

STATUS REPORT ON VER 2.3 MODEL UPDATES AND VER 2.5 MODEL DEVELOPMENT

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Travel Forecasting Subcommittee
May 18, 2018



Since the March TFS meeting...

- Examination of the V2.3 model's treatment of external travel has continued
- Two changes have been implemented:
 1. An adjustment process to modify the *internal* trip-ends of external trips has been developed
 2. F- factors used in the external trip distribution process have been recalibrated
- Changes are being evaluated in both the 2.3 and 2.5 model versions



Today's Presentation

- A recap of the underlying issues identified
- A review the refinements made to the travel model
- Next steps



External travel: Background

- External travel refers to any trips with one trip-end *outside* of the study area and the other *inside* the study area.
- Current travel demand model addresses external travel in terms of autos, light-duty commercial vehicles and trucks;
 - Vehicles are apportioned by direction (I-X, X-I);
 - Autos further apportioned by purpose (HBW, HBS, HBO, NHB)
- External travel is prepared prior to the model's execution
- Regional context: According to the regional travel demand model, external vehicles account for ~7% of total vehicles that are assigned to the network.



Why are we revisiting external travel?

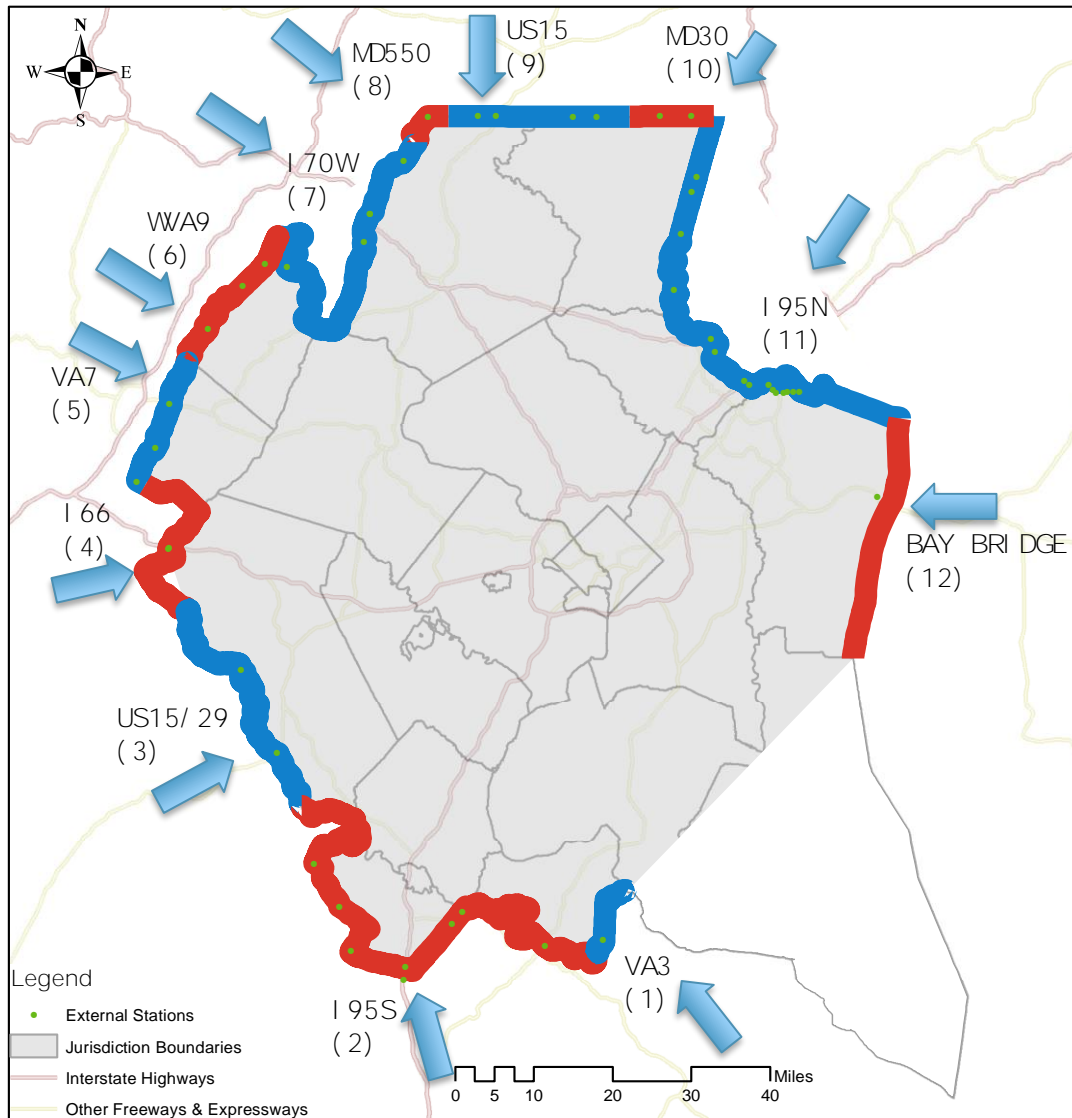
- Recent project planning analyses have pointed to excessive external travel volumes in unexpected places
- The availability 2014 AirSage as a recent observed data resource has allowed for an opportunity to reexamine this market
- After an initial examination, it is apparent that previous gravity model calibration work using the 1994 Auto External Survey (AES) was not well scrutinized



External travel O/D data offered by AirSage

- **General data features**
 - April 2014 cellular movements (presumably person trips)
 - Modal information is unknown
- **Geography**
 - Internal end: TAZ
 - External end: 12 locations about the periphery of the modeled area represent external station groupings
- **Traveler/trip attributes**
 - Residents/non-residents are distinguished
 - Derived purposes: HBW, HB non-W, NHW, NHO





