Fare Media Sales-Based Ridership Model

CAC PRESENTATION

12/20/2023

Agenda

1. Ridership Estimation Background
2. Previous Ridership Estimation Methodology
3. New Fare Media-Based Estimation Methodology
4. New Ridership Data

Ridership Estimation Background

- Without fare gates or automated passenger counters (APCs), Caltrain does not have complete data on the number of riders, or where & when they travel
- The amount of information available through ticket sales varies by ticket type and method of paying for fare ("Fare Media")

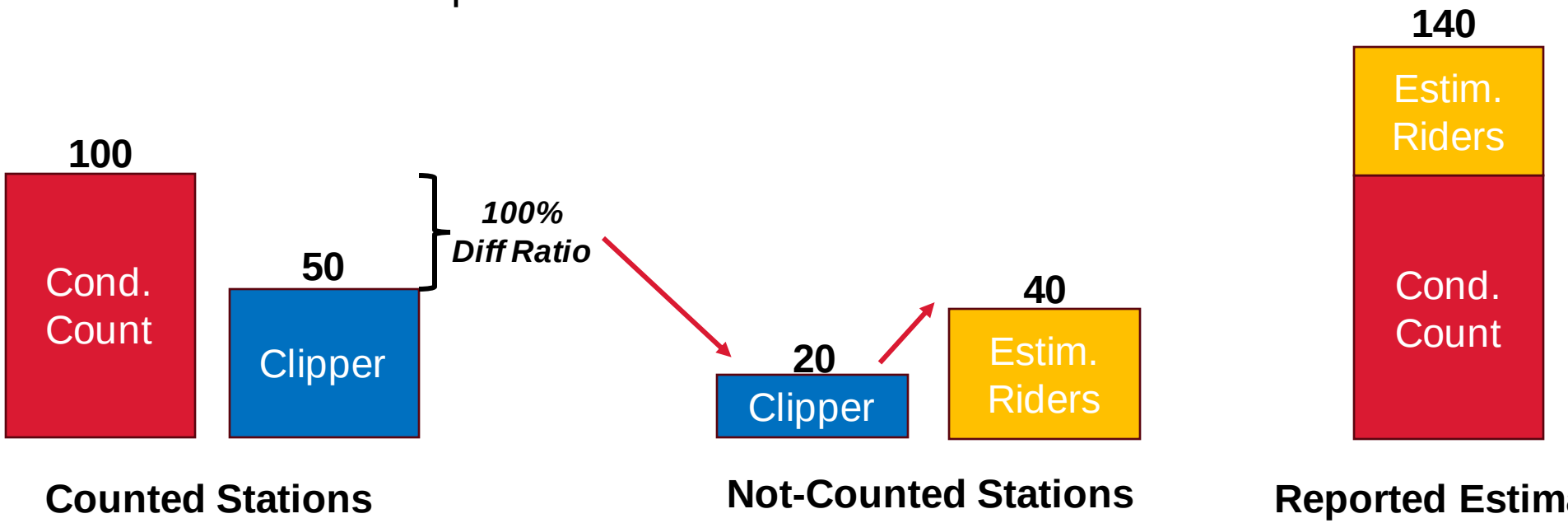
Ticket Type	Fare Media	Number of Trips	Origin Station	Day
One-Way	Clipper	✓	✓	✓
	Paper Ticket	✓	✓	✓
	App	✓	✓	✓
Day Pass	Paper Ticket	?	?	✓
	App	?	✓	✓
Monthly Pass	Clipper	?	?	?
Go Pass	Clipper	✓	✓	✓
	Sticker	?	?	?

