Observing Difficult to Survey Travel Markets with Passive Data and Machine Learning

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Problem

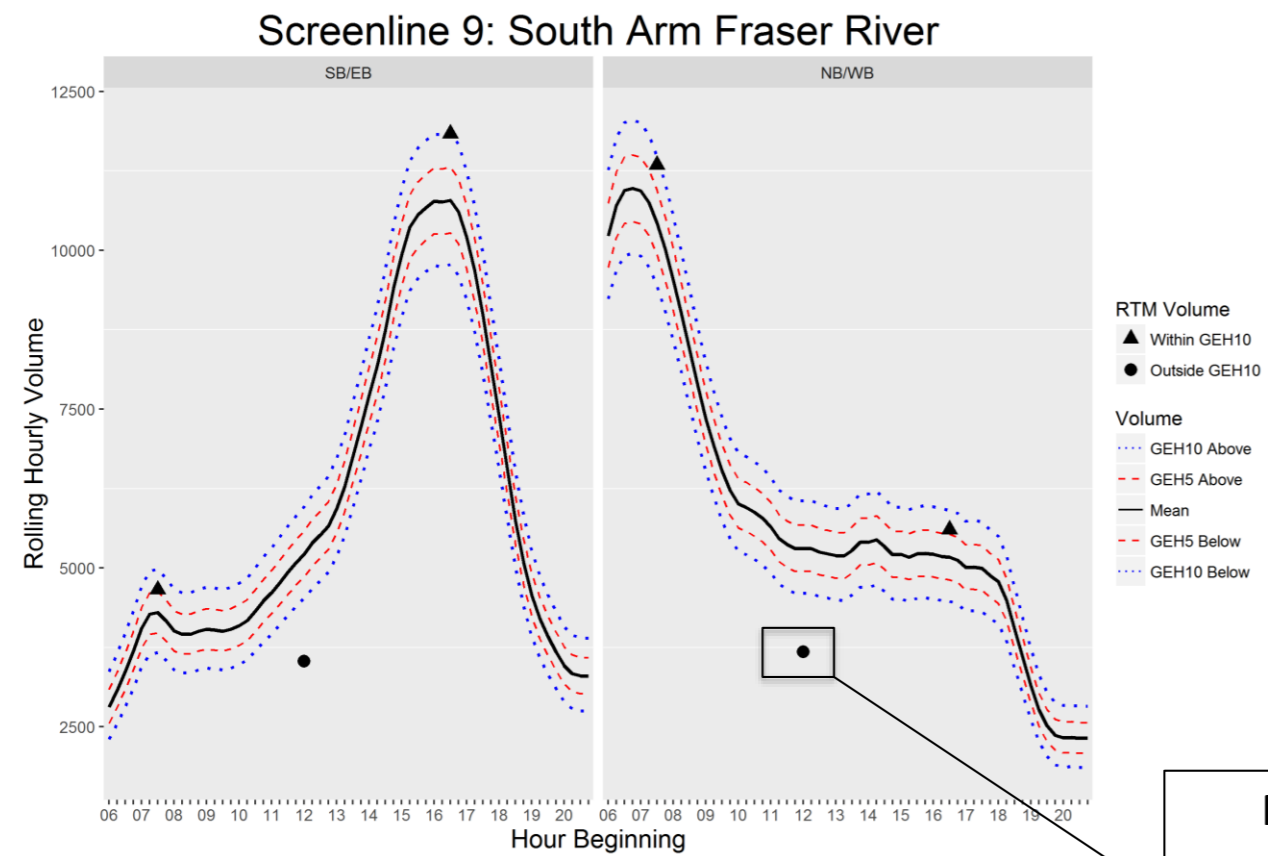