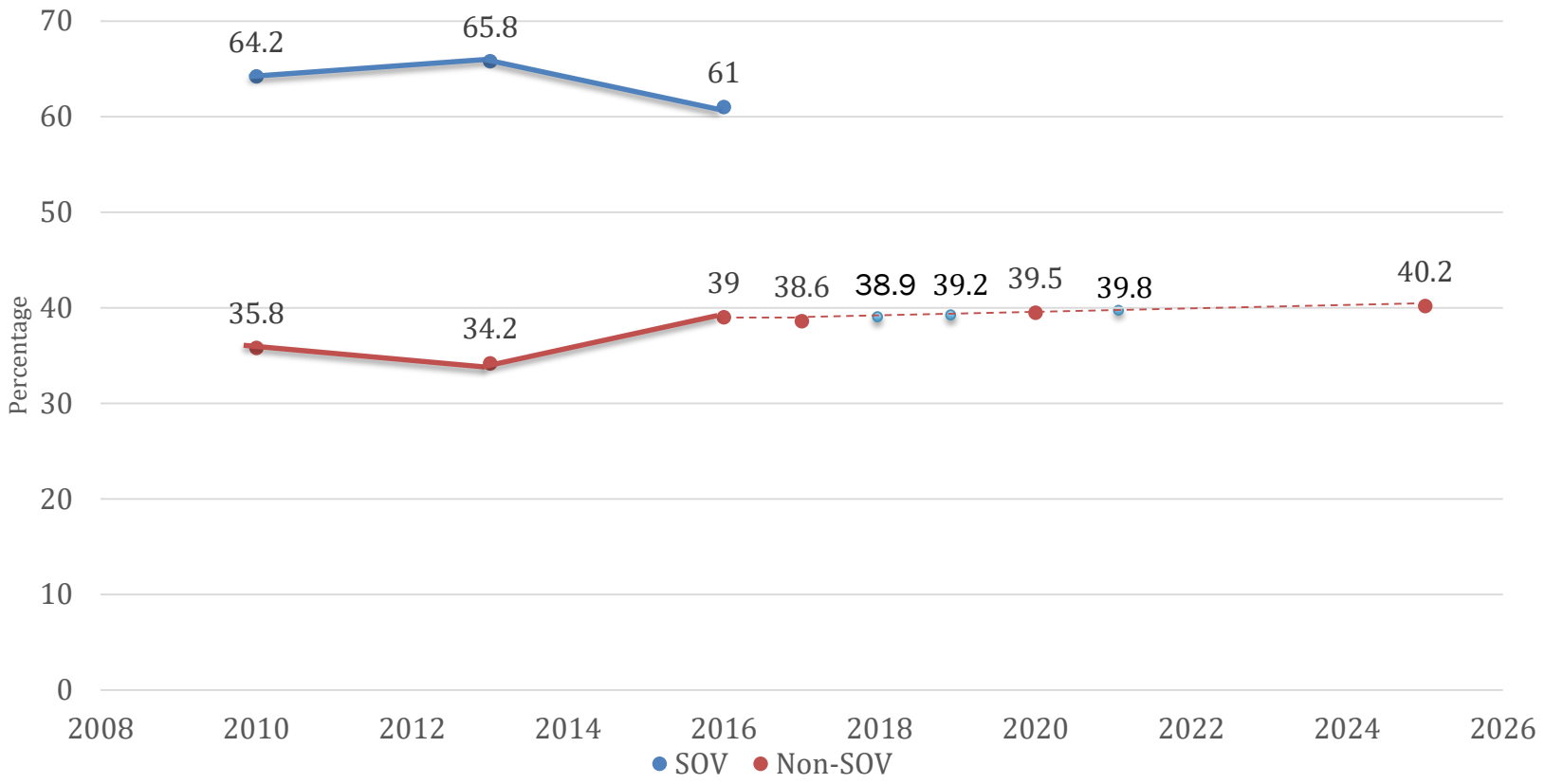
ACS Collection Results for Non-SOV



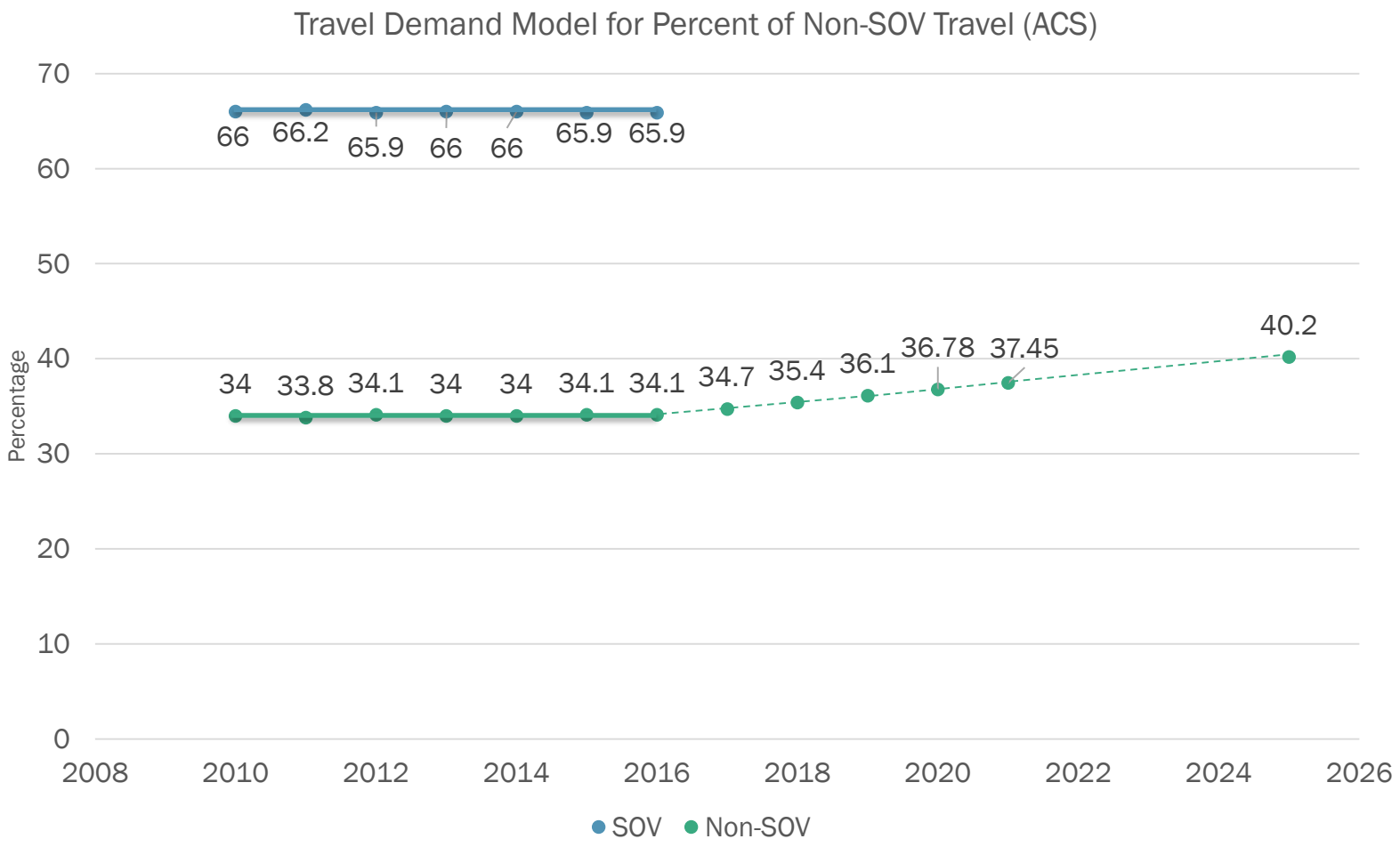
Method 1: Extrapolation



Comparison With State of the Commute Data (Not being Used)



Method 2: Travel Demand Model



Availability of Data for Assessing the Performance of the National Highway System, Freight Movement on the Interstate System, and CMAQ: Traffic Congestion

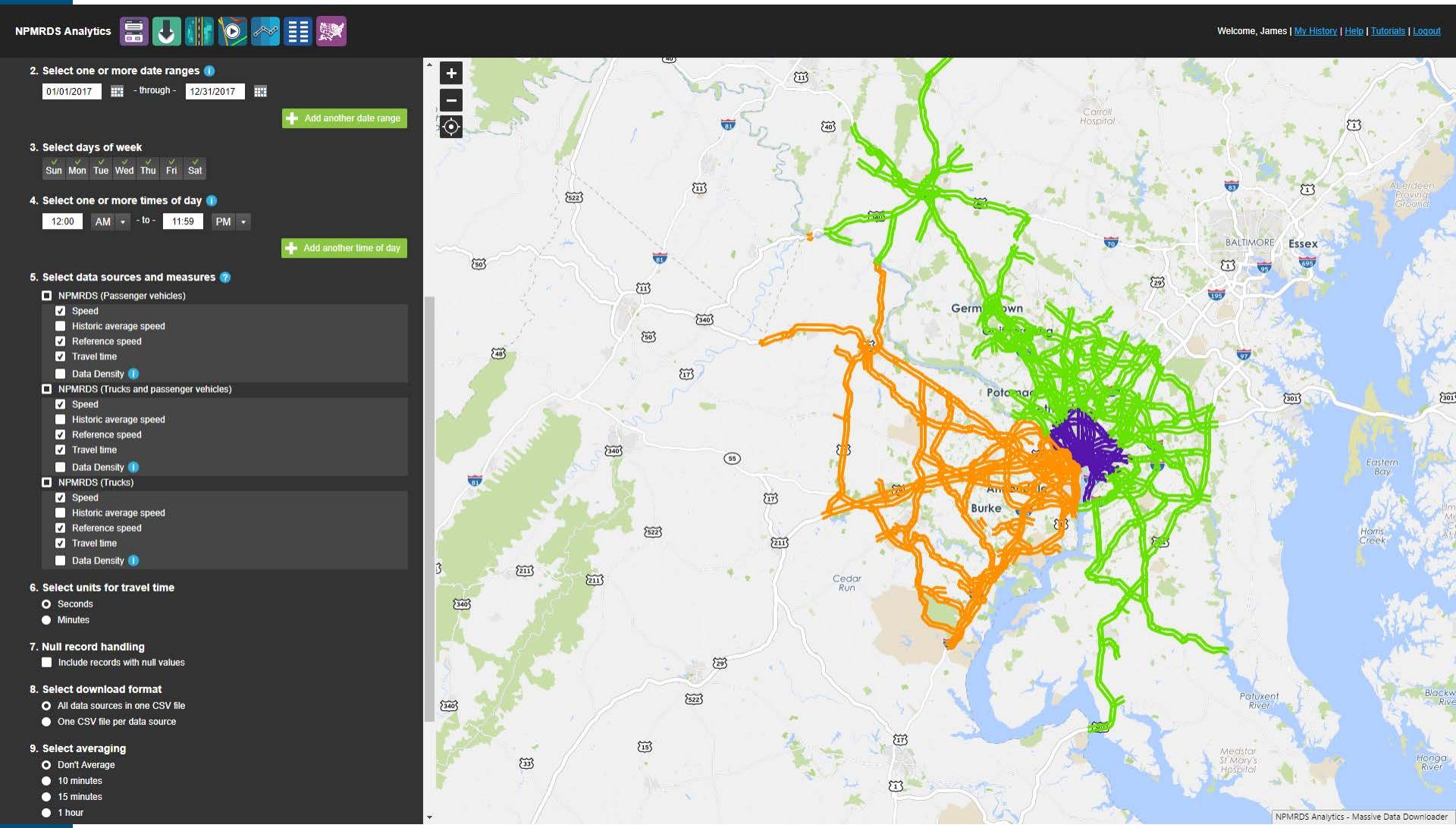
National Performance Management Research Data Set (NPMRDS)

