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Cyclist Compliance at Signalized Intersections

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Bicyclist Compliance at Signalized Intersections: The makings of a thesis

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# Why study cyclist compliance?

- Growing mode of utilitarian travel
  - Room for further growth
    - Increasingly bicycle-friendly transportation policy
    - Decline in car use by younger generations
    - Large percentage of trips are bikeable (under 3 miles)
- Little is known about the *actual* compliance rates for cyclists in the United States.
  - Much anecdotal evidence of cyclist non-compliance.

Origins of the study

- Part of Operational Guidance for Bicycle-specific Traffic Signals project with ODOT
  - DISCLAIMER
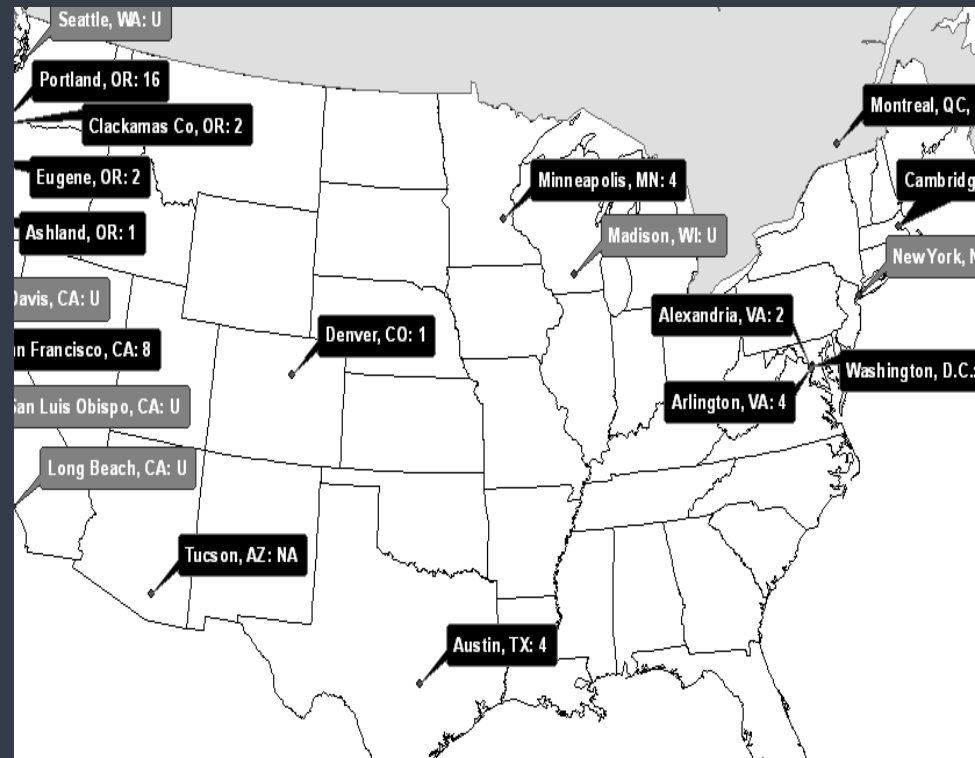
Data Collection

- Two data sources:
  - City of Portland
    - Archived from previous research
    - 3 intersections
      - Portland
      - Bicycle-specific Signals
  - Portland State
    - Project-specific
    - 4 intersections
      - Varying intersection characteristics/locations