Ridership Estimation Background

- Caltrain previously conducted an Annual Passenger Count
  - Physical headcount of all boardings and alightings for each train, at each station
  - Conducted every February until the pandemic
- Ridership estimates also reported to Board on monthly basis
  - Prior to April 2020: Ridership estimated from a combination of fare media sales, Triennial Survey, and Annual Count data
  - April 2020 through October 2023: Ridership estimated from a combination of conductor counts and Clipper data used
- Board-reported ridership estimates are distinct from NTD estimates, which uses on-board sampling that is only statistically significant at the annual level

Previous Ridership Estimation Methodology

- Overview
  - Conductors counted boardings at 14 high-ridership stations
  - Conductor counts were compared to Clipper data from those stations to calculate a "difference ratio"
  - Difference ratio was applied to the Clipper data from not-counted stations to estimate their ridership



Previous Ridership Estimation Methodology

- Limitations and Disadvantages
  - Counting passengers became more difficult for conductors as ridership increased
  - Required manual data entry, which introduced opportunities for entry error
  - Assumed the same rate of Clipper use at counted stations and not-counted stations
  - Estimates available at the system level, no information on origin station, ticket type, or fare product

New Fare Media-Based Estimation Methodology

- Electric multiple units will include APCs, but Caltrain needed a new estimation methodology before electrified revenue service
- Comparison of the old methodology to a fare media sales-based methodology revealed an undercount, corresponding to entry errors
- New model automatically ingests and cleans available fare media data and incorporates simple, data-informed assumptions to estimate unknown variables

New Fare Media-Based Estimation Methodology

Ticket Type	Fare Media	Number of Trips	Origin Station	Day
One-Way	Clipper	✓	✓	✓
	Paper Ticket	✓	✓	✓
	App	✓	✓	✓
Day Pass	Paper Ticket	2 trips / day	One Way Clipper Data	✓
	App	2 trips / day	✓	✓
Monthly Pass	Clipper	26 trips / month	Available Monthly Pass Tag Data	Clipper Go Pass Historical Data
Go Pass	Clipper	✓	✓	✓
	Sticker	Go Pass Clipper Data & Go Pass Survey Results	Sticker Go Pass Survey Results	Go Pass Clipper Data

Static Assumptions

Dynamic Assumptions

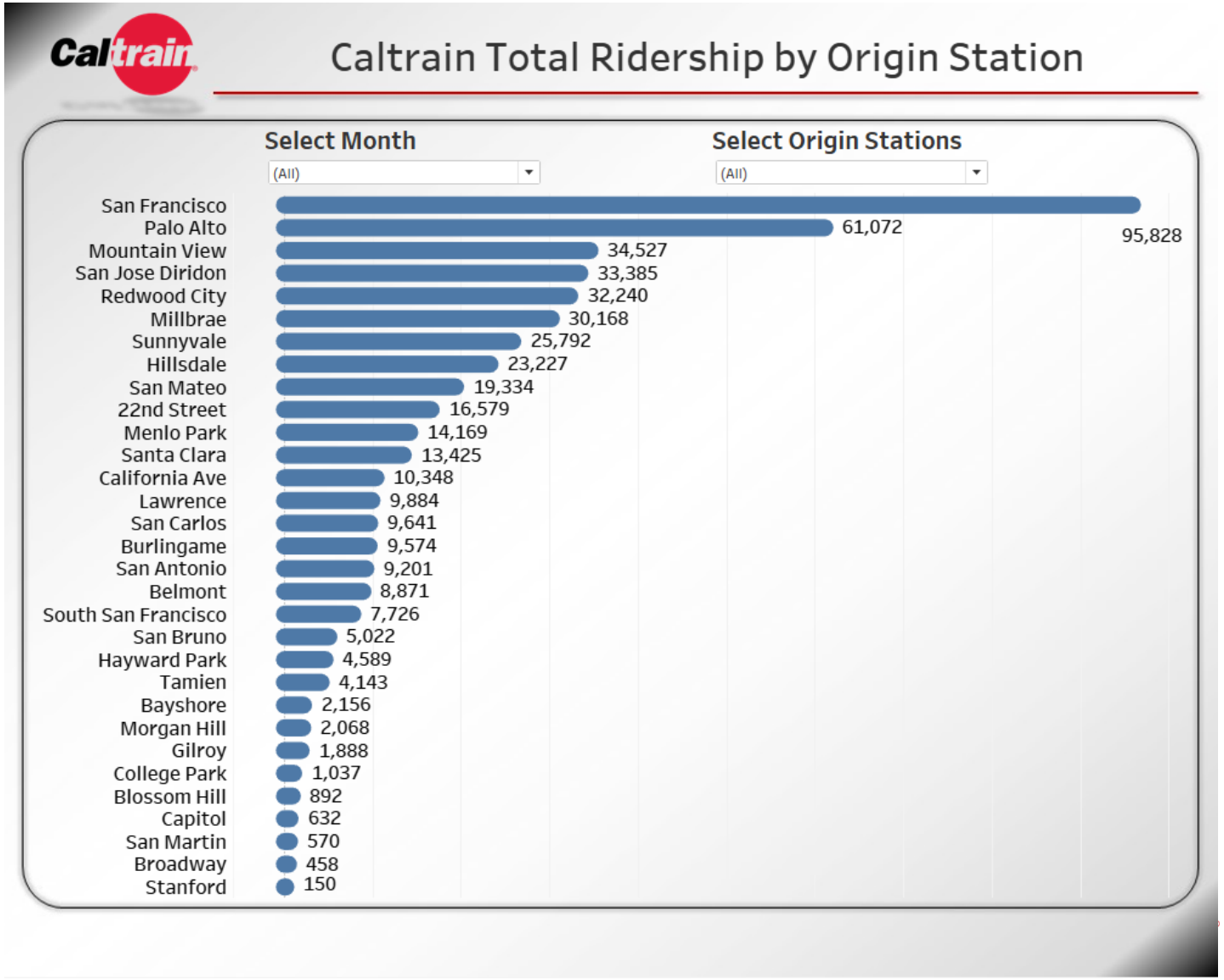
New Fare Media-Based Estimation Methodology