Station Group Map

External trip-ends were geocoded to 12 locations instead of to 47 individual stations

For example, Station Group 11 relates to the I-95 entry-point near Baltimore but it accounts for external travel occurring at 15 proximate external stations in the highway network

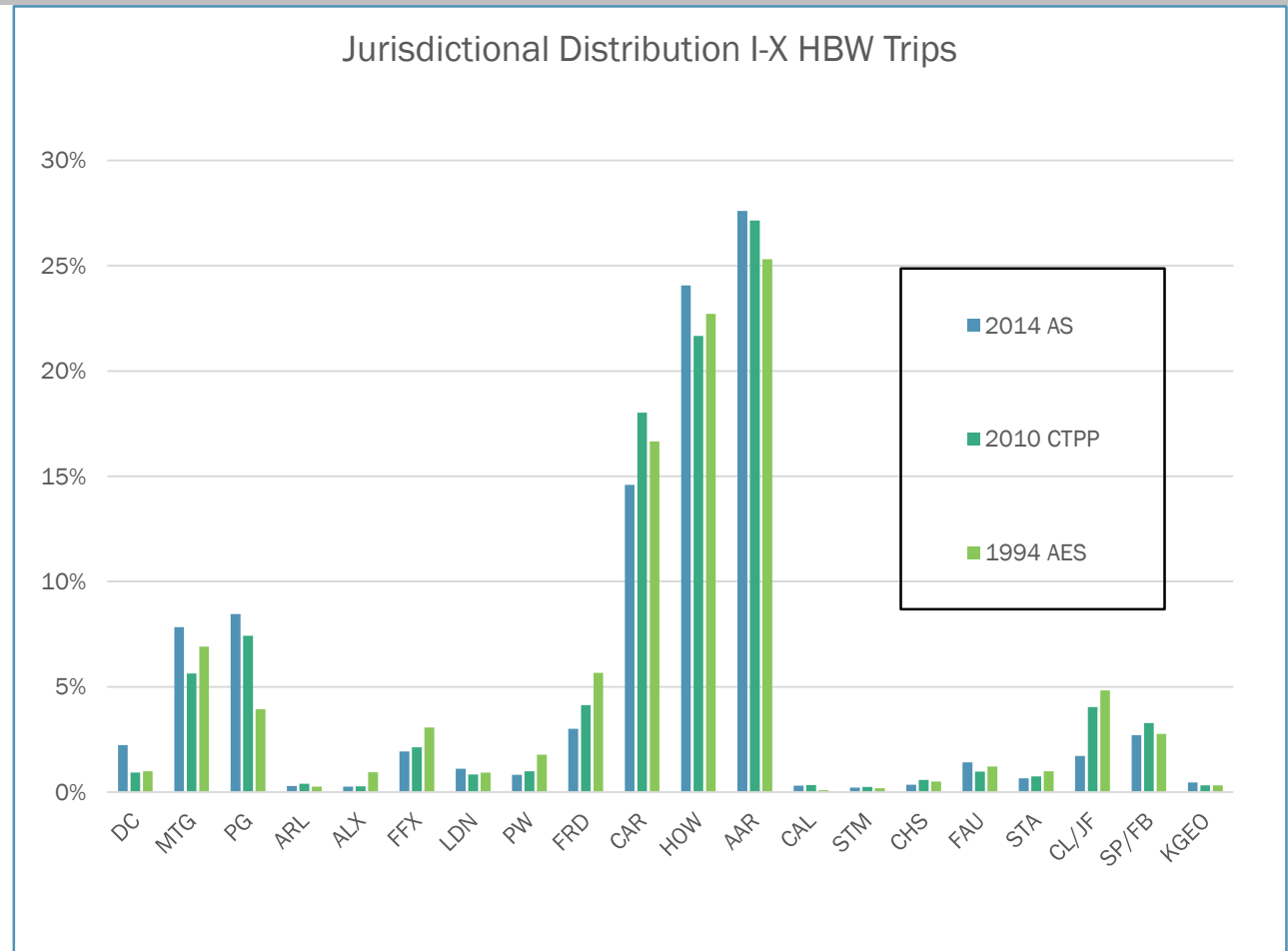
(AirSage lacked the ability to provide facility-specific external O/D data)

Analysis of AirSage trip data quality:

I-X trip distribution: 2014 AS vs. 2010 CTPP vs. 1994 AES

Observations:

- 1) AirSage I-X distribution is consistent with CTPP and Auto External Survey
- 2) I-X distribution over 20 years ('94-'14) is remarkably stable