City of Portland Footage

PSU Camera Setup

PSU Study-Specific Footage
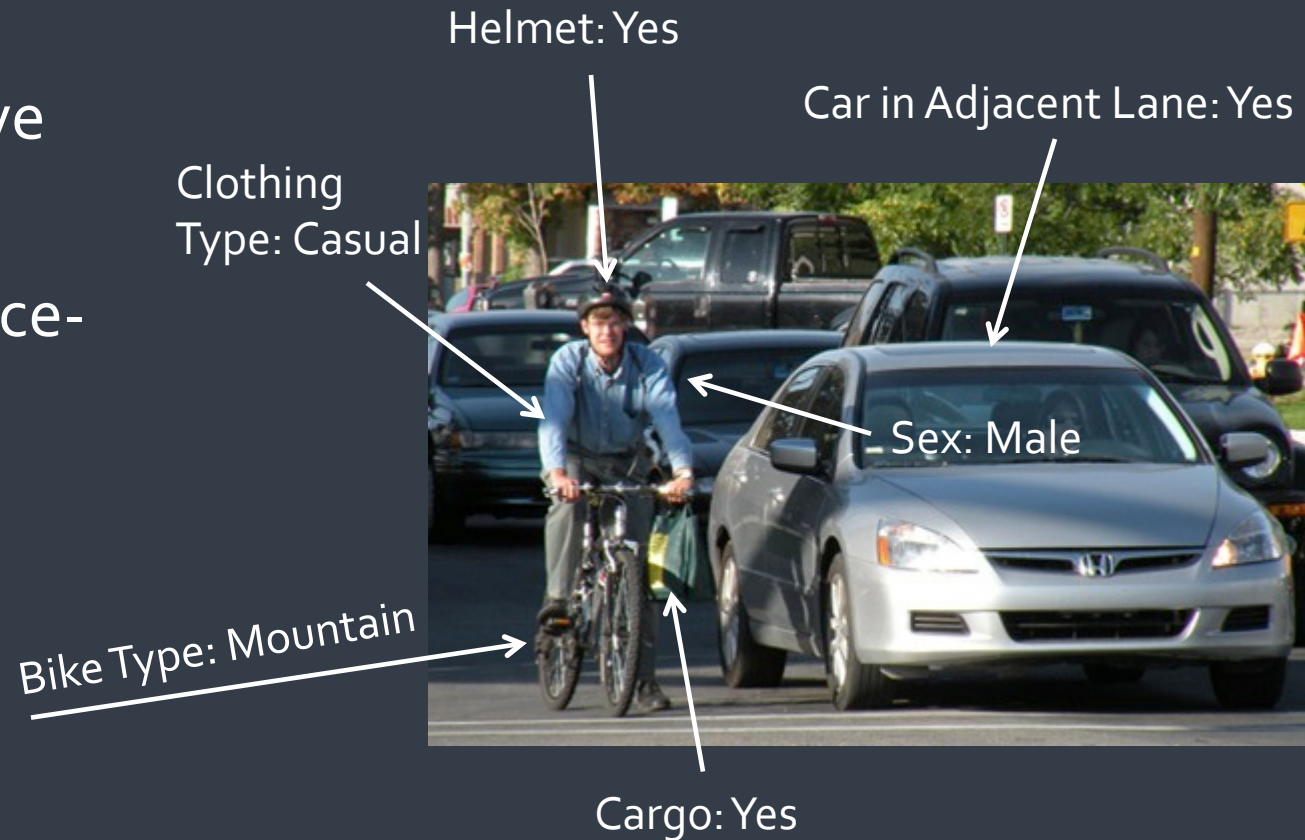
Data Reduction

- Cyclists were eligible to become part of the study if they were observed to:
    - Arrive on the red indication
    - Utilize bicycle infrastructure (and bicycle signal where applicable) on both sides of the intersection

Data Reduction

- Three types of data collected:
  - Descriptive
  - Event
  - Compliance-specific