Benefits

- Automated data collection & cleaning reduces data entry errors
- Significant reduction in workload for conductors, as well as TASI and Caltrain staff
  - TASI continues to perform special event counts, South Santa Clara County stations, and ad-hoc counts (e.g. to monitor vehicle load)
- Easy to understand - applies common sense, data-driven assumptions

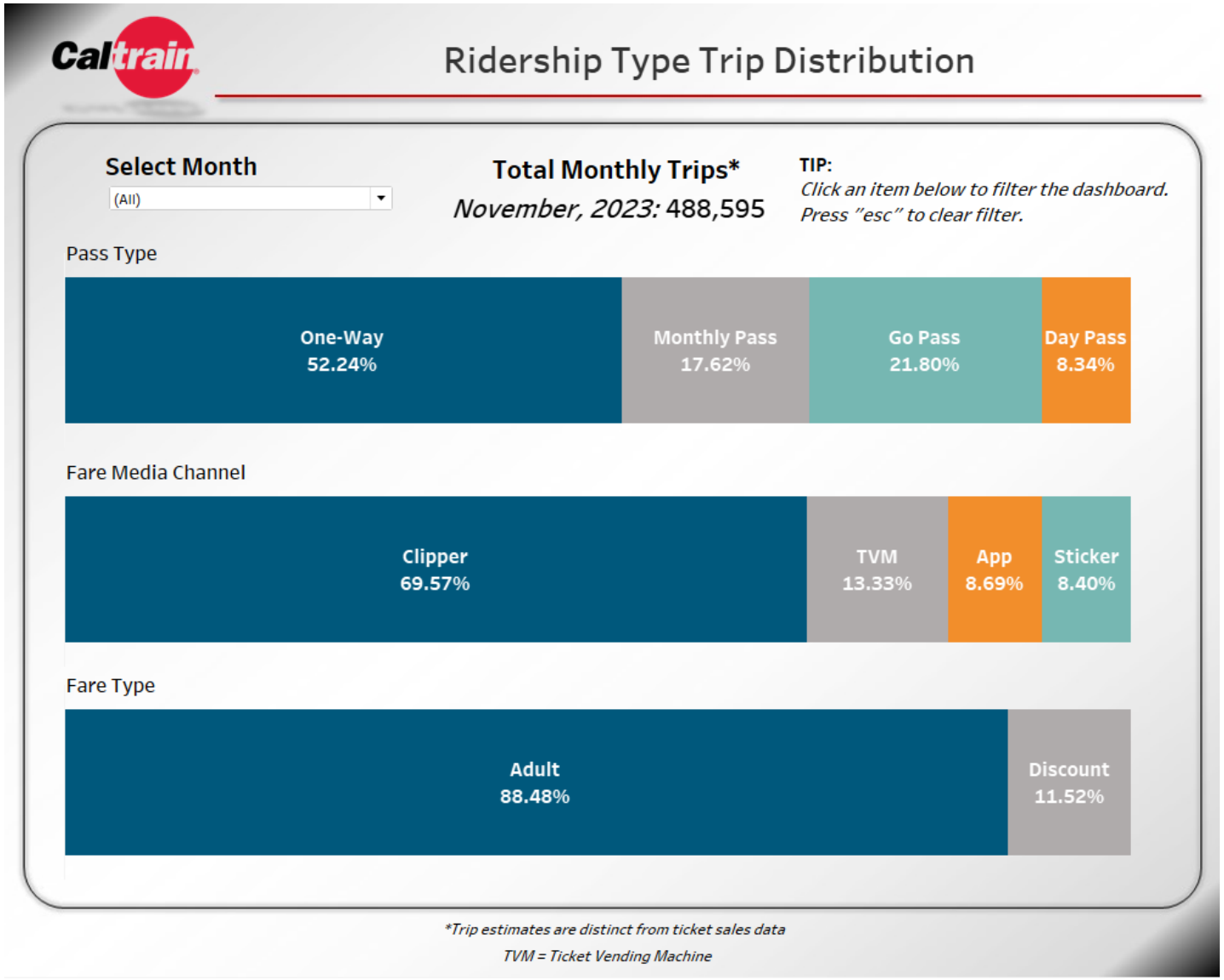
New Ridership Datapoints

Example Origin Station Chart (still in development)



New Ridership Datapoints

Example Ridership Type Chart (still in development)



FOR MORE INFORMATION

WWW.CALTRAIN.COM

Appendix A: Primary Model Assumptions

Day Pass:

- Each day pass generates 2 trips on the day it was purchased
- Trips generated by day passes purchased at TVM's are distributed to stations according to the origin station distribution of Clipper one-way trips for that day

Monthly Pass:

- Each monthly pass generates approximately 26 trips in the month it was purchased for
- Monthly pass trips are distributed across days of the week at the same rate as 2022 Clipper Go Pass Trips
- Monthly pass trips are distributed to stations according to the available Clipper tag for that month