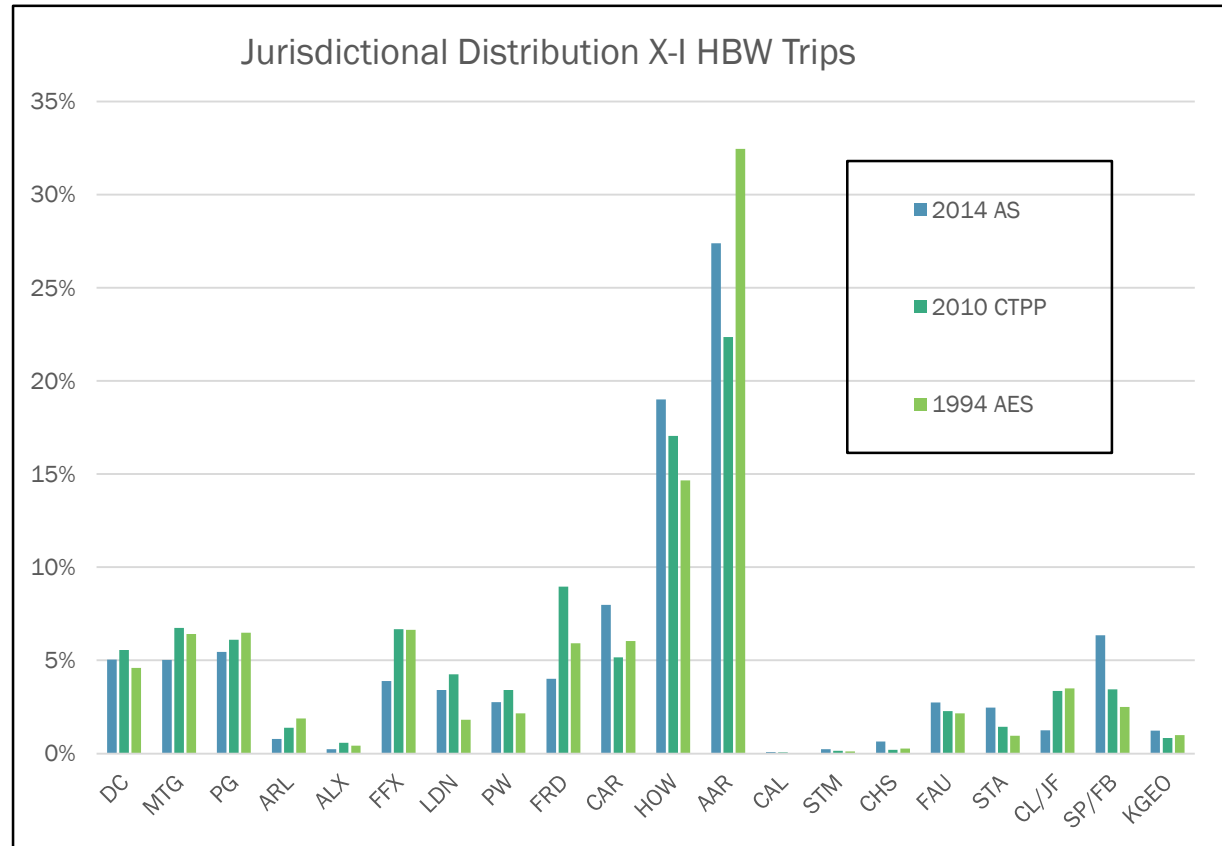
Analysis of AirSage trip data quality:

X-I trip distribution: 2014 AS vs. 2010 CTPP vs. 1994 AES

Observations:

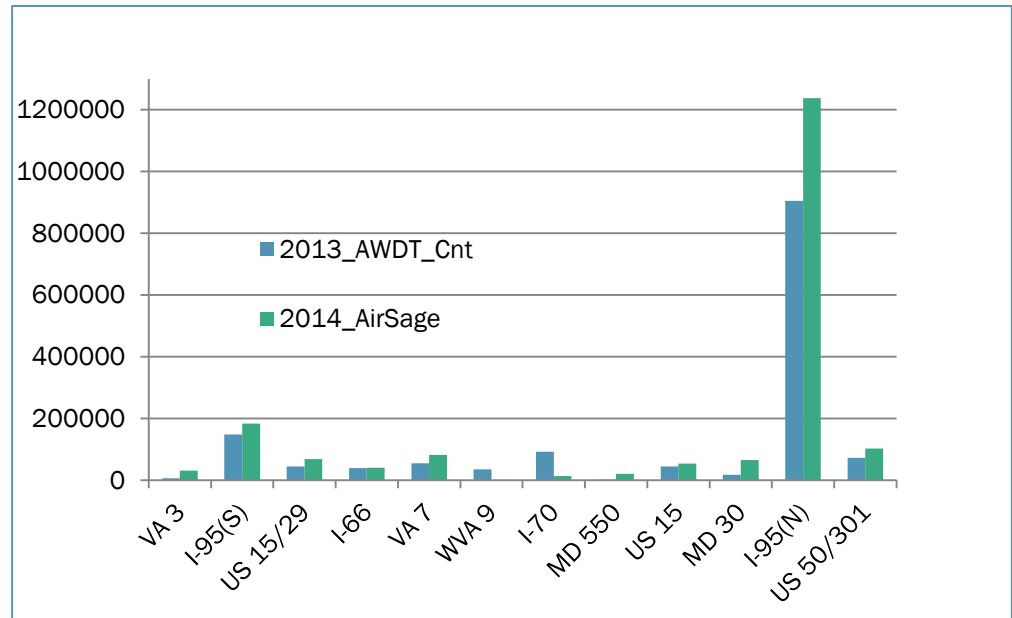
More deviation in data is noted for Baltimore area counties than that shown for I-X trips

Overall patterns are in general agreement



Analysis of AirSage data quality: External & thru trip-ends vs. counts

Station Group	2013_Count	2014_AirSage
VA 3	5,800	31,229
I-95(S)	147,900	183,810
US 15/29	44,800	68,401
I-66	39,500	40,778
VA 7	55,000	81,539
WVA 9	35,300	374
I-70	91,700	13,022
MD 550	2,100	20,104
US 15	44,000	53,384
MD 30	17,300	65,305
I-95(N)	904,700	1,237,319
US 50/301	72,500	102,271
	1,460,600	1,897,537



Observation:

AirSage does not agree with counts at the station group level of analysis

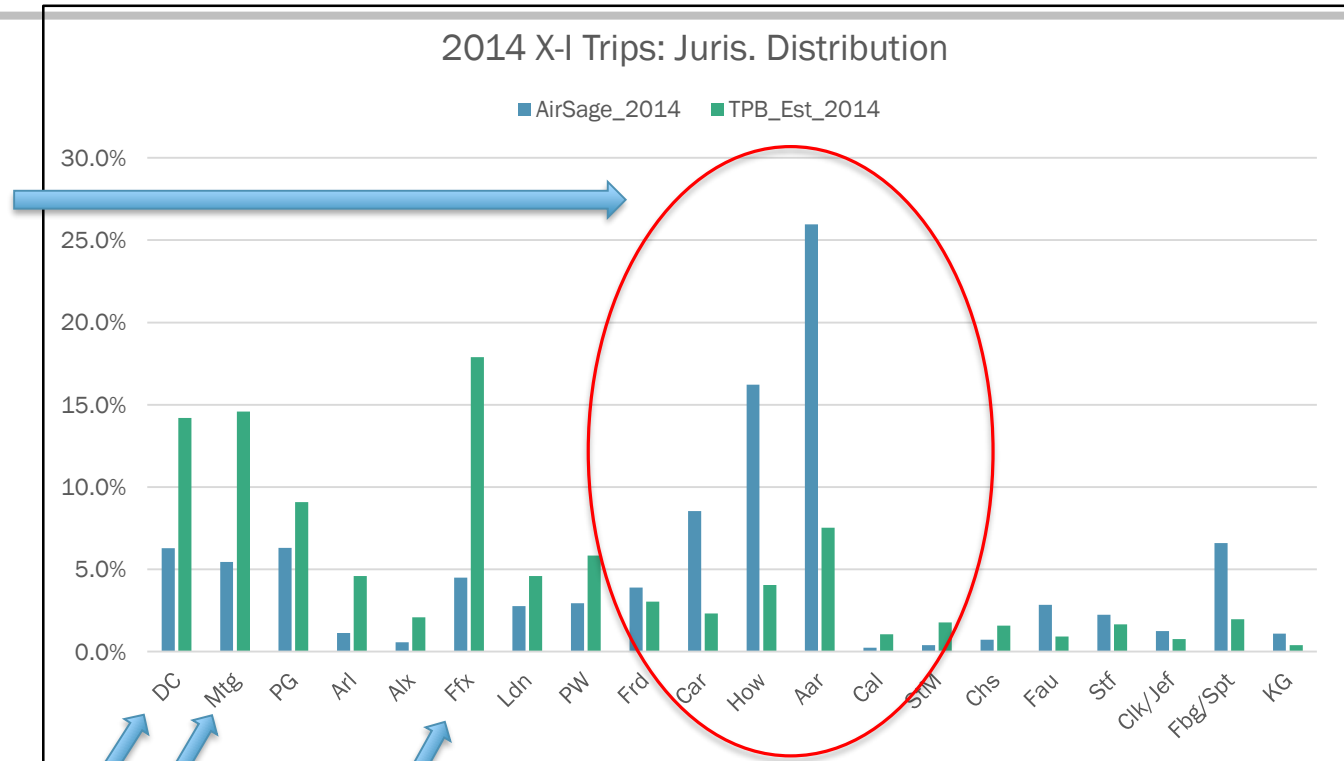


Comparison of AirSage and V2.3 X-I trip distribution (jurisdiction level)

Observation:

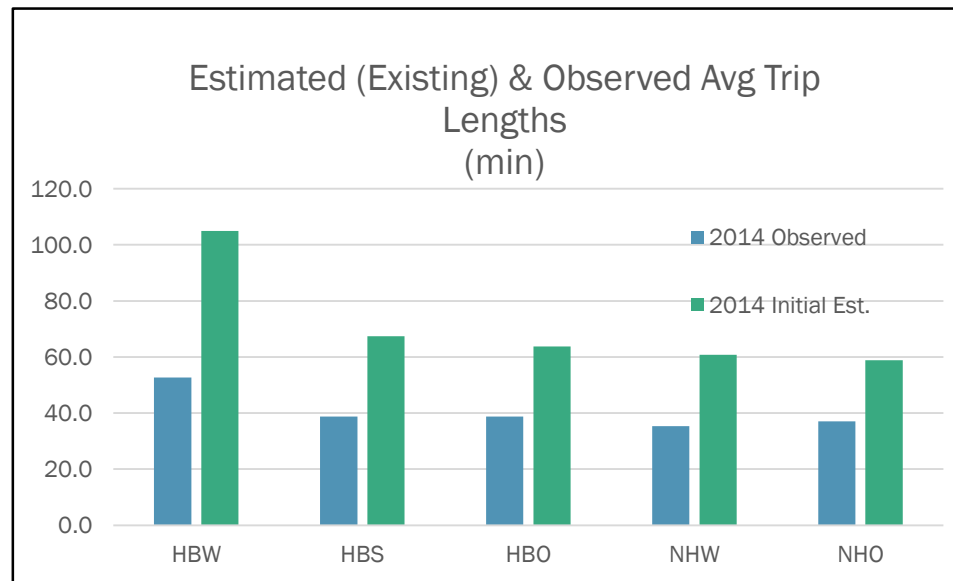
Model under-predicts external (X-I) travel to Baltimore area counties;

Model over-predicts external travel to DC and major suburban counties



Comparison of External Trip lengths by purpose: AirSage vs. Existing V2.3 Model

Purpose	AirSage 2014 Observed	Existing V2.3 2014 Initial Est.
HBW	53	105
HBS	39	67
HBO	39	64
NHW	35	61
NHO	37	59



Why does this problem exist?