- States and MPOs which wished to use data sets other than the NPMRDS were required to request approval from FHWA by October 2nd, 2017.
  - No regional DOTs did
- An archived speed and travel time data set (including associated location referencing data)
  - covering the National Highway System (NHS)
  - for Passenger vehicles, Trucks, and Trucks and Passenger vehicles combined.
  - at 5 minute intervals;
  - not use imputed data;
- Available at npmrds.ritis.org

NPMRDS Coverage

- Traffic Message Channel (TMC) can be changed over time
- Data from February 2017 onward is provided by a team led by University of Maryland Center for Advanced Transportation Technology Laboratory (CATT Lab).
- Greater coverage: adheres to the following monthly data completeness commitments:
  - Interstate Truck Coverage — Total: 60%
  - Interstate Truck Coverage — Peak (M-F, 6a-8p): 70%
  - Interstate All-Vehicles — Total: 75%
  - Interstate All-Vehicles — Peak: 85%
  - Non-Interstate All Vehicles — Total: 25%
  - Non-Interstate All Vehicles — Peak: 35%

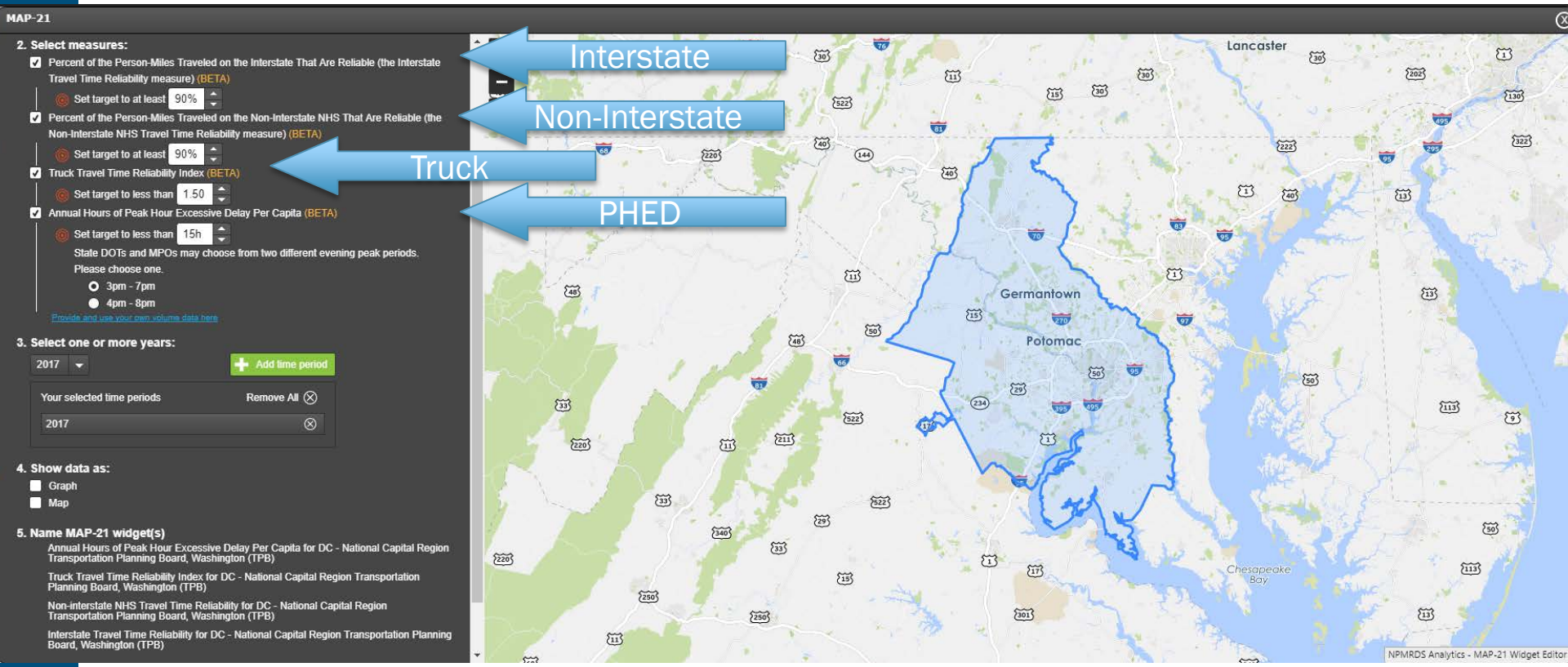
Download NPMRDS from RITIS



Additional MAP-21 widgets by RITIS

- State DOTs and MPOs may purchase additional capability from the University of Maryland CATT Lab to meet MAP-21 data needs
- A set of Dashboard widgets to help set targets, understand baseline conditions, and assess progress toward achieving the goals associated with the measures.
- Available currently
  - Interstate Travel time reliability (TTR)
  - Non-interstate NHS TTR
  - Truck TTR Index
  - Annual Hours of Peak Hour Excessive Delay (PHED) Per Capita

RITIS MAP-21 Widget



CMAQ Program: Traffic Congestion

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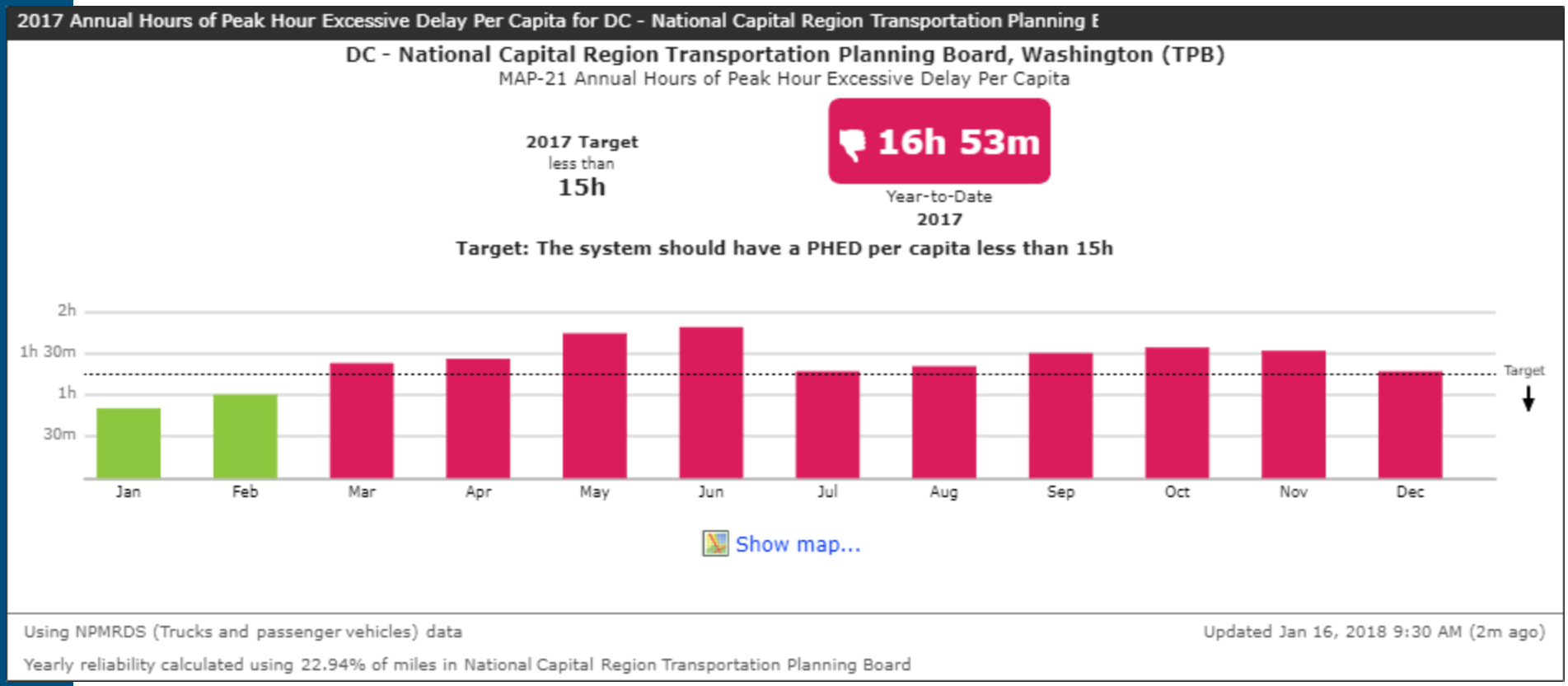
Peak Hour Excessive Delay (PHED) Performance Measure