Helmet: Yes

Car in Adjacent Lane: Yes

Clothing Type: Casual

Sex: Male

Bike Type: Mountain

Cargo: Yes

Compliance Indicators

- Compliant
- Non-compliant
  1. Gap Accepted
  2. Signal Jump

Compliance Indicators

Gap Accepted

Compliance Indicators

Signal Jump

Results

- Total of 2,617 cyclists
- Compliance Rate: 89.7%

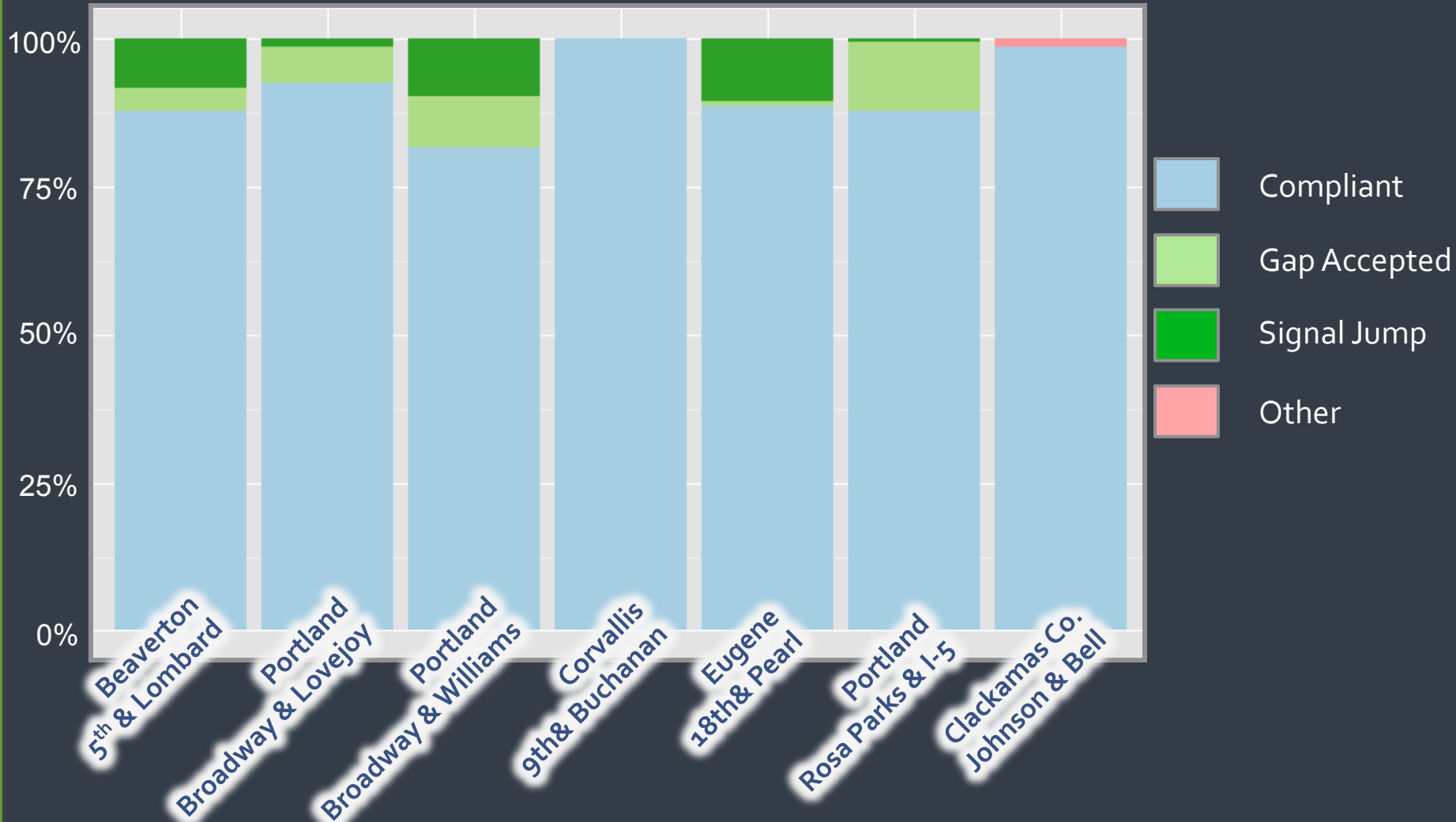| Compliance Indicator	Percent	Number of Observations
Compliant	89.7	1809
Gap Accepted	5.9	118
Signal Jump	4.3	87
Other	0.1	3

Comparison to Other Modes

- The average non-compliance rate for pedestrians is 15.8%[2].

  - Cyclists in this study had combined violation rate for signal jumps and accepted gaps of 7.8%

- Motorists were found to run red indications at a rate of 1.3%[3].