Question relates to what the model “knows” and does not “know”

- Model "knows“ about internal traffic generation productions and attractions
 - Currently, the trip distribution of external trips among internal TAZs is based on internal productions and attractions (Ps/As)
- Model does not know about real-world influences associated with external travel, particularly relating to the Baltimore area, for example:
 - Washington area residents working in Baltimore likely live in jurisdictions that are proximate to the Baltimore area
 - A Baltimore resident's shopping trip to the Washington region is more likely headed to Anne Arundel Mills than to Montgomery Mall or Tysons Corner
 - A Baltimore resident's recreational trip to the Washington region is more likely headed to Live! Casino and Hotel than to MGM National Harbor



Approach to correct extl. trip distribution:

Step 1: Adjust TAZ-level Ps/As:

Procedure:

- “Observed” external Ps/As are summarized to jurisdiction level, by purpose, to develop “target” distributions
- Initial external modeled Ps/As are summarized to juris. level, by purpose. Initial modeled distributions are then calculated
- Jurisdictional P/A adjustment factors are developed using the observed distributions and the initial/modeled distributions. The factors are developed by purpose.
- Jurisdictional P/A adjustments are applied back to the initial TAZ- level Ps/As; Adjusted/modeled TAZ-level Ps/As now reflect the desired/observed distribution



Approach to correct extl. trip distribution:

Step 2: Recalibrate external trip distribution process

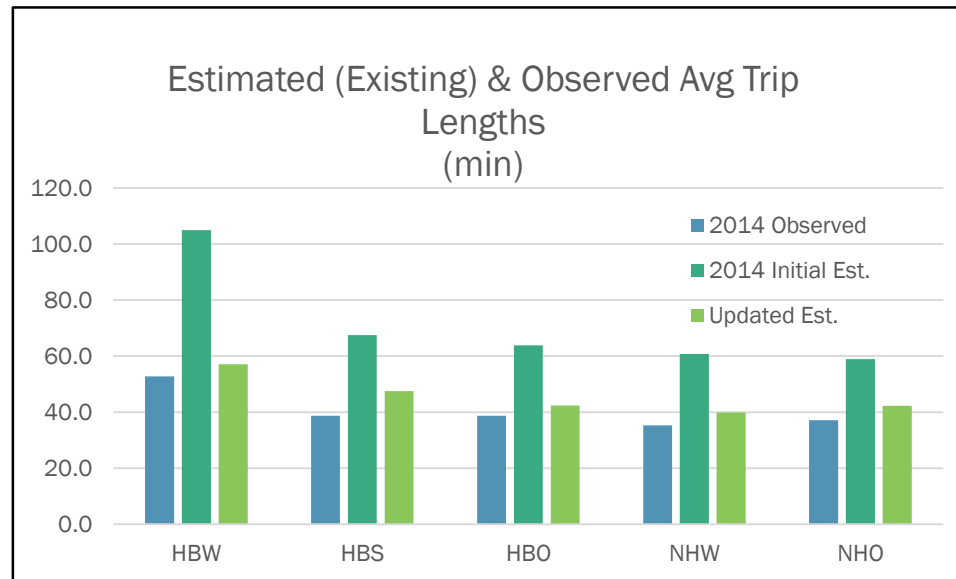
Procedure:

- The adjusted Ps/As developed in Step 1 are used
- Observed Trip Length Frequencies (TLFs) were prepared, by purpose, from AirSage data
- F-Factors were developed through a straightforward gravity model calibration



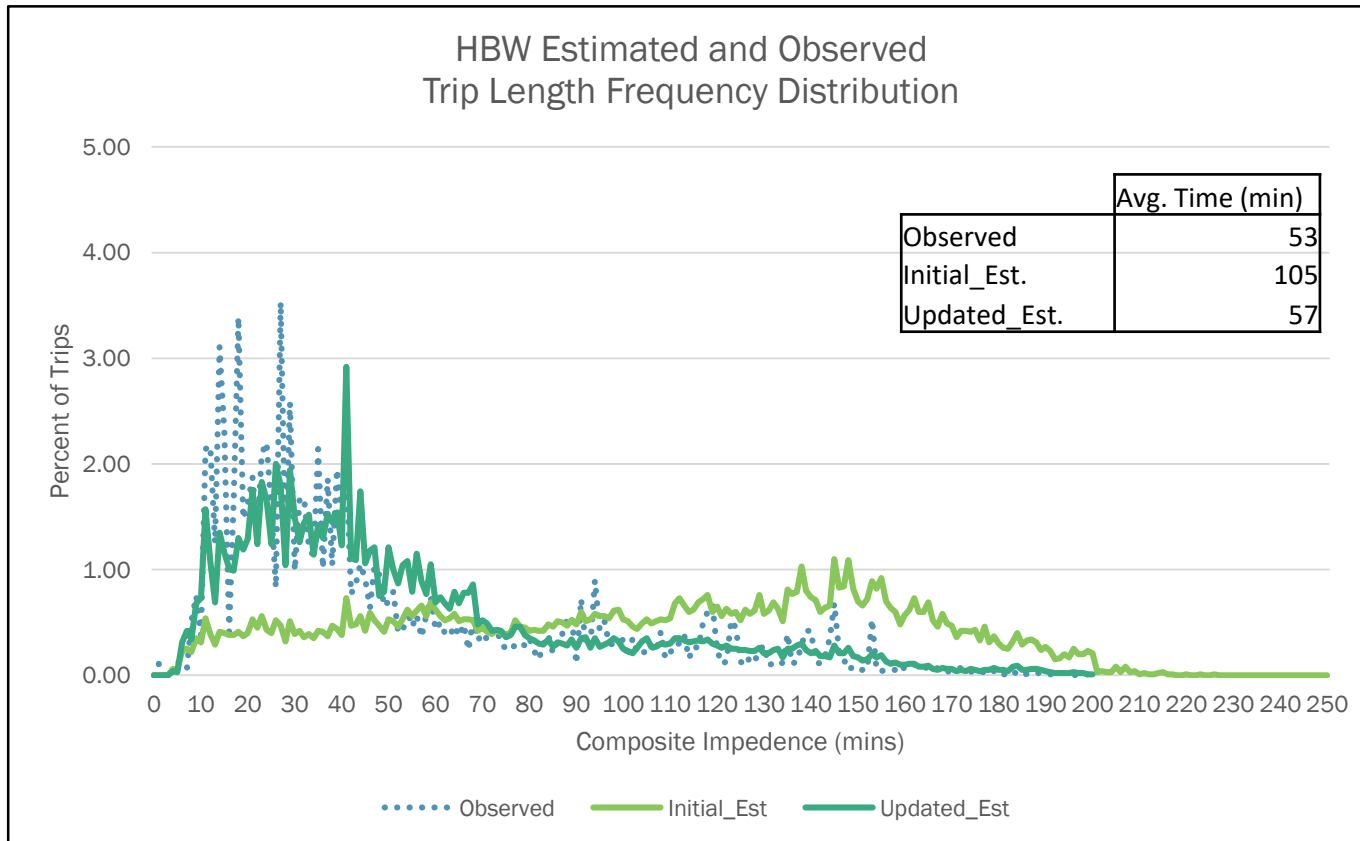
Trip length results after trip distribution calibration, by purpose