Go Pass:

- Each sticker Go Pass generates the same number of monthly trips as the average Clipper Go Pass for that month
- Sticker Go Pass trips are distributed to stations based on the weighted distribution of Go Pass survey results. Origin station survey responses are weighted by the trip frequency responses.
- Sticker Go Pass trips are distributed by days in the month based on that month's daily distribution of Clipper Go Pass trips

Appendix A: Primary Model Assumptions

Monthly Pass Day-of-Week Multipliers:

- Monday: 1.0
- Tuesday: 1.3
- Wednesday: 1.3
- Thursday: 1.2
- Friday: 0.9
- Saturday: 0.2
- Sunday: 0.2
- Holidays: 0.0

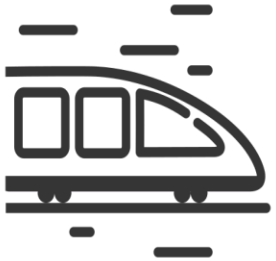
Go Pass Sticker Survey Trip Frequency Response Weighting:

- Less than once a month – weight: 0.1
- 1-3 days/month – weight: 0.25
- 1-2 days/week – weight: 1.5
- 3-5 days/week – weight: 4
- 6-7 days/week – weight: 6.5

Appendix B: GP Survey Trip Calculation Graphic

Clipper Go Pass

100 Utilized Cards



3,000 Actual Trips

30 Trips per Card

Sticker Go Pass

50 Survey Responses

X

30 Trips per Card

=

1,500 Estimated Sticker Go Pass Trips

*Numbers are for illustrative purposes