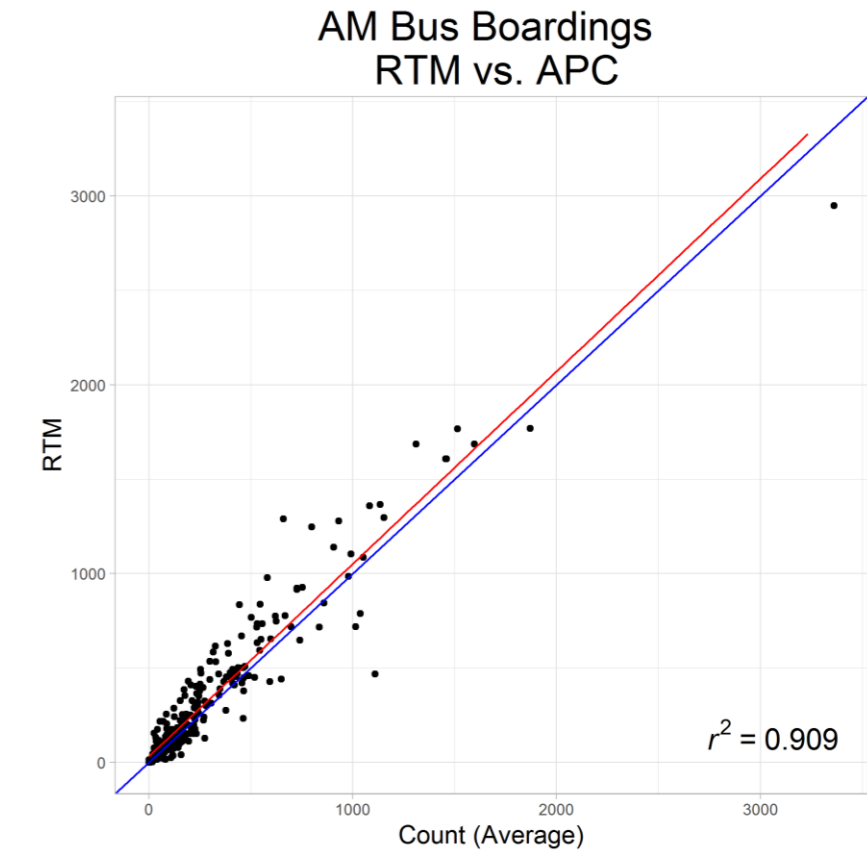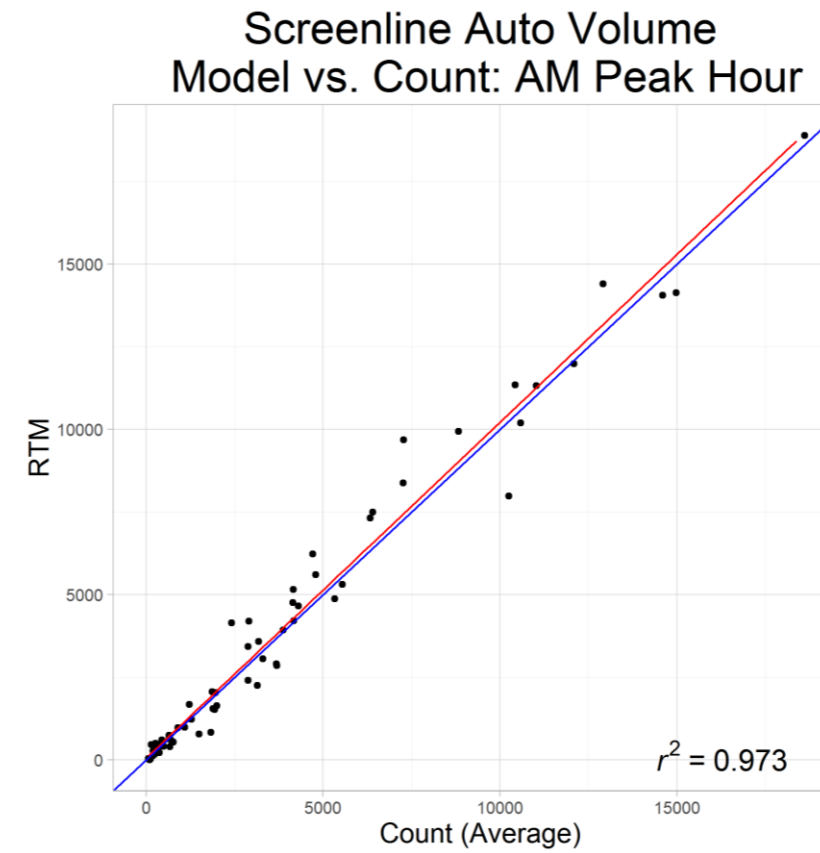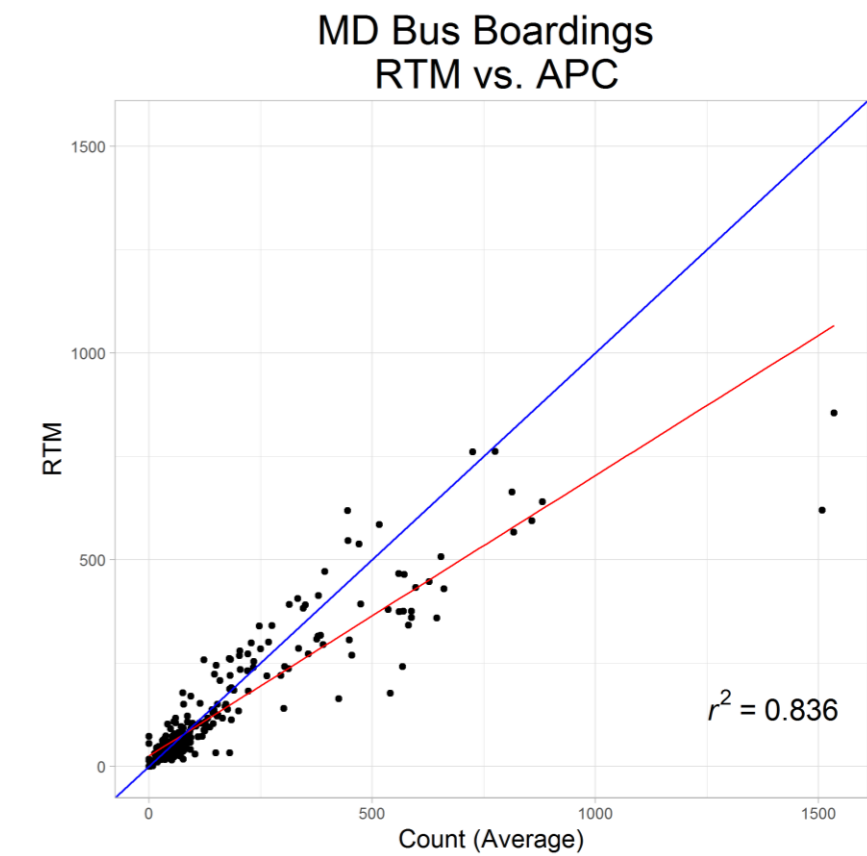- Missing trips from Regional Travel Model (RTM)
  - RTM underrepresenting off-peak travel
    - Known issue for a number of years
    - Observed across all modes and locations
    - Various possible causes considered (discussed next)