  - Cyclists in this study accepted gaps at a rate of 4.5%.
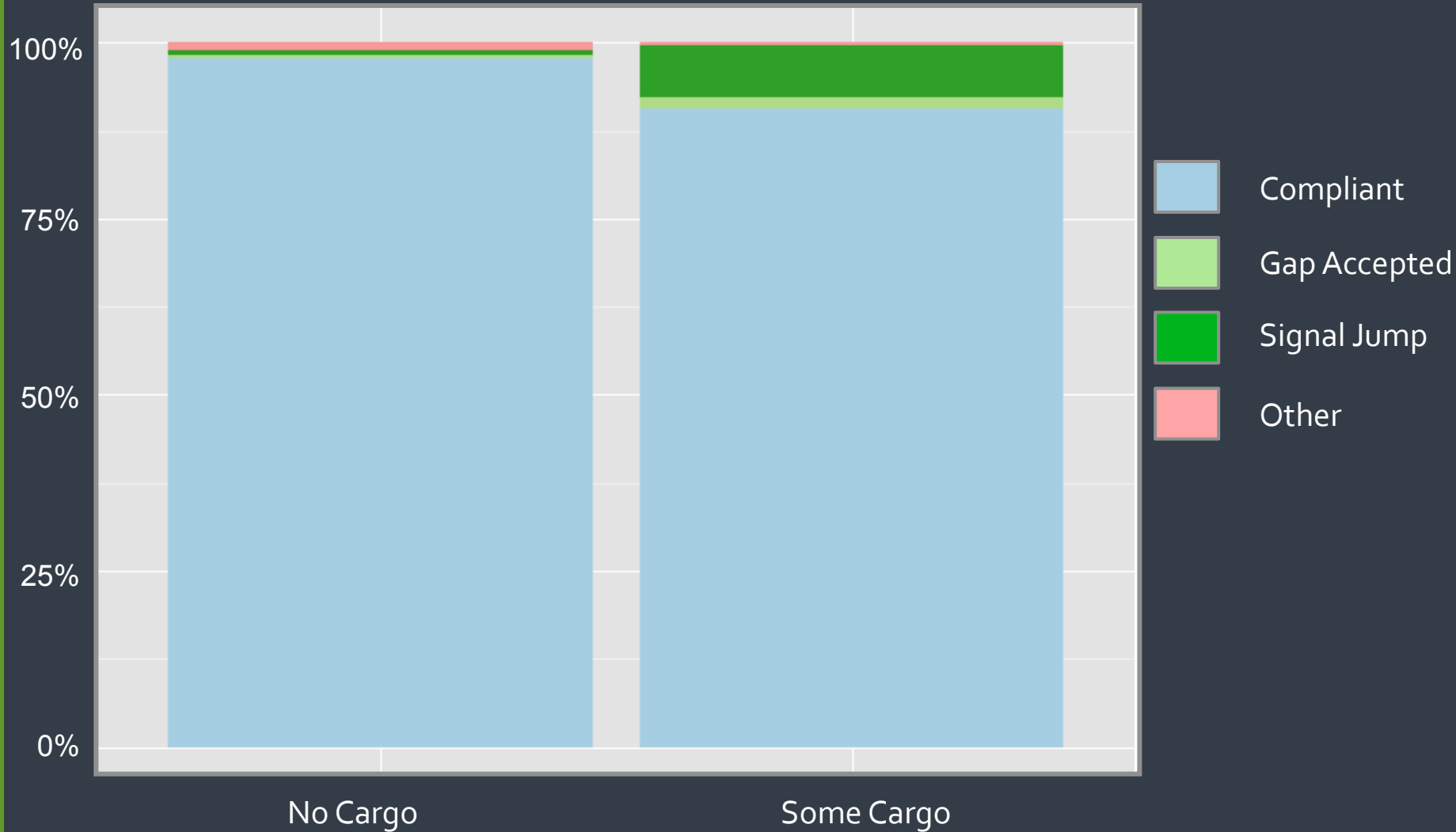
Compliance at Bike-Specific Signals
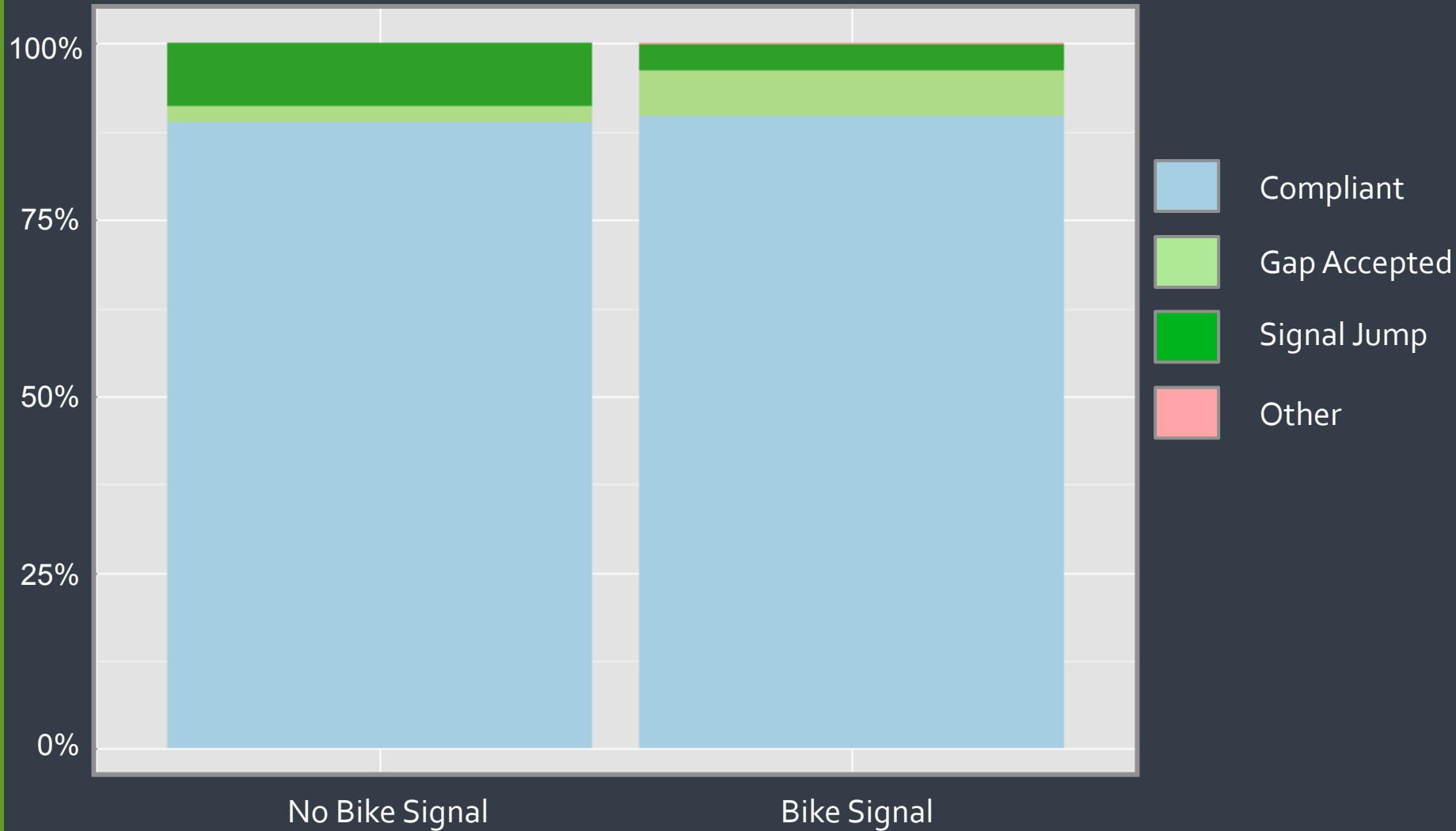
Compliance per Location