Annual Hours of Peak Hour Excessive Delay (PHED) per Capita

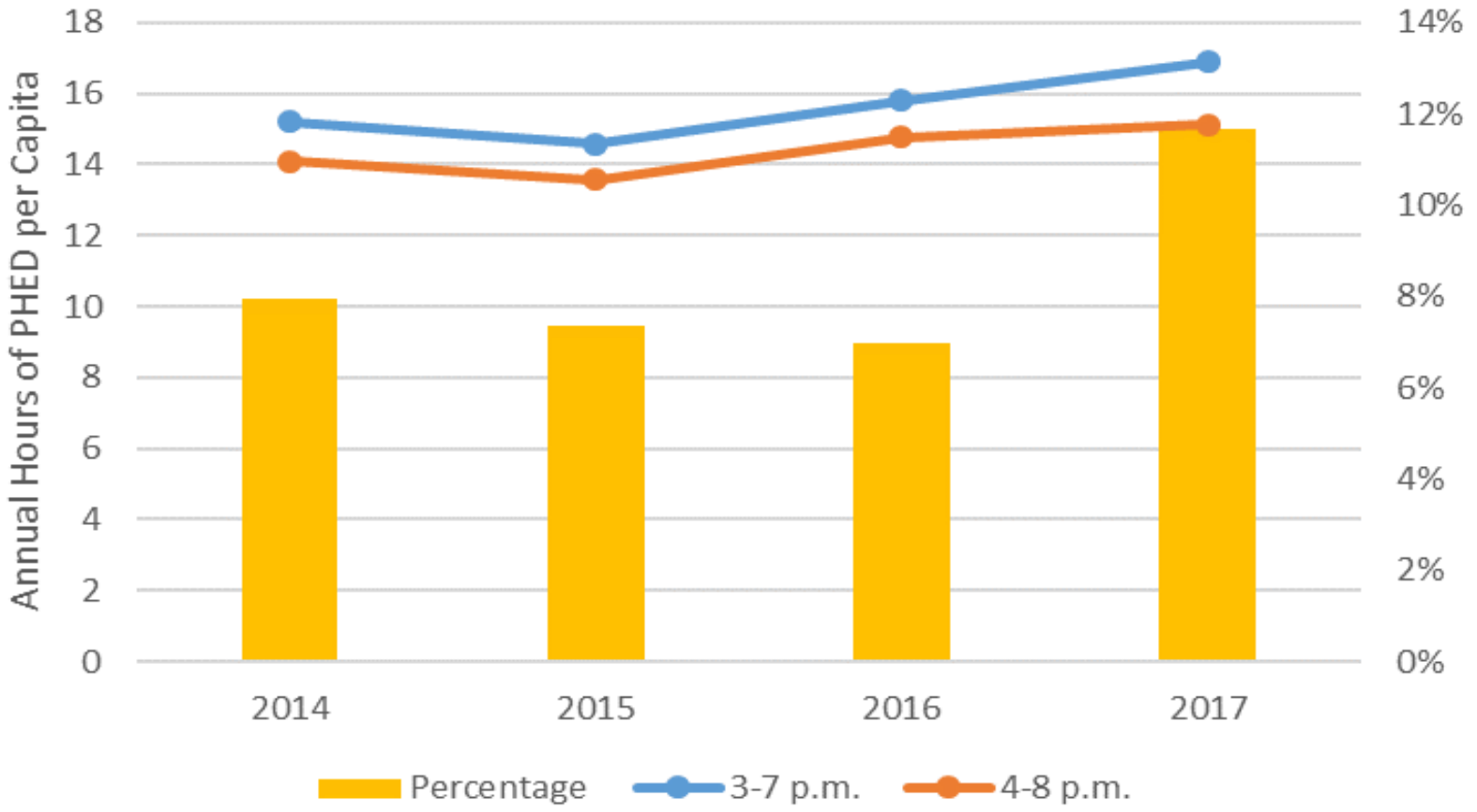
- The PHED measure
  - The cumulative hours of excessive delay experienced by all people traveling through all reporting segments during peak hours in the applicable urbanized area for the full reporting calendar year.
- Peak travel hours are defined as:
  - Weekday morning peak: 6 a.m. to 10 a.m.;
  - Weekday afternoon peak: **EITHER** 3 p.m. to 7 p.m. **OR** 4 p.m. to 8 p.m.
- States and MPOs within an applicable urbanized area must coordinate on a single, unified target.
  - Due by May 20, 2018

Example - 2017 PHED (3 p.m. to 7 p.m)



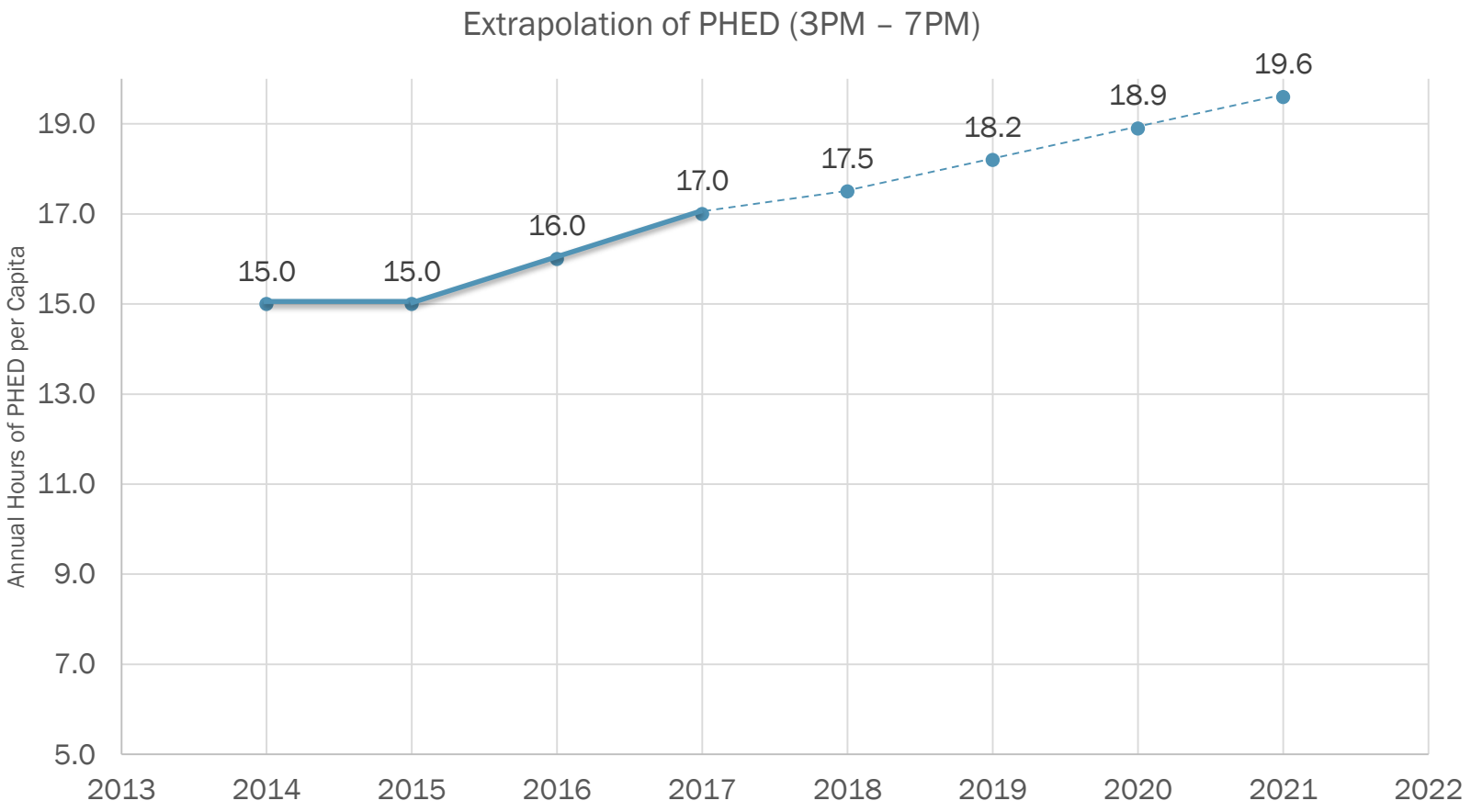
Example with PM Peak from 3:00 p.m. to 7:00 p.m.