Screenline Auto Volume
Model vs. Count: AM Peak Hour

$r^2 = 0.973$

AM Bus Boardings
RTM vs. APC

$r^2 = 0.909$

Screenline 9: South Arm Fraser River

Screenline Auto Volume
Model vs. Count: MD Peak Hour

$r^2 = 0.97$

MD Bus Boardings
RTM vs. APC

$r^2 = 0.836$

MD RTM volume well below line of observed data

Together all the way
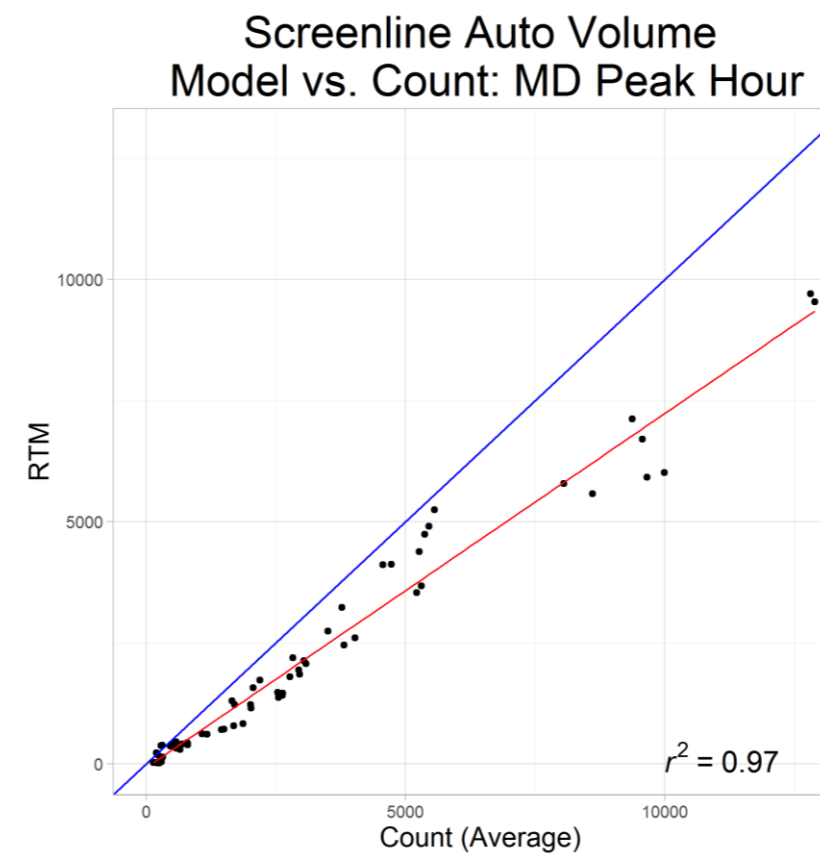
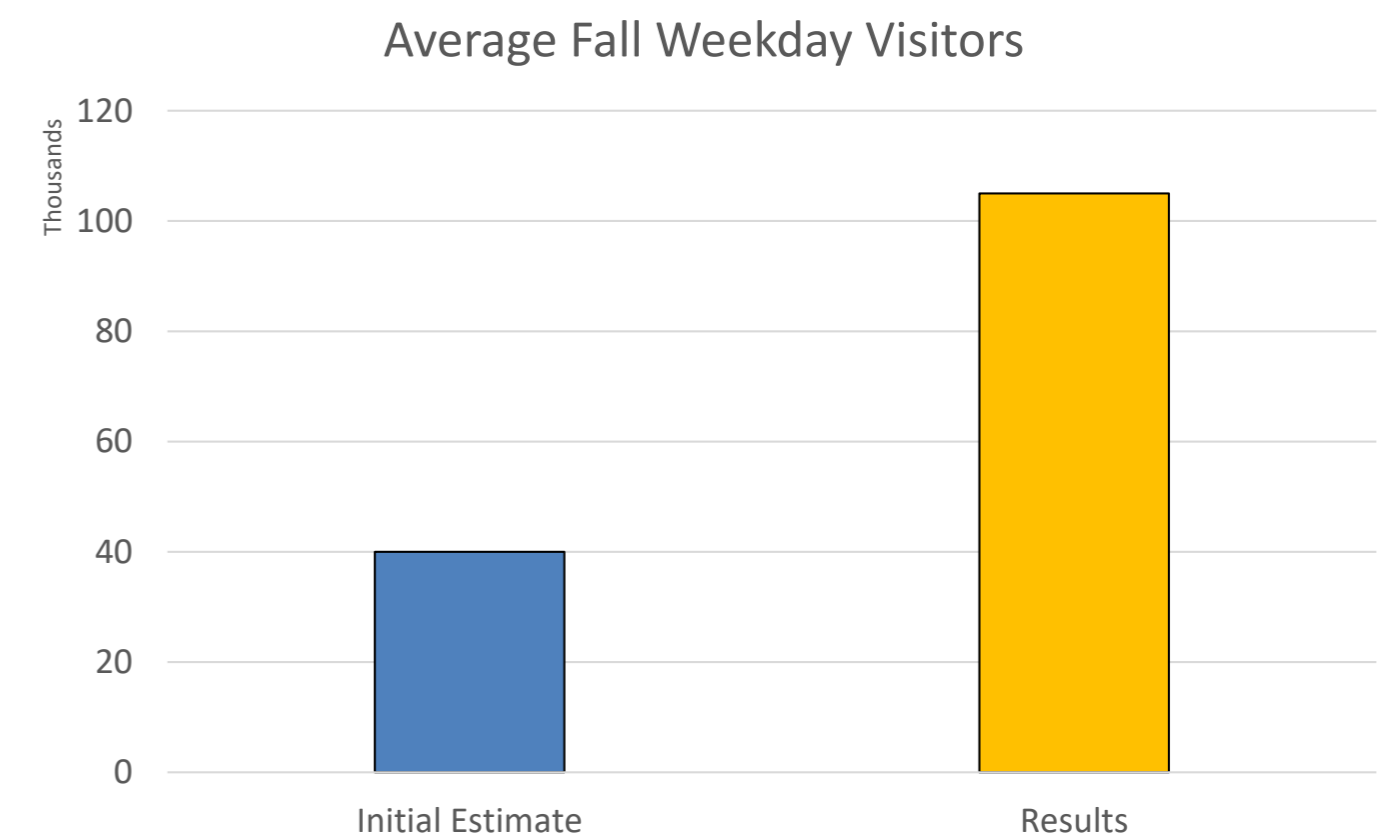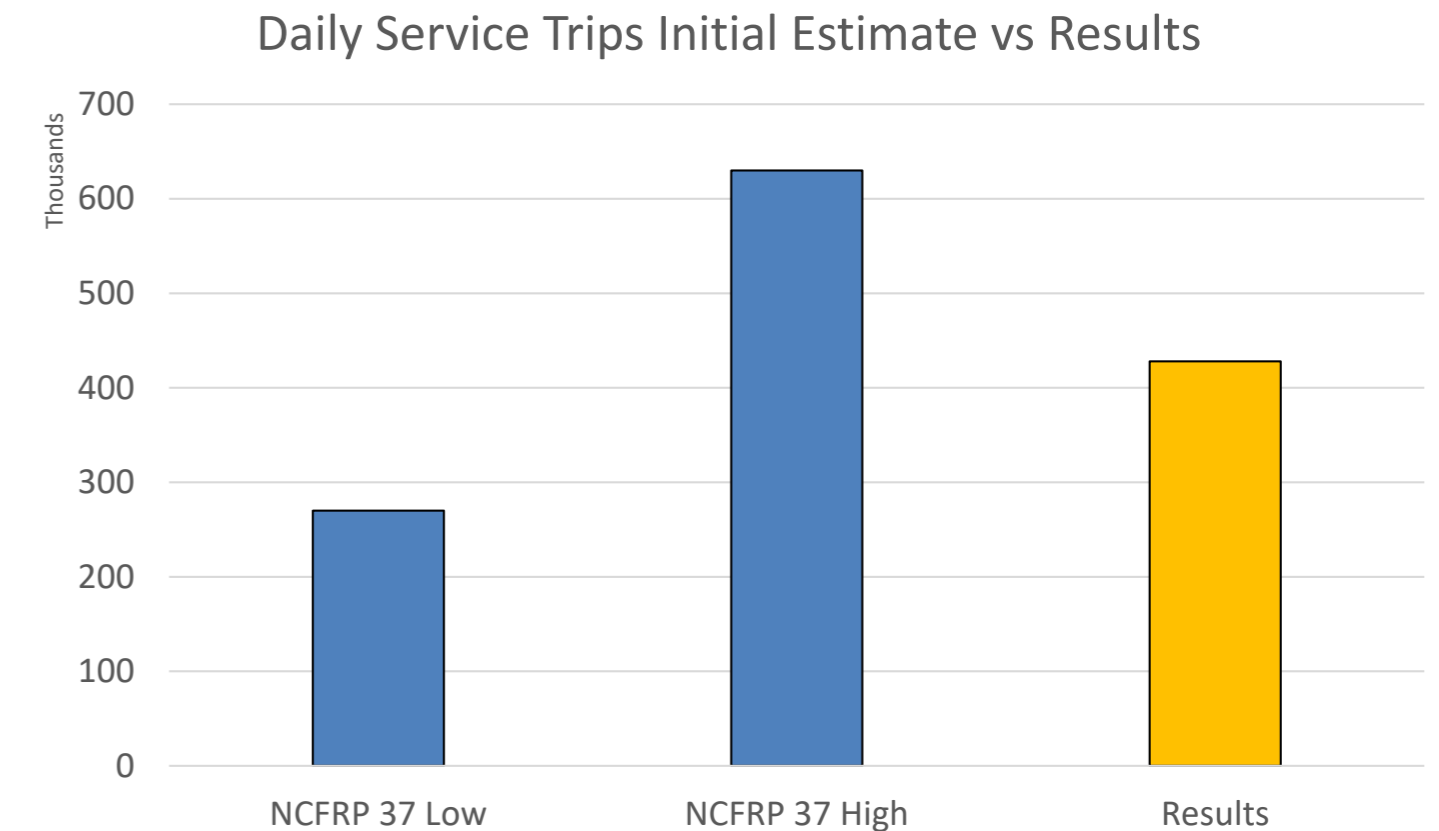# Hypotheses

