Performance measures for urban trails: Minneapolis, MN

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CTS Conference

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Performance Measures for Urban Trails

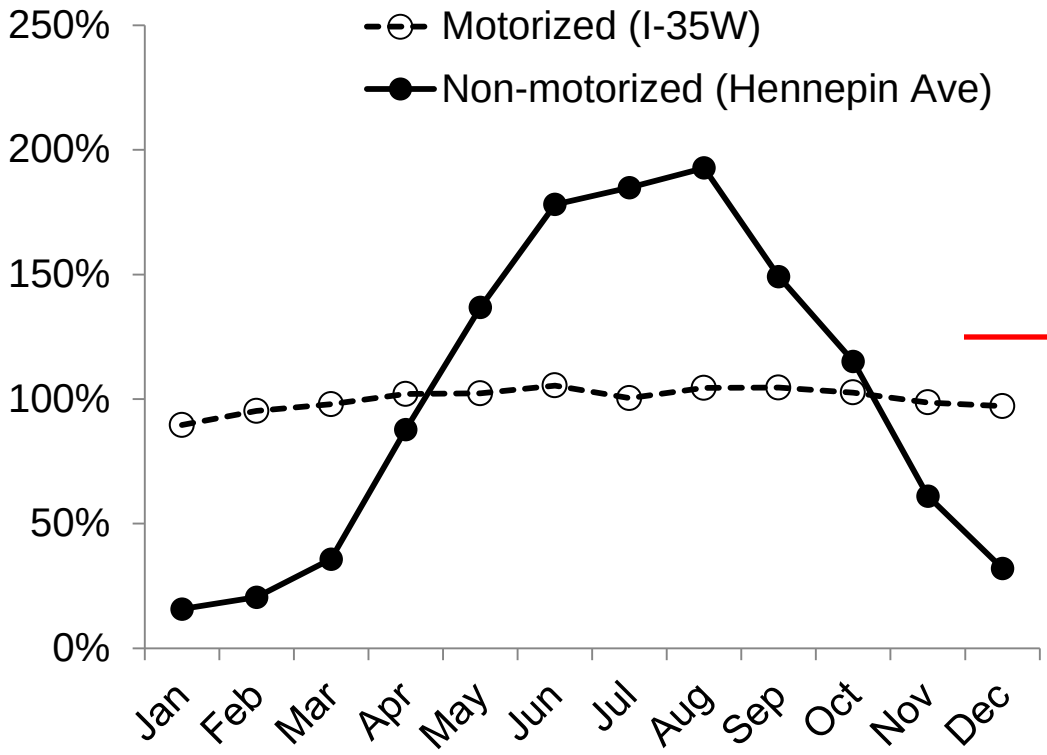
- Motivation
  - *How does traffic vary on our trail network?*

- Approach
  - Adapt procedures for traffic monitoring outlined in Federal Highway Administration *Traffic Monitoring Guide* (2013)

FHWA Traffic Monitoring Guide

- Objective: two key performance measures
  - Average annual daily traffic (AADT)
  - Vehicle miles traveled (VMT)
- Approach
  - Establish network of permanent and short-duration monitoring sites
  - Use adjustment factors from reference sites to extrapolate short-duration counts
- Challenges in Nonmotorized Monitoring
  - Traffic variability, technology, resources