Compliance by Presence of Cargo

Legend:
- Compliant
- Gap Accepted
- Signal Jump
- Other

X-axis: No Cargo, Some Cargo

Compliance by Helmet Use
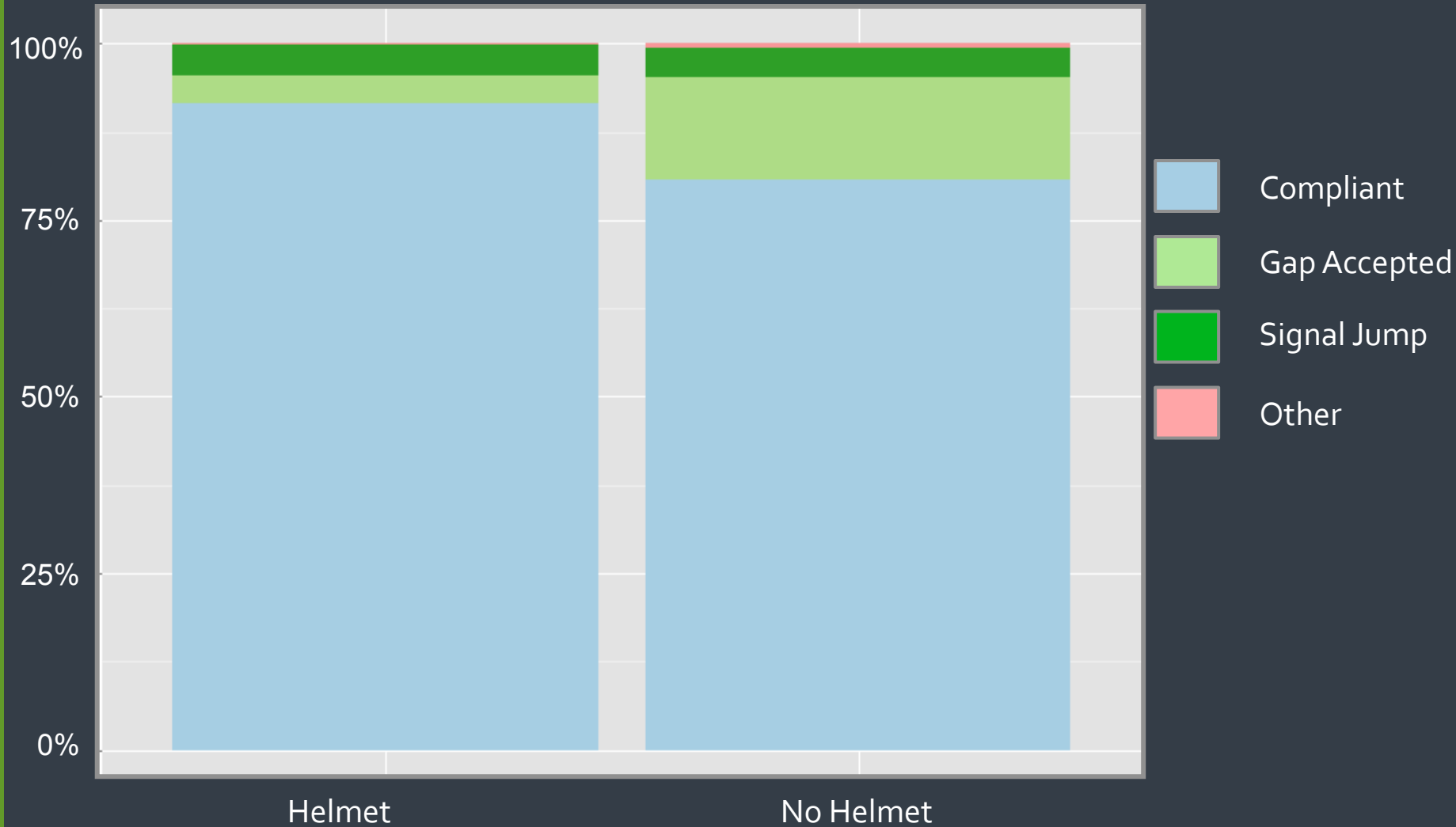
Compliance by Peak Period