Sensitivity of Annual Hours of PHED per Capita with Two Time Periods



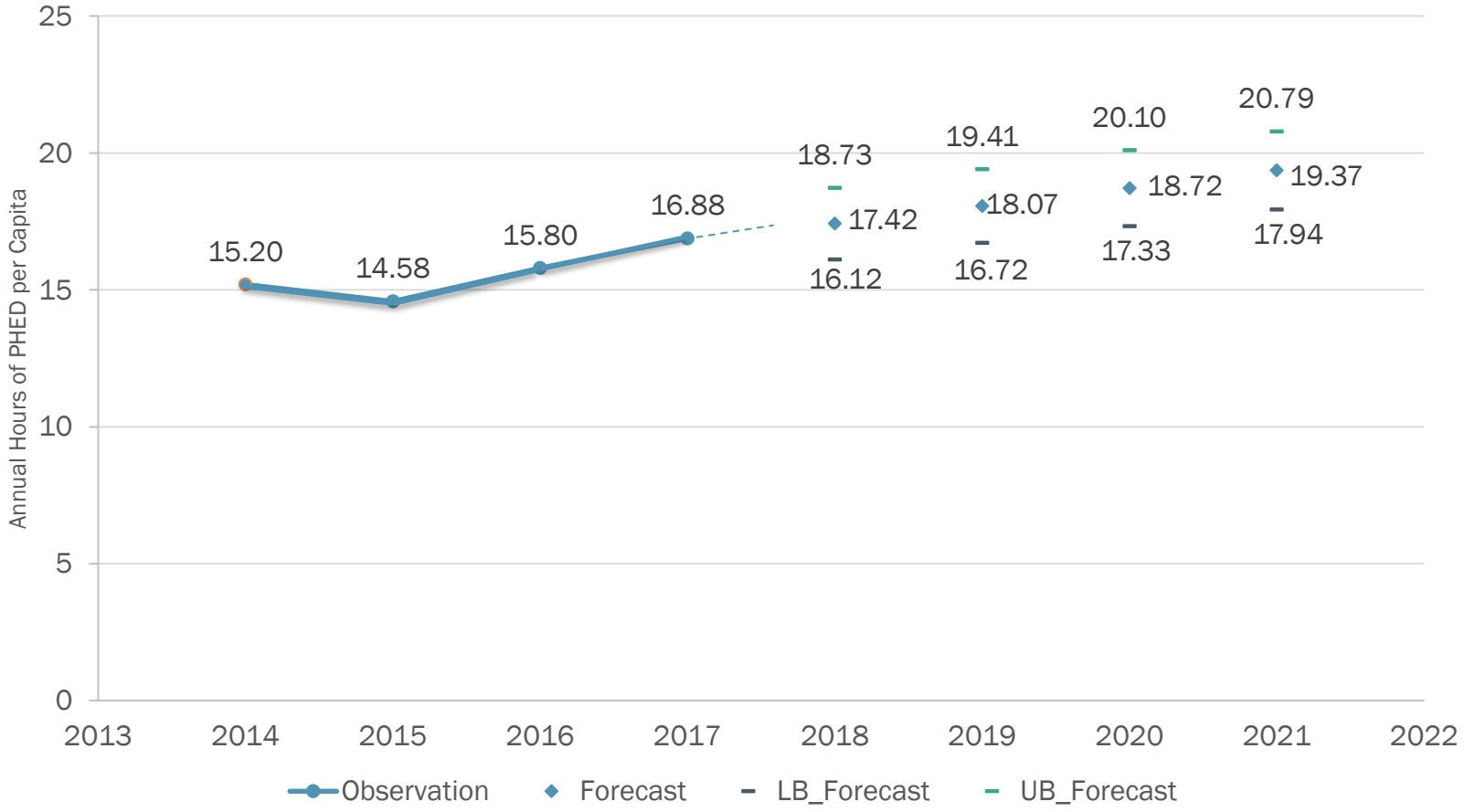
Based on the Annual Hours of PHED per Capita calculated by NPMRDS Analytics of RITIS.

Method 1: Extrapolation (Linear)



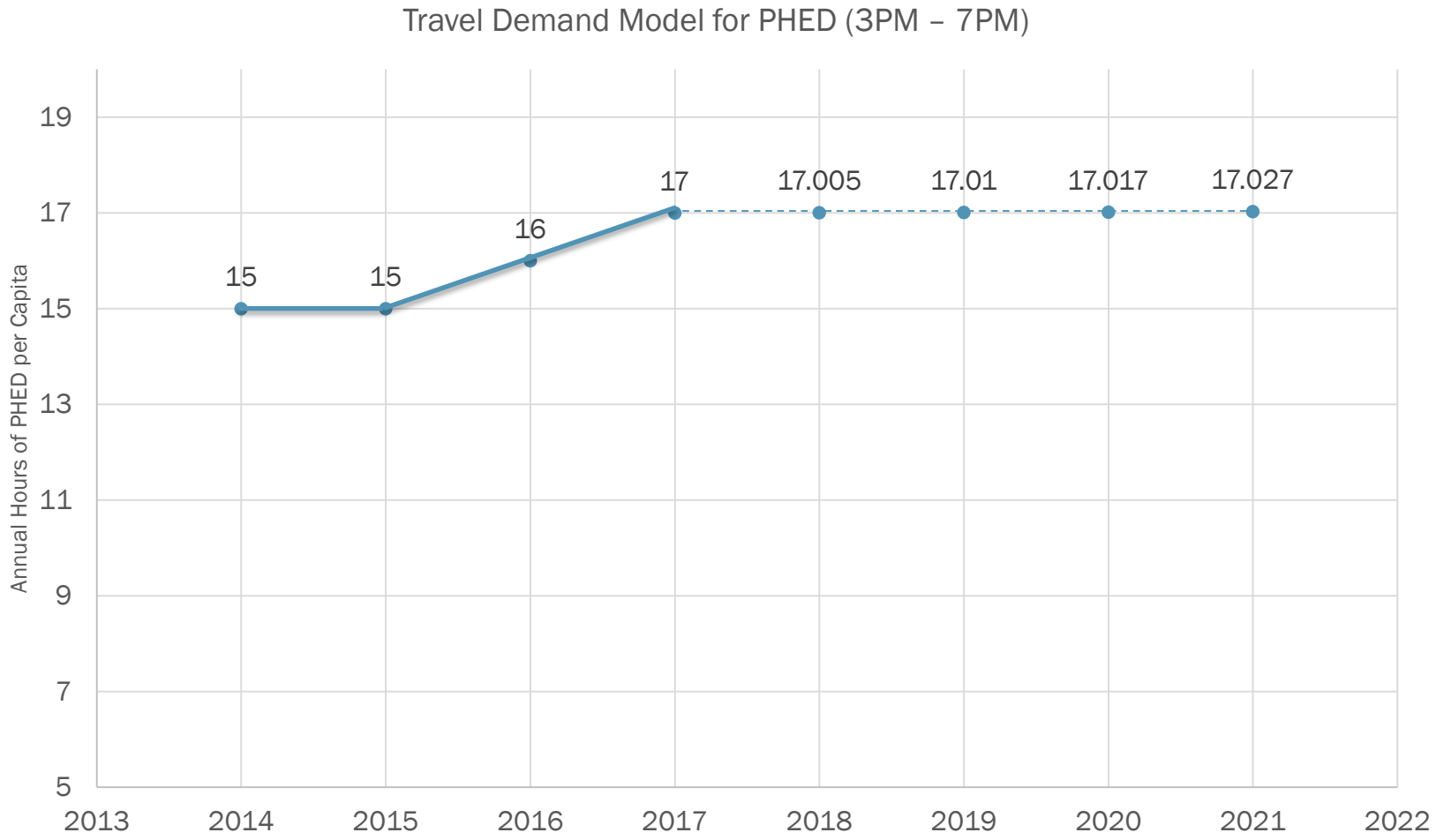
Based on the Annual Hours of PHED per Capita calculated by NPMRDS Analytics of RITIS.

Method 1: Extrapolation (Exponential)



Based on the Annual Hours of PHED per Capita calculated by NPMRDS Analytics of RITIS.

Method 2: Travel Demand Model



Assessing Performance of the National Highway System

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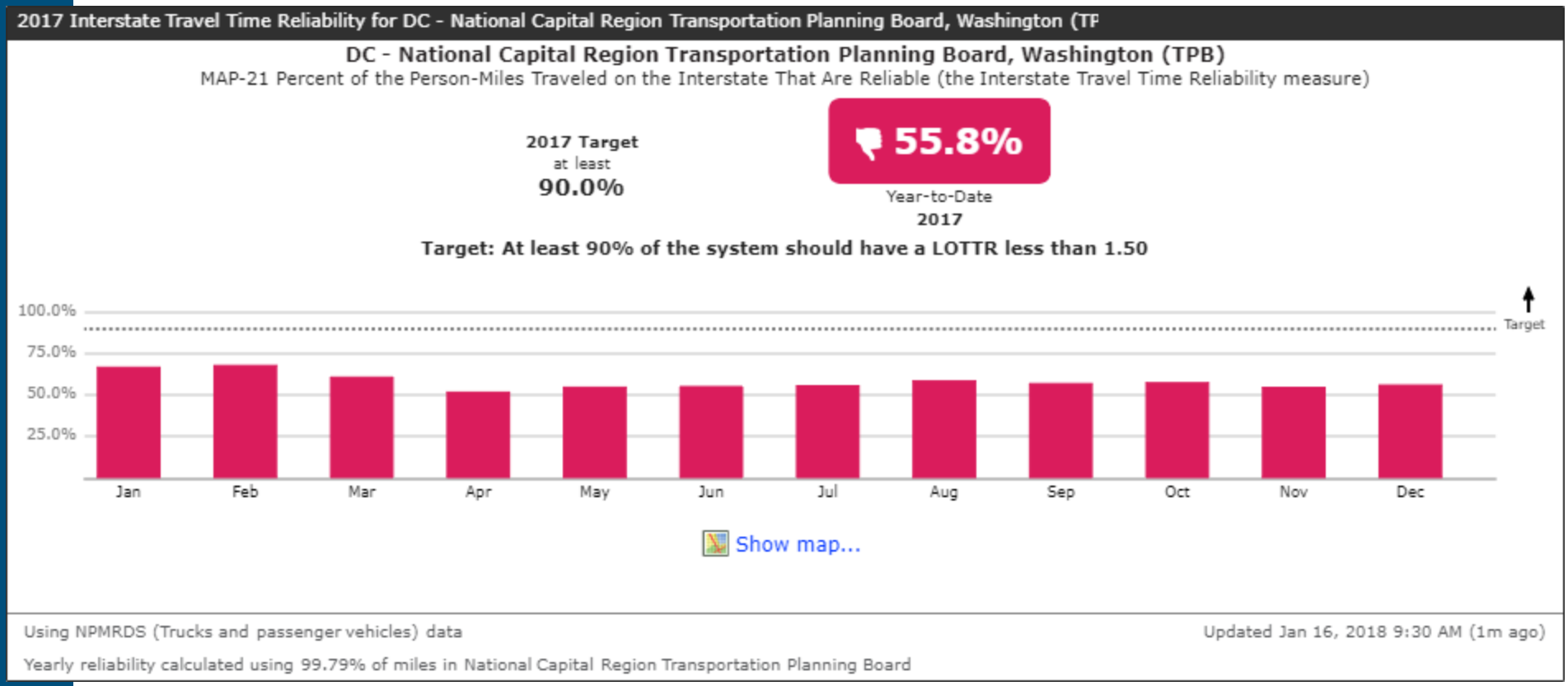
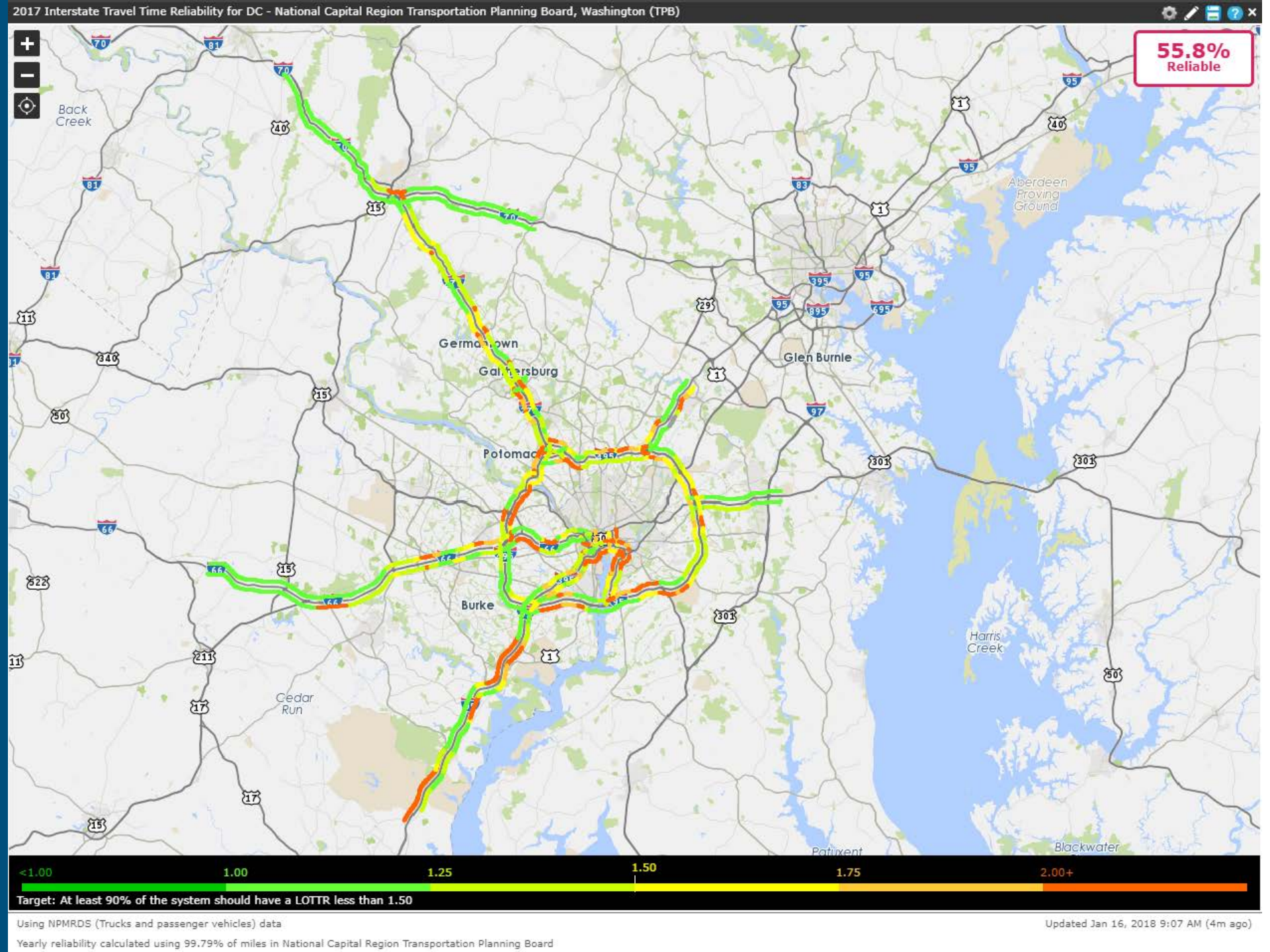
Travel Time Reliability (TTR) & Truck Travel Time Reliability (TTTR) Performance Measures