Purpose	AirSage 2014 Observed	Existing V2.3 2014 Initial Est.	Updated 2014 Updated Est.
HBW	53	105	57
HBS	39	67	48
HBO	39	64	42
NHW	35	61	40
NHO	37	59	42



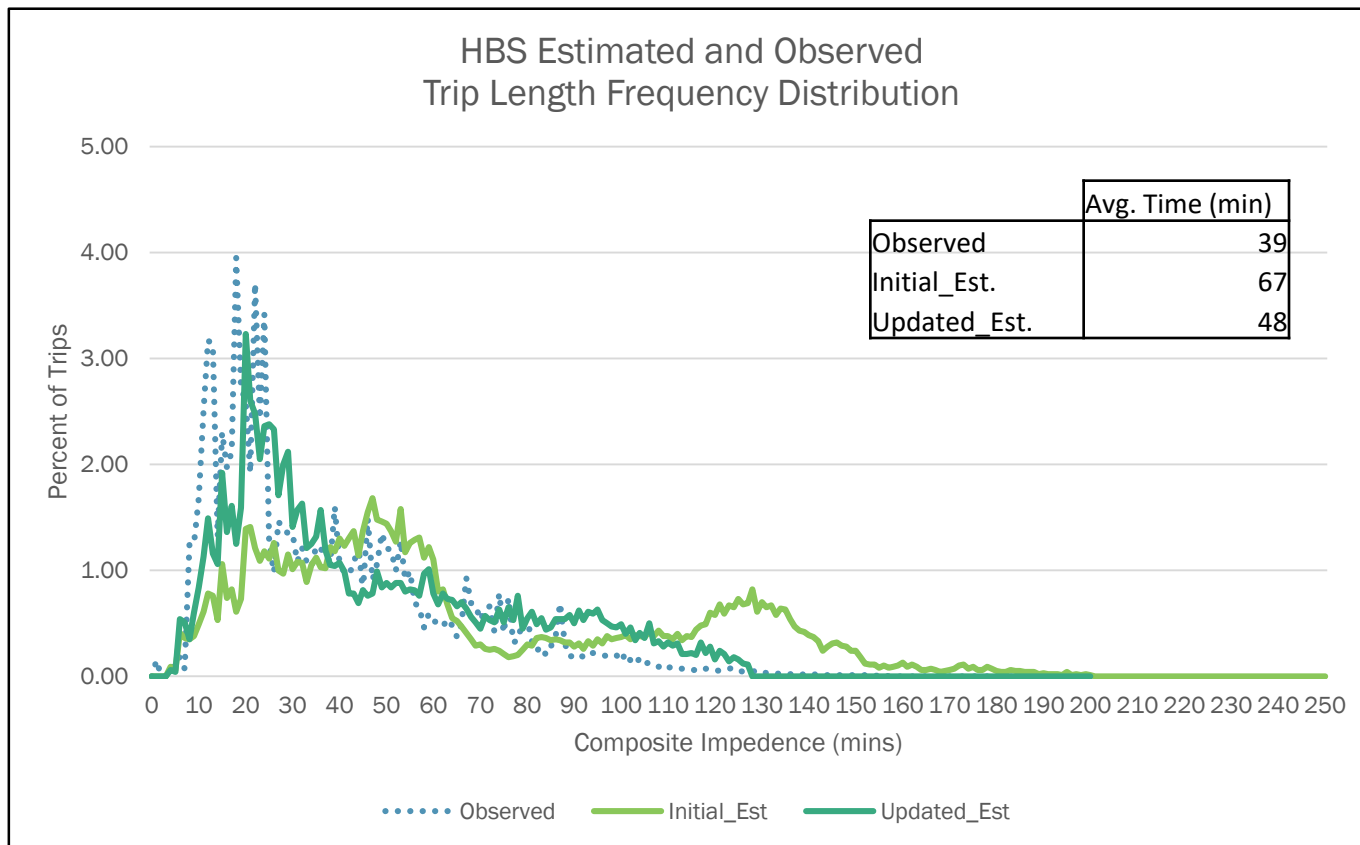
Est./Obs. Trip Length Frequency

Purpose: HBW



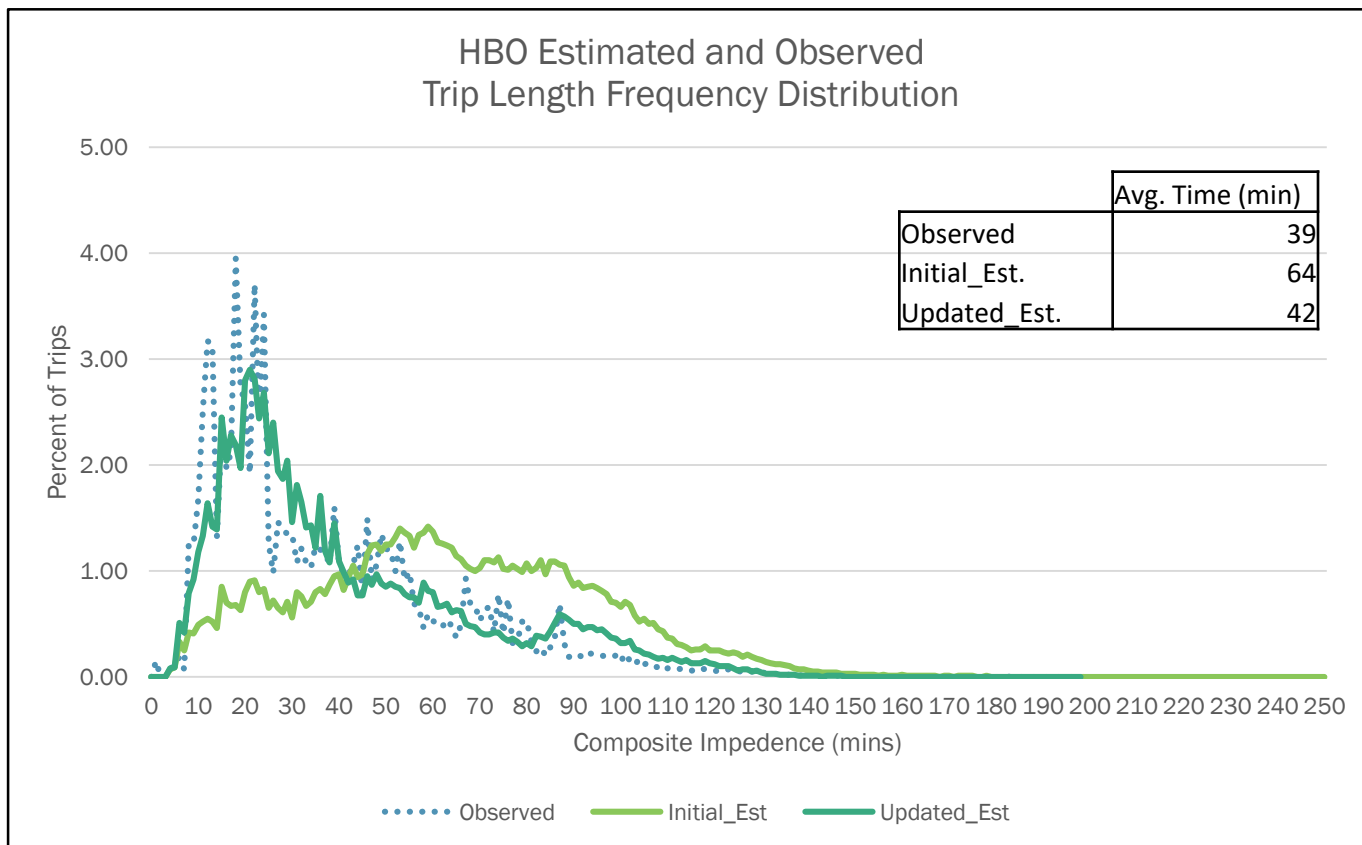
Est./Obs. Trip Length Frequency

Purpose: HBS



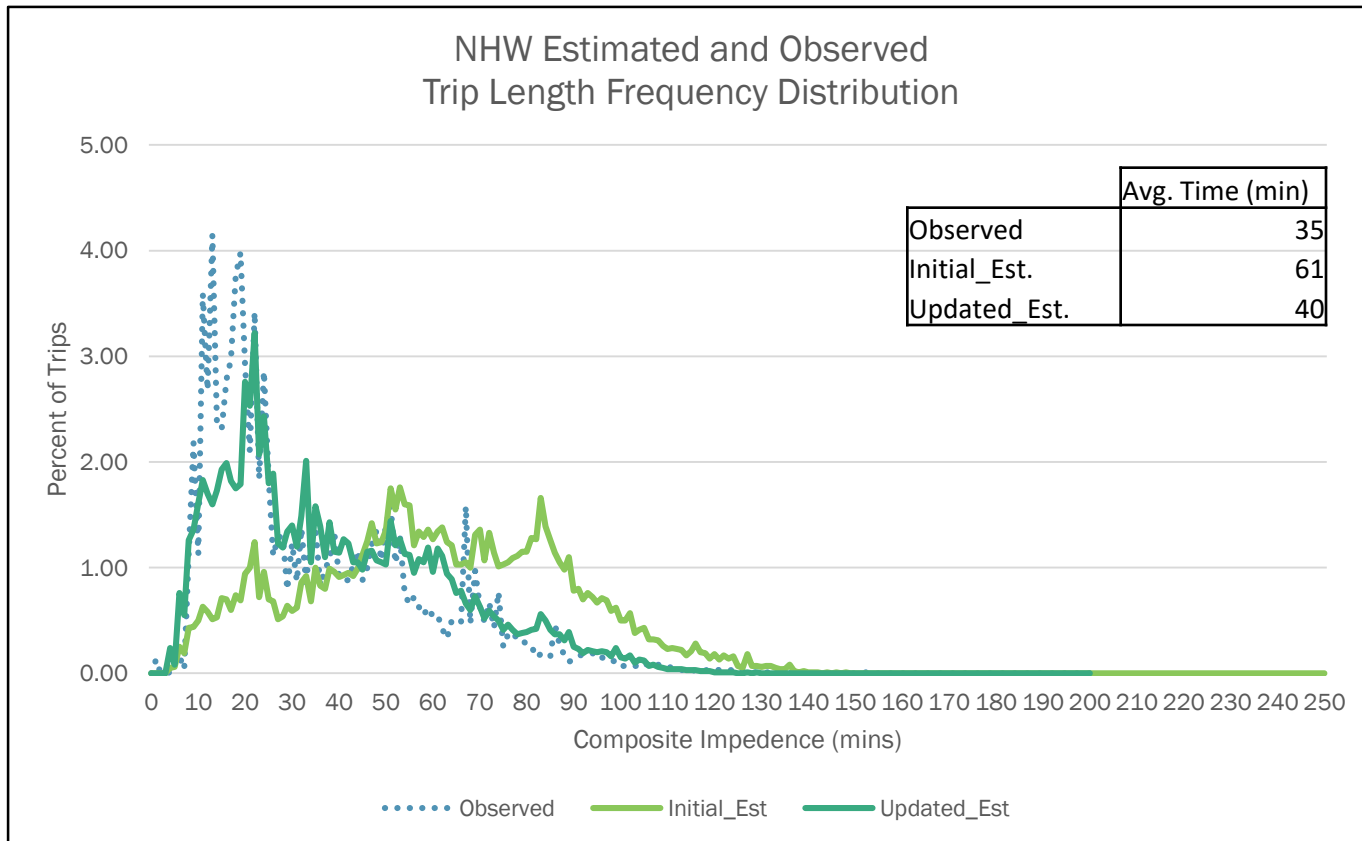
Est./Obs. Trip Length Frequency