Legend:
- Compliant
- Gap Accepted
- Signal Jump
- Other

X-axis: AM, PM, Off Peak

Y-axis: 0%, 25%, 50%, 75%, 100%

Compliance by Wait Time

Legend:
- Gap Accepted
- Signal Jump
- Other

X-axis: Wait Time (sec)
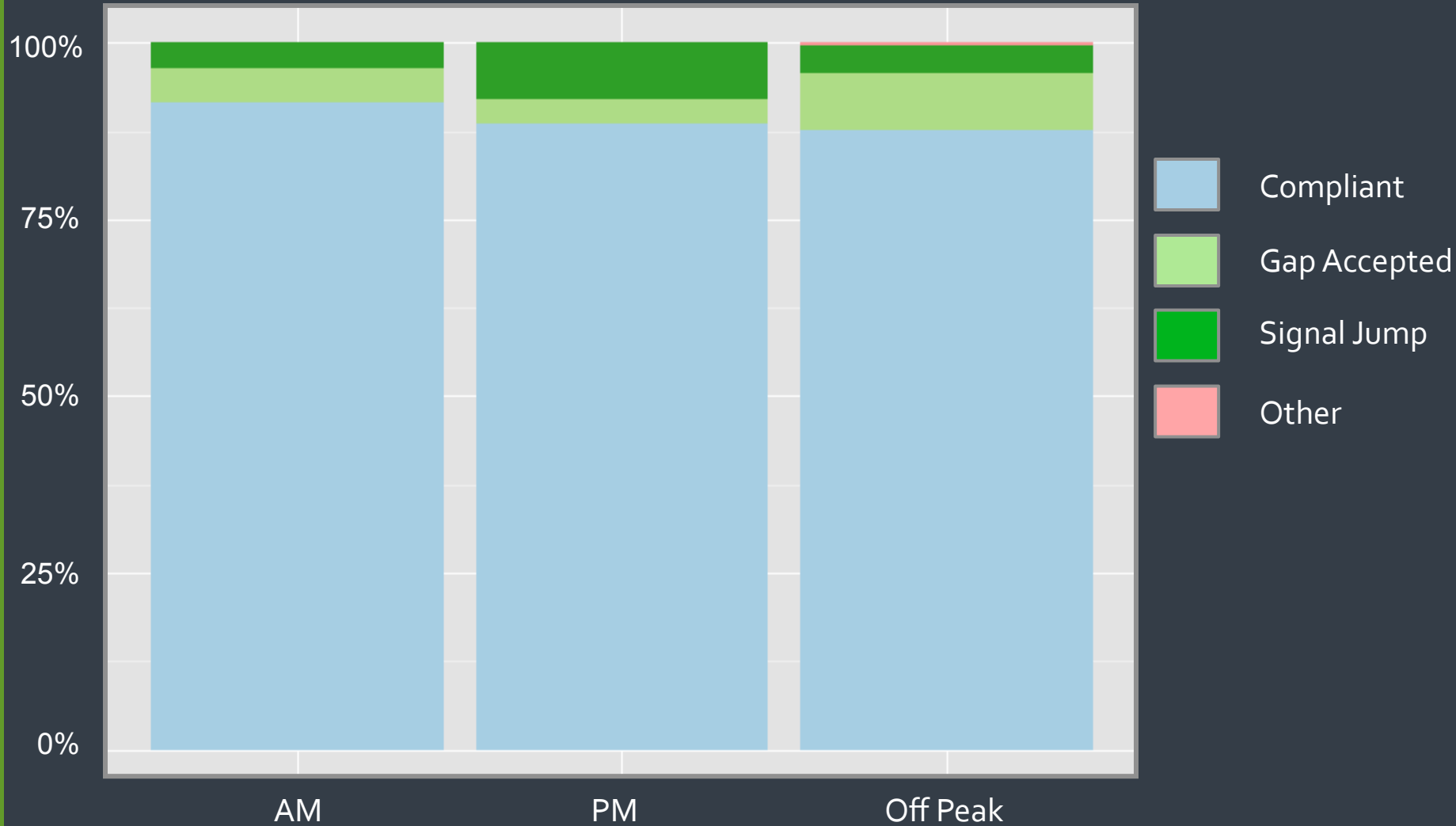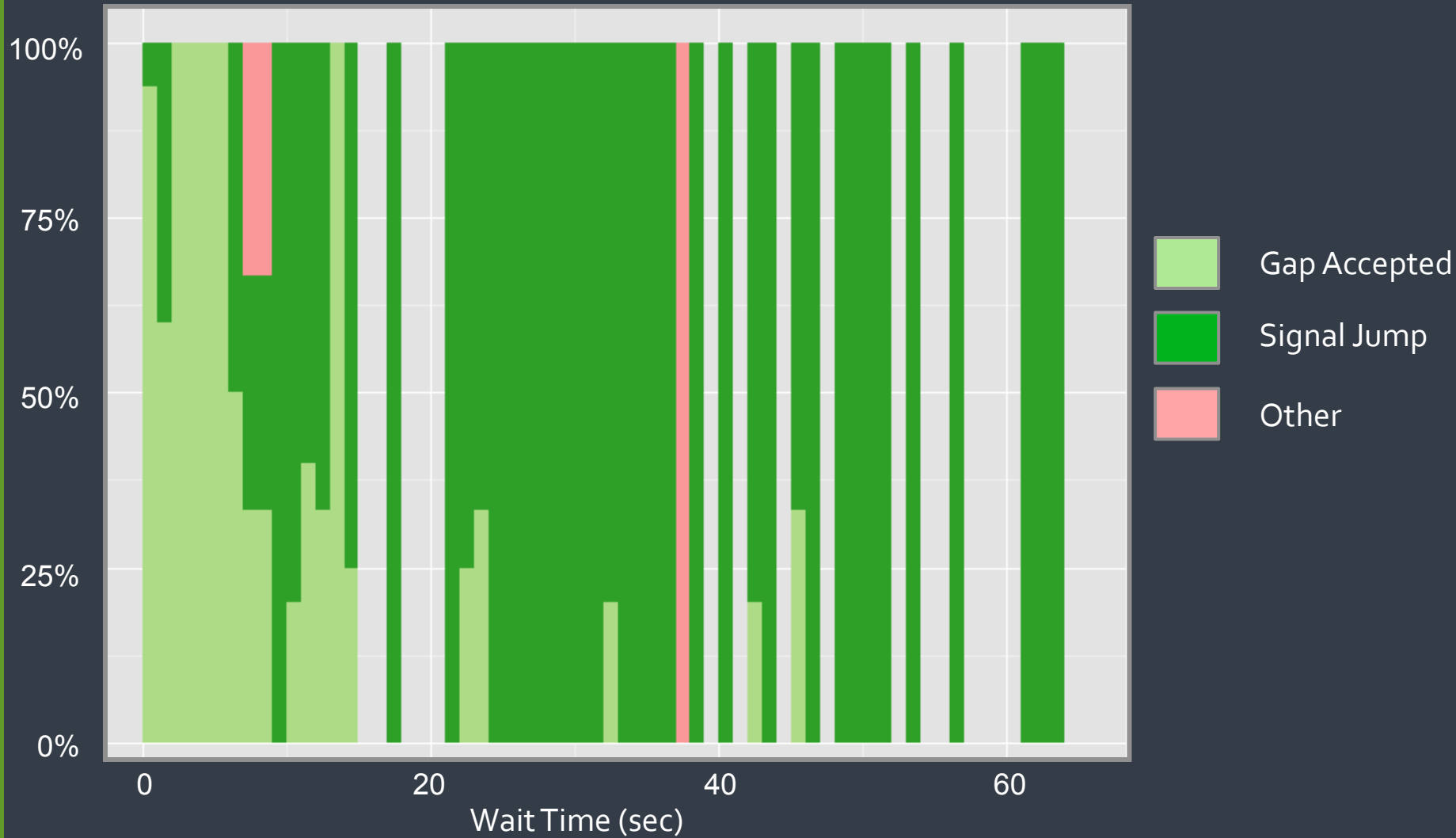
Gap Accepted by Cross Traffic

Outcomes

- Compliance at bicycle-specific signals is comparable to compliance at traditional signals
 - Cyclists understand bicycle signals
- Observed compliance nearly 90%

Continuing Work

- Further analysis needed
  - Previous analysis was descriptive
  - Varying compliance at study locations
  - Risk-taking profile for non-compliant cyclists
    - More likely to not wear a helmet
    - Not influenced by wait time
    - Minimum gap accepted equal to or less than minimum crossing time (determined by AASHTO) for high volume intersections.