Travel Time Reliability (TTR) Measures

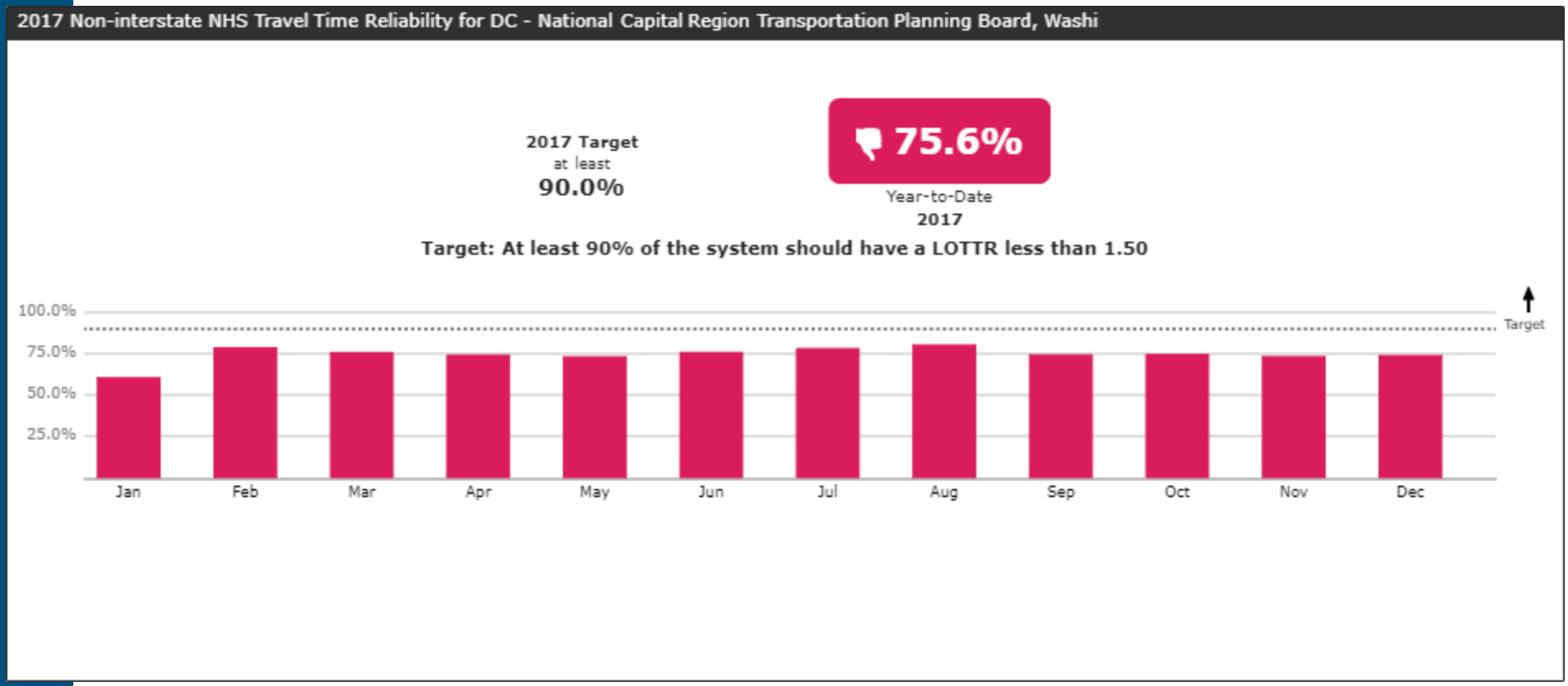
- Measurement of travel time reliability on the Interstate and non-Interstate National Highway System (NHS)
  - Percent of person-miles traveled on NHS are reliable
  - Level of Travel Time Reliability (LOTTR): the ratio of the longer travel times (80th percentile) to a “normal” travel time (50th percentile).
  - Reliable: LOTTR of all 4 time periods < 1.5 for the reporting segment
- Time periods include:
  - 6 a.m. to 10 a.m. for every weekday
  - 10 a.m. to 4 p.m. for every weekday
  - 4 p.m. to 8 p.m. for every weekday
  - 6 a.m. to 8 p.m. for every weekend