Purpose: HBO



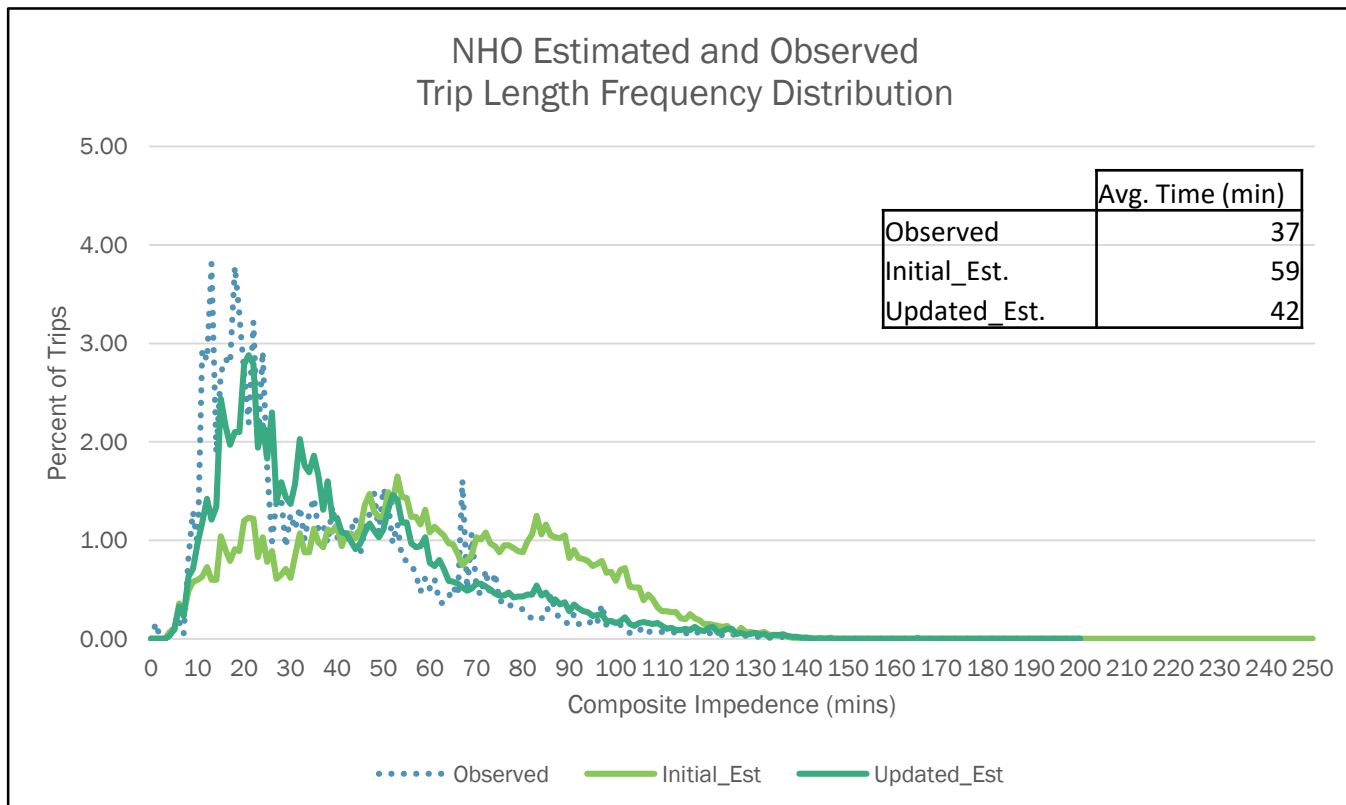
Est./Obs. Trip Length Frequency

Purpose: NHW



Est./Obs. Trip Length Frequency

Purpose: NHO



Conclusions/Next Steps

- We have determined that the external trip distribution process requires adjustments
- A process to correct external problems has been identified and has been implemented
- Changes to the existing model will include:
 - Updated F-Factor file
 - 2 Scripting updates:
 - Prepare_Ext_Auto_Ends.s
 - Trip_Distribution_External.s
- Model tests with the above changes have been executed in both V2.3.66 and V2.5 models; results are being evaluated



Appreciation

Model executions and evaluation:

- Meseret Seifu & Ray Ngo

Consultation:

- Mark Moran, Dusan Vuksan, Feng Xie



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