Continuing Work -- Modeling

[PRELIMINARY] Factors Affecting Gap Acceptance

Legend:
- # Cyclists Already Waiting
- Sex = Female
- Cross Traffic Squared
- Lack of helmet
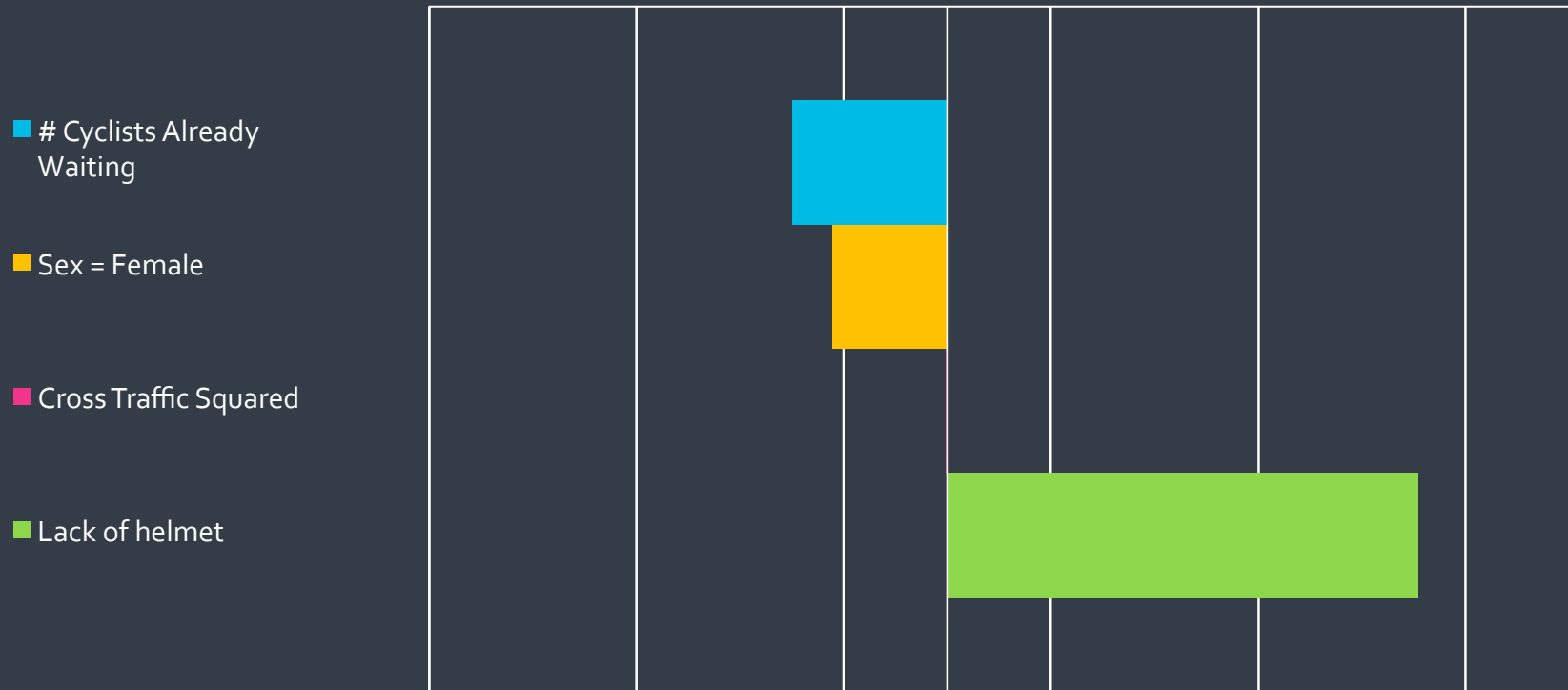
Continuing Work – Survey

- Personality type
- Justifications
- Intersection types
- Demographics

Acknowledgements

- Oregon DOT Research Project TAC

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- All the potential takers of the attitudes survey

Questions?

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Find interim report, TRB papers, and presentations at
http://bit.ly/SxRrZd

References for Discussion

1. Zeeger, C. V., & Cynecki, M. J. (1985). Determination of Motorist Violations and Pedestrian-related Countermeasures Related to Right-Turn-On-Red. Transportation Research Record: Journal of the Transportation Research Board, (1010), 16–28.

2. Virkler, M. R. (1998). Pedestrian Compliance Effects on Signal Delay. Transportation Research Record: Journal of the Transportation Research Board, (1636), 88–91.

3. Retting, R. A., Williams, A. F., Farmer, C. M., & Feldman, A. F. (1999). Evaluation of Red Light Camera Enforcement in Oxnard, California. Accident Prevention & Analysis, 31, 169–174.