Example - 2017 Interstate TTR

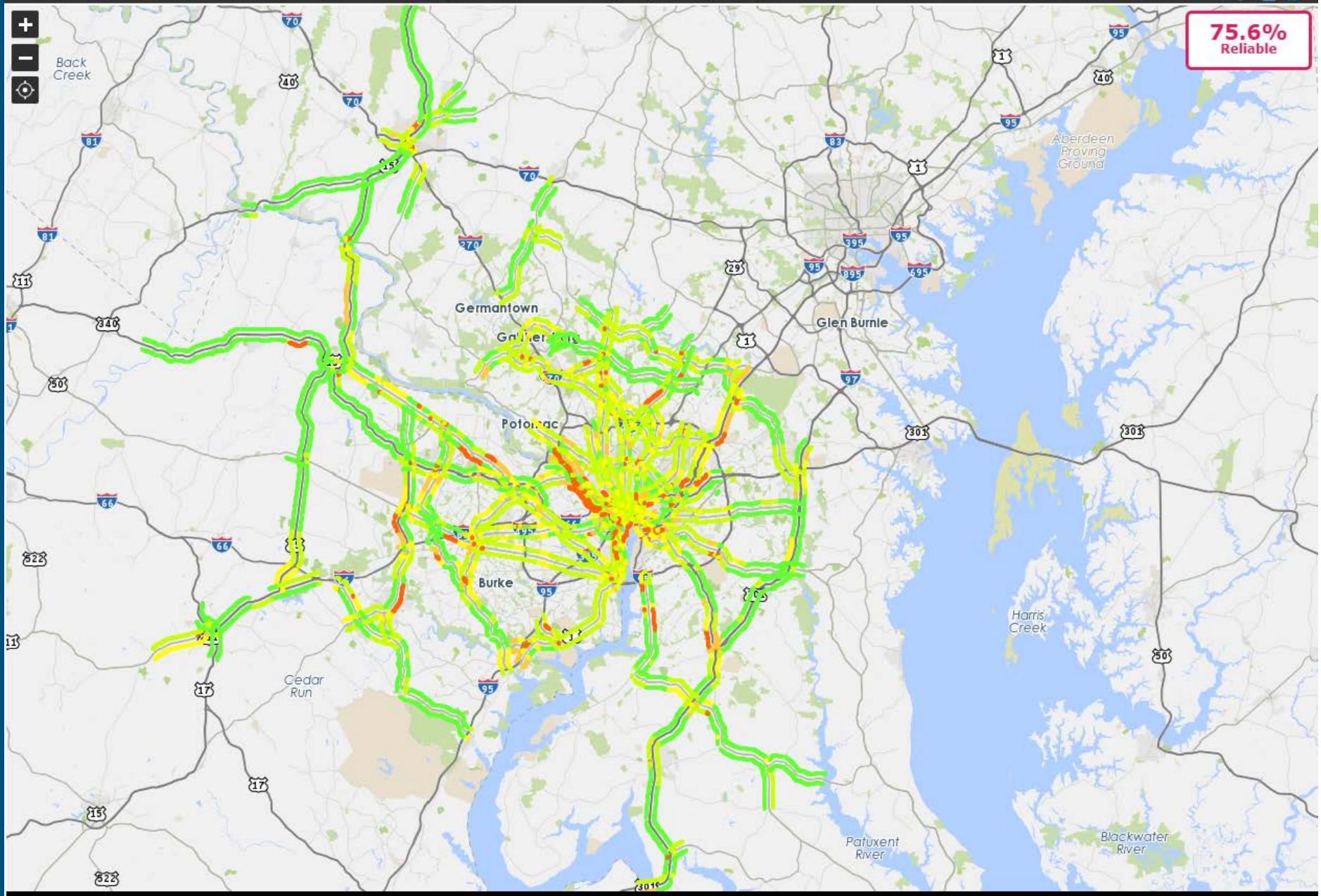



2017 Interstate Travel Time Reliability for DC - National Capital Region Transportation Planning Board, Washington (TPB)
55.8%
Reliable
Back Creek
Aberdeen Proving Ground
Germantown
Gaithersburg
Glen Burnie
Potomac
Burke
Harris Creek
Cedar Run
Patuxent
Blackwater
<1.00
1.00
1.25
1.50
1.75
2.00+
Target: At least 90% of the system should have a LOTTR less than 1.50
Using NPMRDS (Trucks and passenger vehicles) data
Updated Jan 16, 2018 9:07 AM (4m ago)
Yearly reliability calculated using 99.79% of miles in National Capital Region Transportation Planning Board

Example - 2017 Non-interstate NHS TTR



2017 Non-interstate NHS Travel Time Reliability for DC - National Capital Region Transportation Planning Board, Washington (TPB)

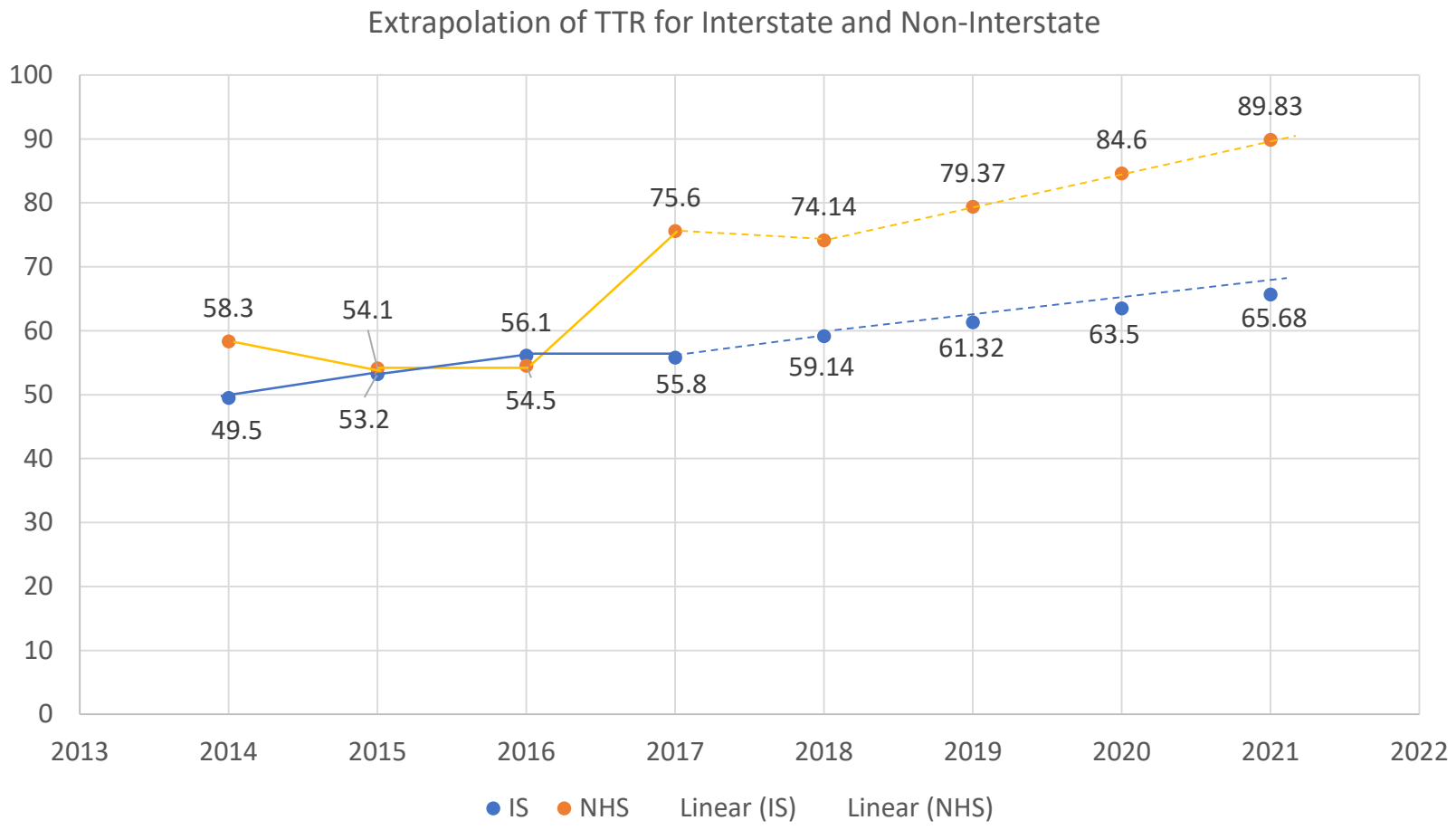


Using NPMRDS (Trucks and passenger vehicles) data

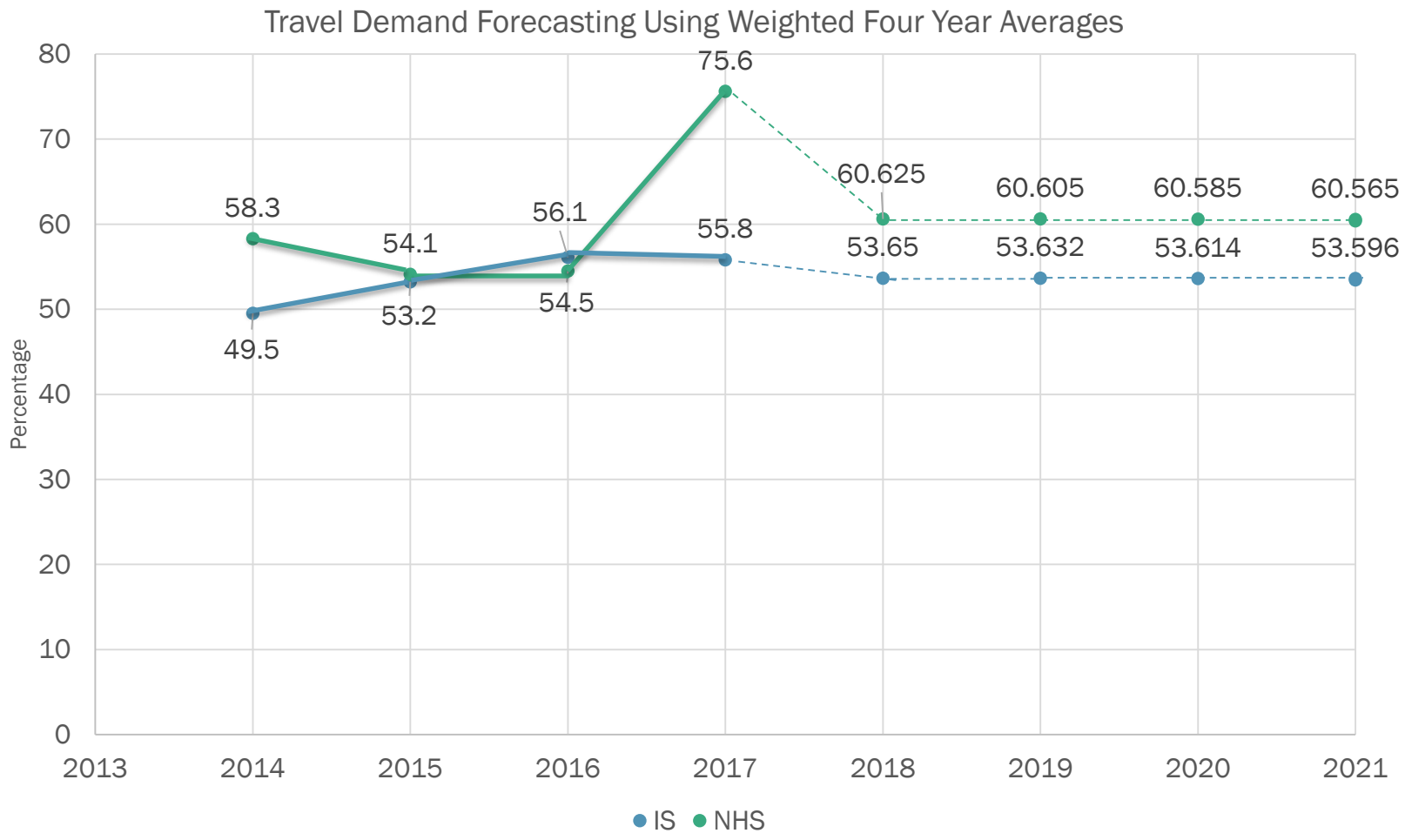
Updated Jan 16, 2018 9:30 AM (21m ago)

Yearly reliability calculated using 99.75% of miles in National Capital Region Transportation Planning Board