Objective/Approach: Estimate AADT and TMT for Minneapolis trail network

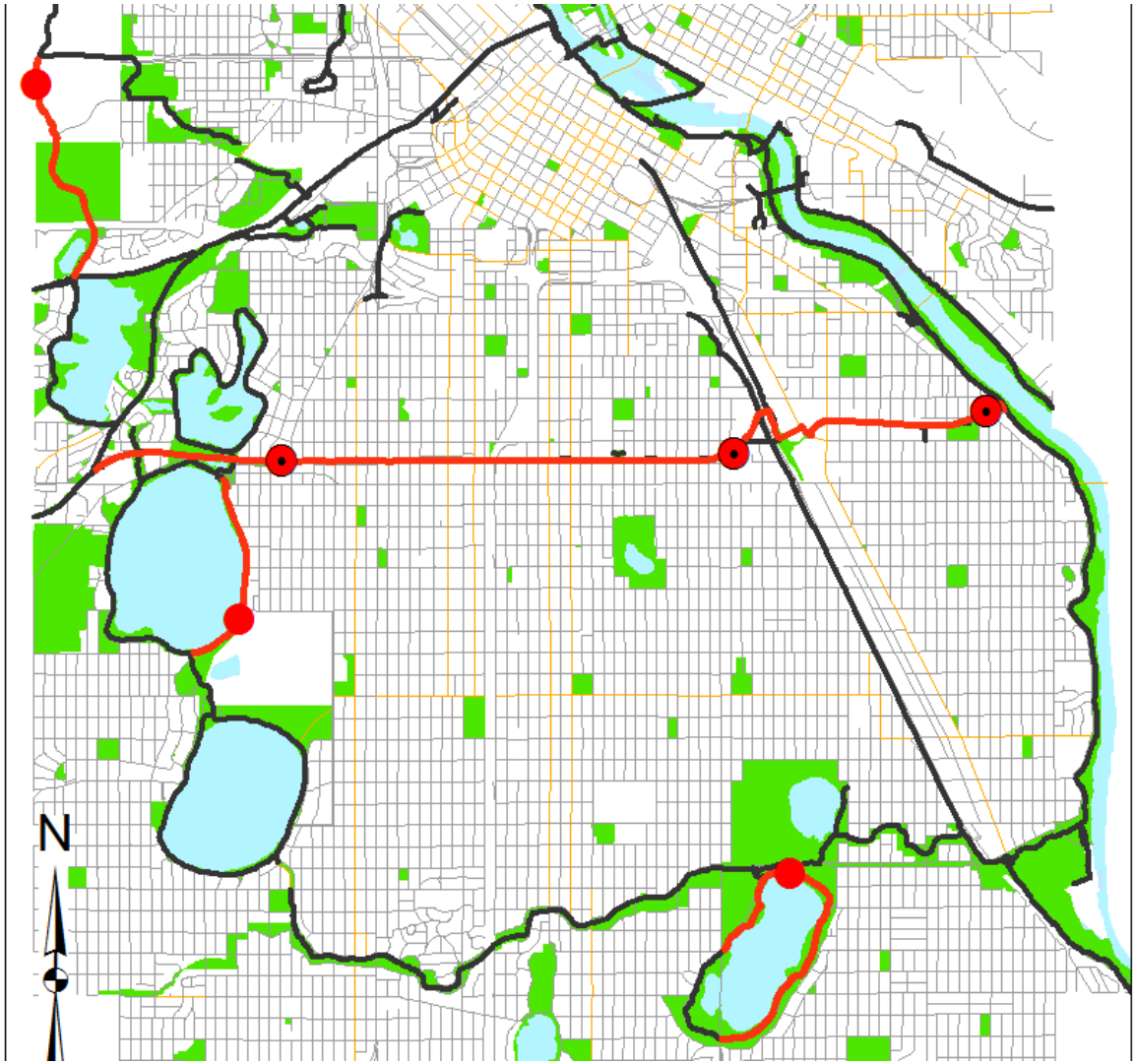


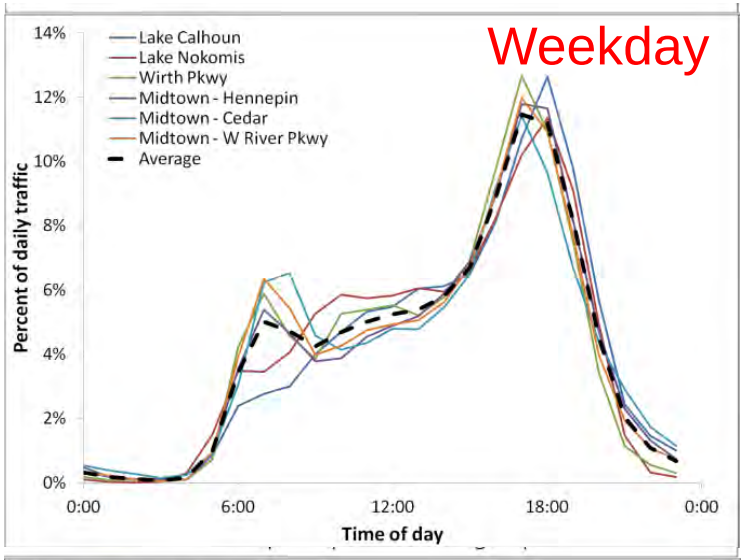
Protocol for motor vehicles

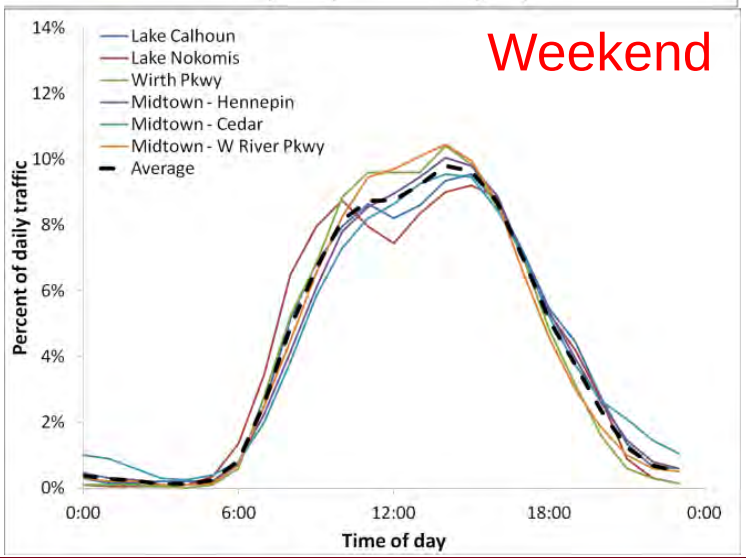
1. 48-hour short-duration counts
2. Month-of-year, day-of-week scaling factors
3. Factor groups

How to adjust for non-motorized traffic?