- Certain groups excluded from household survey used to estimate models
  - Service trips (people who travel intra-regionally as part of their work)
    - Not well studied – one major report National Cooperative Freight Research Program (NCFRP) Research Report 37
    - Used rates estimated in that report to ball-park totals before the project

  - Visitors
    - Survey local households and guests are excluded by design
    - Not clear where to intercept representative sample of visitors
      - Only 50% stay in paid accommodation according to tourism Vancouver and Statistics Canada data
      - Numerous potential entry points

- Under-reporting of off-peak trips in household survey
  - Trips made by residents but not reported in the survey
    - Not part of this study, but recent household survey included sub-sample with smartphone/GPS
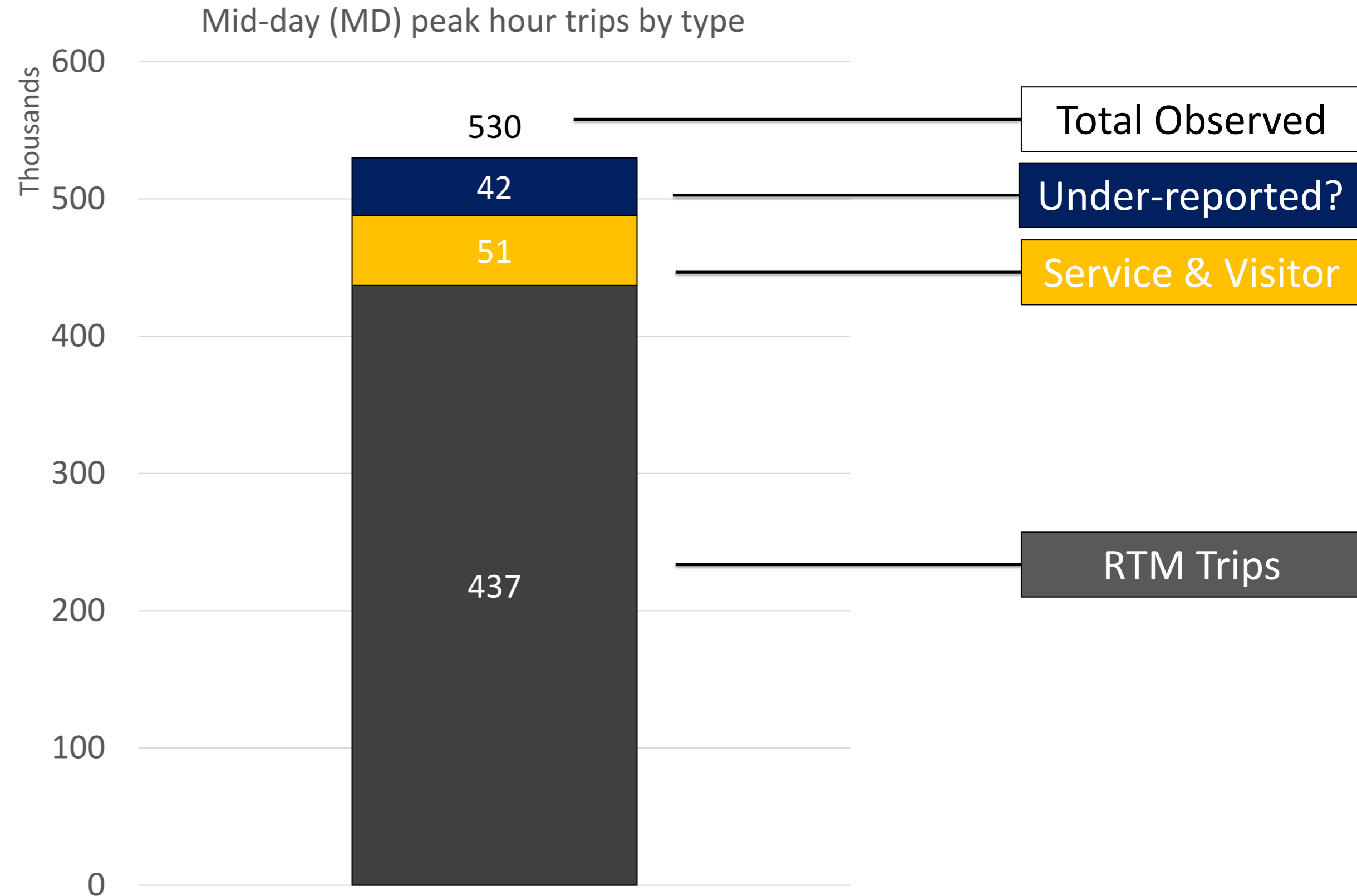   - Could be recall or definitional differences of 'trips'

Results

- Initial estimates were prepared from the literature to assess the 'size of the prize'
  - Service
    - Calculations from NCFRP 37 with various rates estimated in that study

  - Visitors
    - Initial estimate based on Tourism Vancouver monthly visitor data and assumptions of average length of stay

  - More results on the poster, come visit!

Daily Service Trips Initial Estimate vs Results

NCFRP 37 Low	NCFRP 37 High	Results

(y-axis: Thousands, 0 to 700)

Average Fall Weekday Visitors

Initial Estimate	Results

(y-axis: Thousands, 0 to 120)

Conclusions

- How much of the gap was filled?
  - Service trips
    - Equivalent to a small trip purpose
    - Significant presence in mid-day

  - Visitors
    - More visitors than originally estimated
    - Visitors make a lot of trips during the Mid-day and PM in CBD

  - Under reported
    - Also notable
    - Addressed with next trip diary

Mid-day (MD) peak hour trips by type

Together all the way

Next Steps

Daily Trip Distribution
RTM vs. ~~Trip Diary~~ Observed Data!

- Various uses for the data:
  - Model validation
    - Using total origin destination (OD) results to test and validate trip diary weighting and expansion
    - No previous comparable view into trip making, particularly distribution
    - Will compare next model update as well, allowing validation against a different data source than estimation

  - Model integration
    - Mostly likely used as seed matrices
    - Matrices need to be disaggregated – have a plan!
    - Service trips assumed to be all auto
    - Visitor mode choice an open question – please come by and share ideas/experiences if you have any