Method 1: Extrapolation



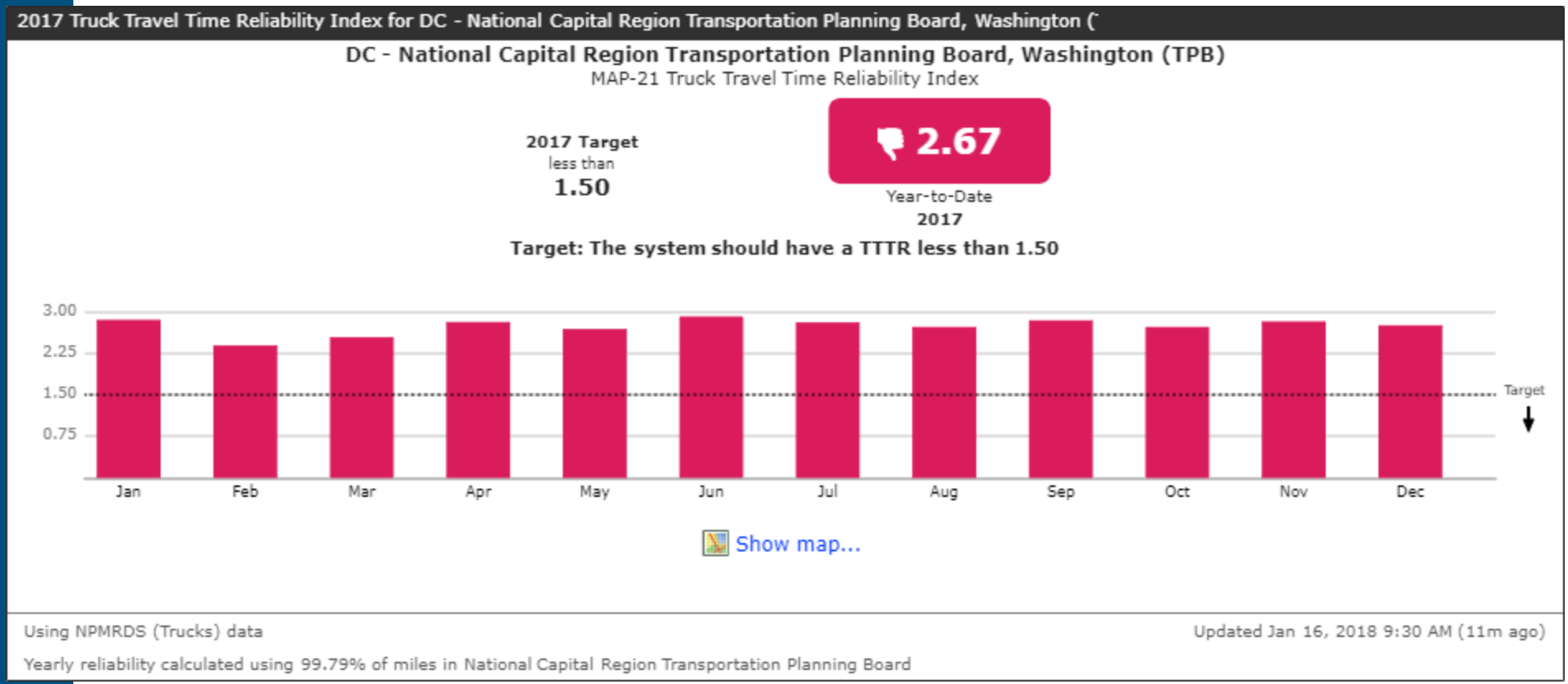
Method 2: Travel Demand Forecasting



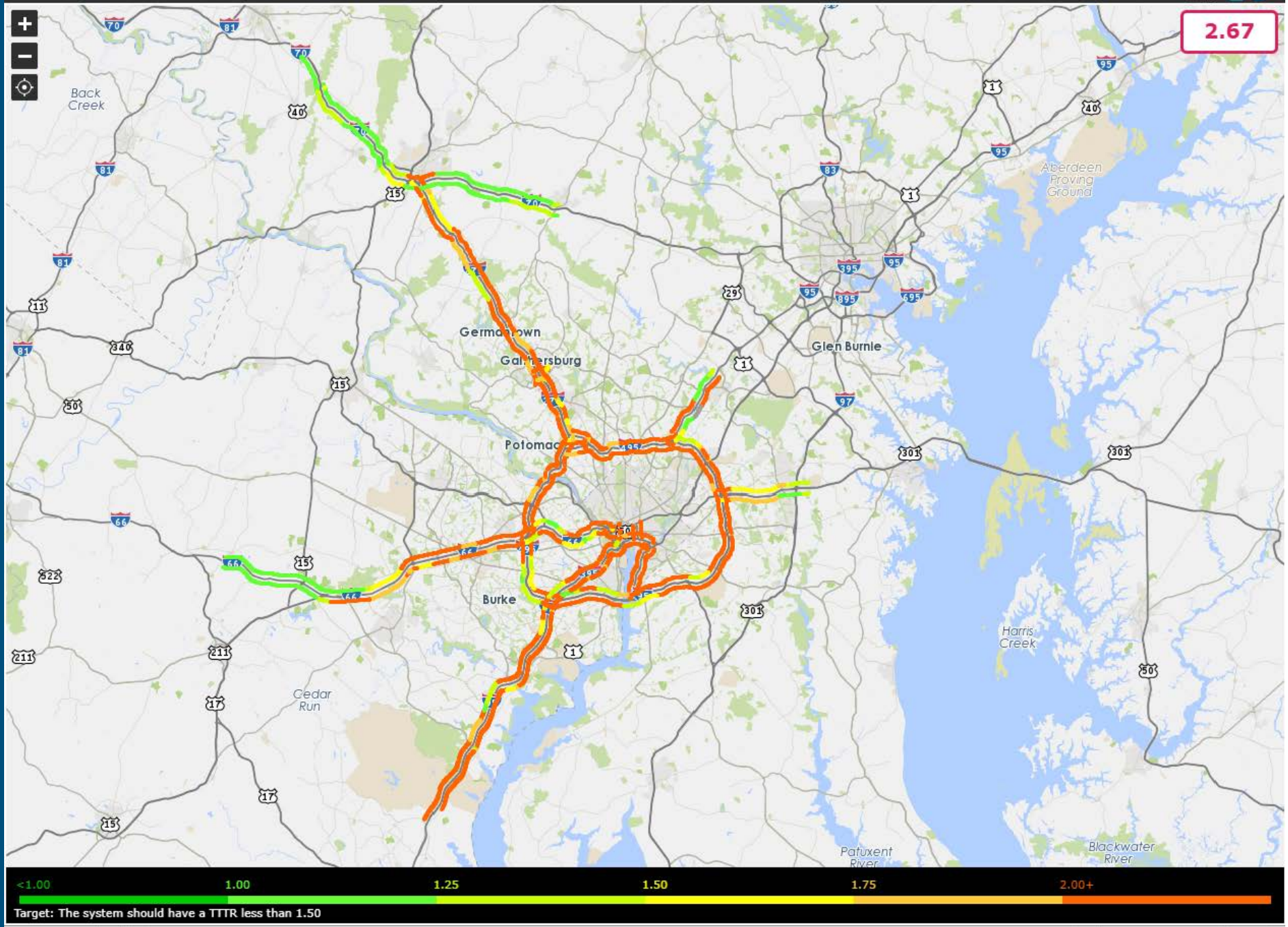
Truck Travel Time Reliability (TTTR) Index

- The freight reliability measure
  - TTTR: the ratio of the longer travel times (95th percentile) to a "normal" travel time (50th percentile) for each of the five time periods.
  - The maximum TTTR of the five time periods of a Interstate System reporting segment is the key factor to the TTTR Index calculation.
- Time periods include:
  - AM peak: 6 a.m. to 10 a.m. for every weekday
  - Mid day: 10 a.m. to 4 p.m. for every weekday
  - PM peak: 4 p.m. to 8 p.m. for every weekday
  - Overnight: 8 p.m. to 6 a.m. for every day
  - Weekend: 6 a.m. to 8 p.m. for every weekend

Example - 2017 Truck TTR Index



2017 Truck Travel Time Reliability Index for DC - National Capital Region Transportation Planning Board, Washington (TPB)

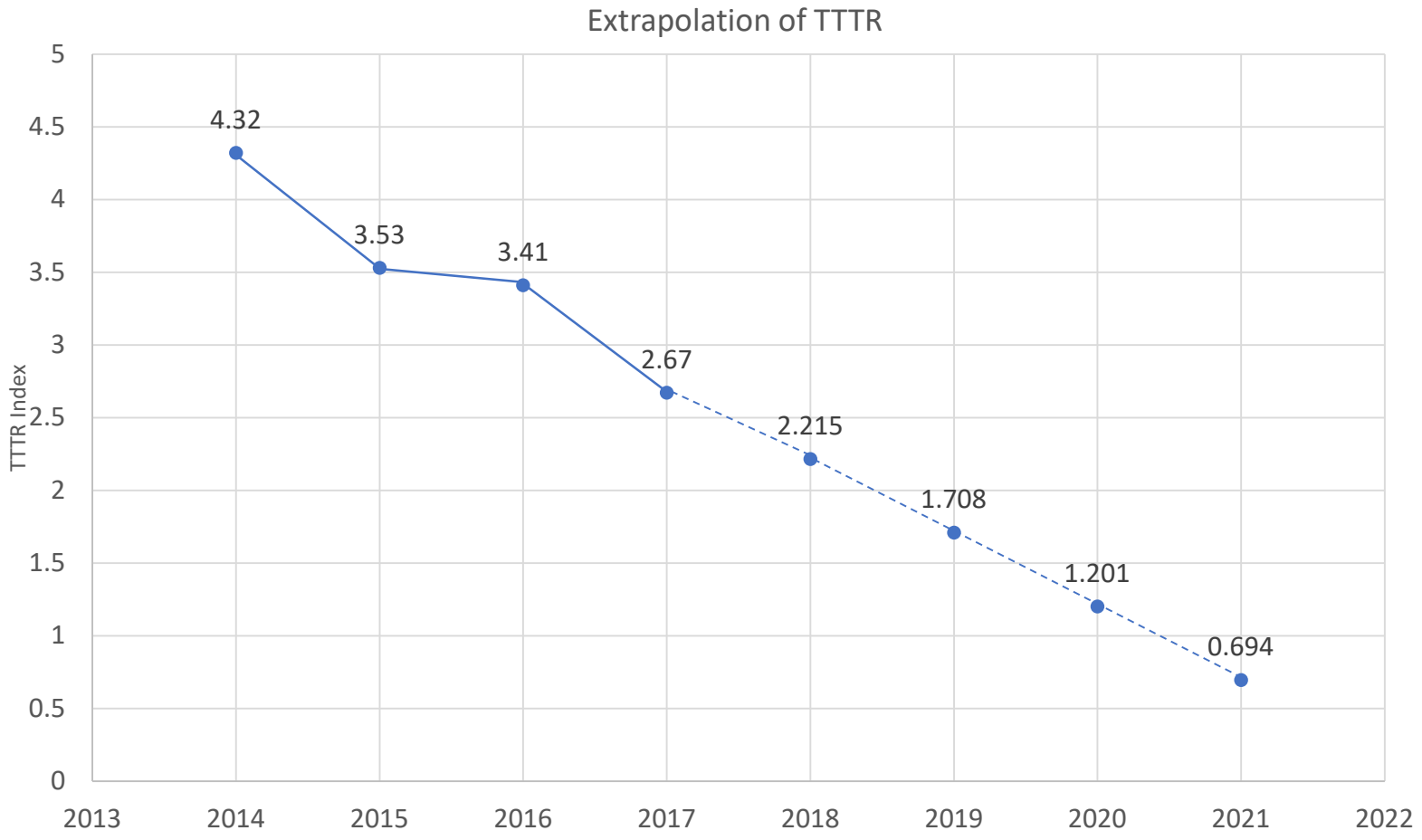


Using NPMRDS (Trucks) data

Updated Jan 16, 2018 9:30 AM (14m ago)

Yearly reliability calculated using 99.79% of miles in National Capital Region Transportation Planning Board

Method 1: Extrapolation



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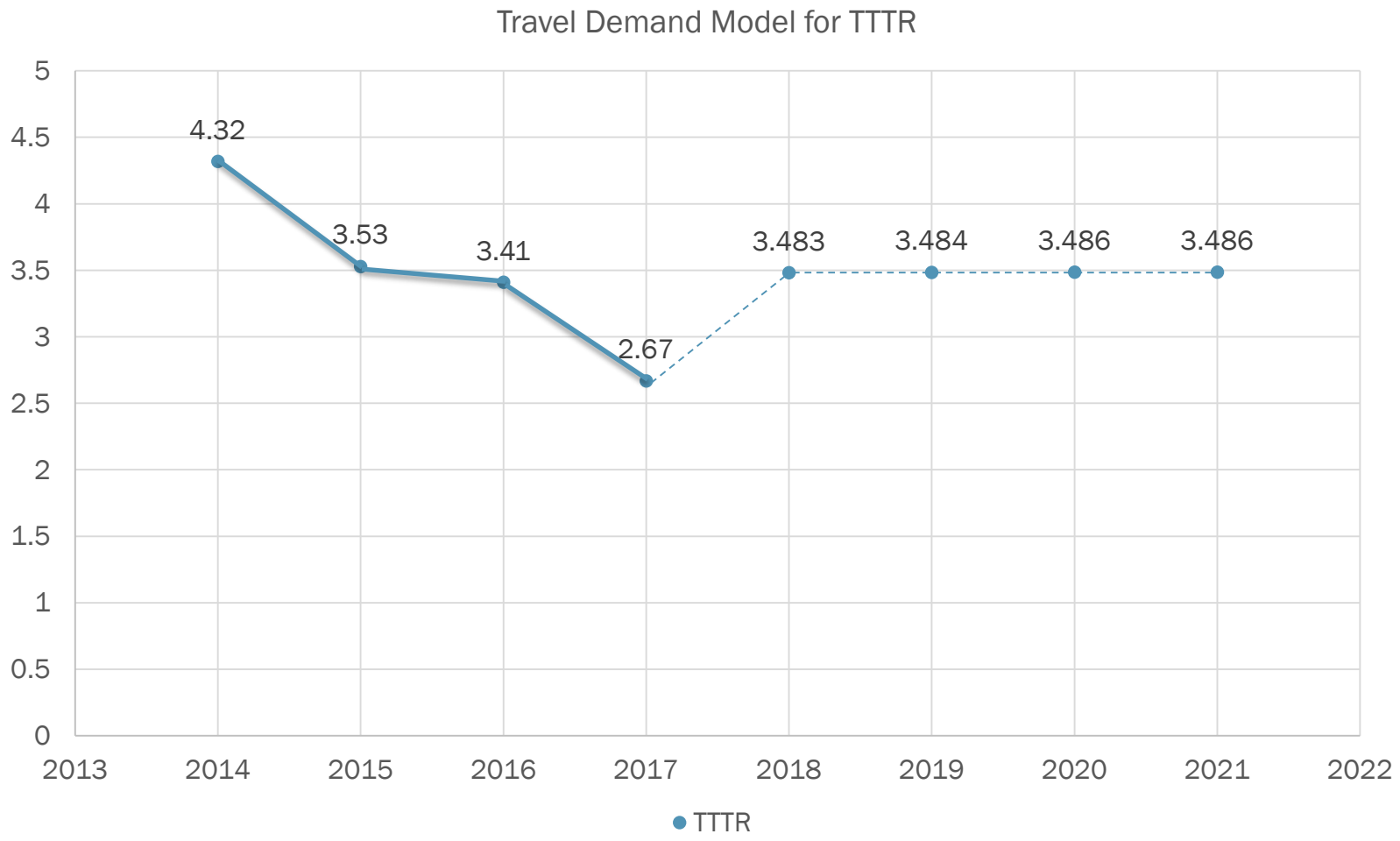


Eric Randall
TPB Transportation Engineer
(202) 962-3254
erandall@mwcog.org

Jan-Mou ("James") Li, Ph. D.
TPB Transportation Engineer
(202) 962-3329
jli@mwcog.org

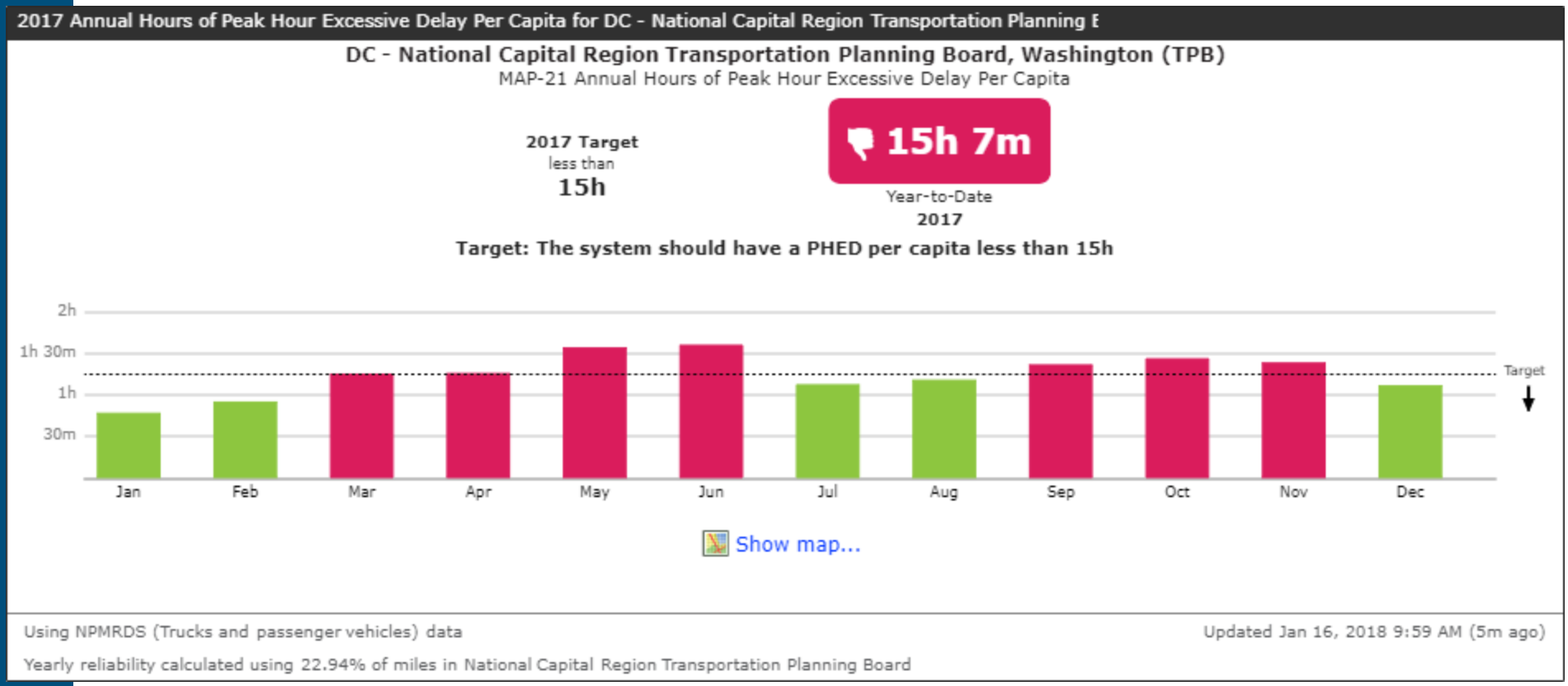
Matthew Gaskin
TPB Transportation Planner
(202) 962-3761
mgaskin@mwcog.org

mwcog.org/tpb

Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

National Capital Region
Transportation Planning Board

Example - 2017 PHED (4:00PM–8:00PM)



Example with PM Peak from 4:00 pm to 8:00 pm

Summary of TTR, TTTR, and PHED Data

	2014	2015	2016	2017
TTR Interstate	49.5%	53.2%	56.1%	55.8%
TTR Non-Interstate	58.3%	54.1%	54.5%	75.6%
TTTR	4.32	3.53	3.41	2.67
PHED (3PM – 7PM)	15	15	16	17