Reference locations

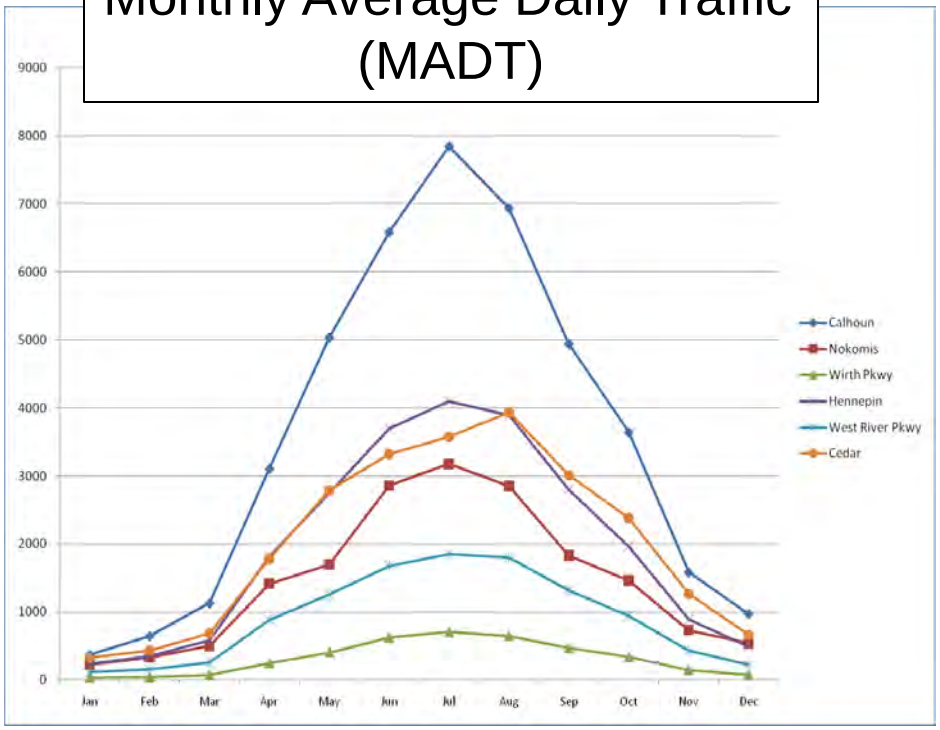




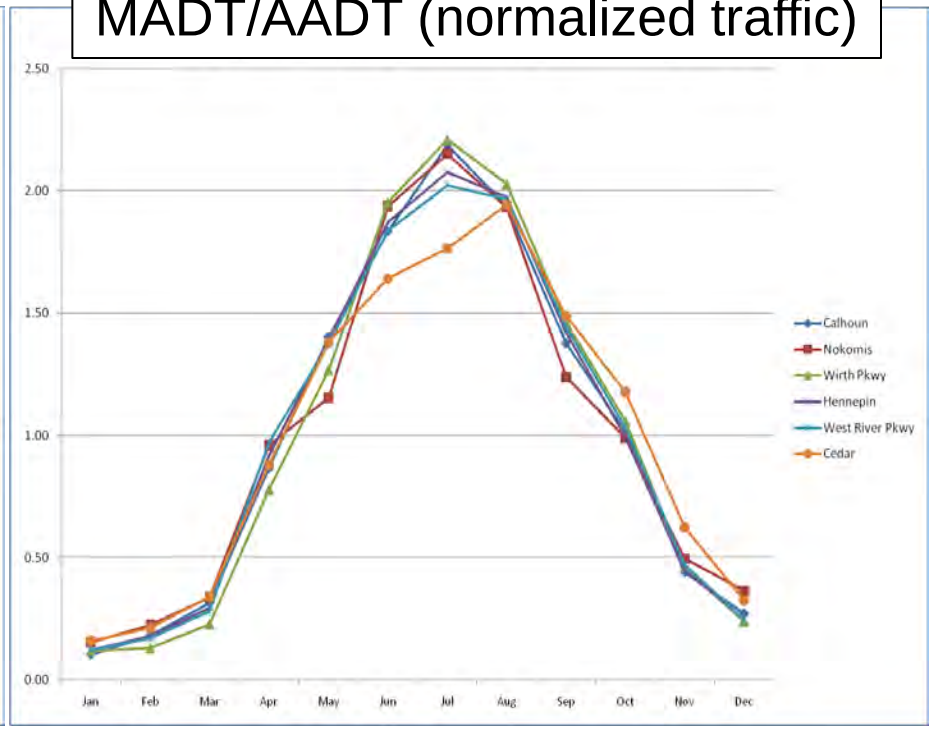


Reference locations

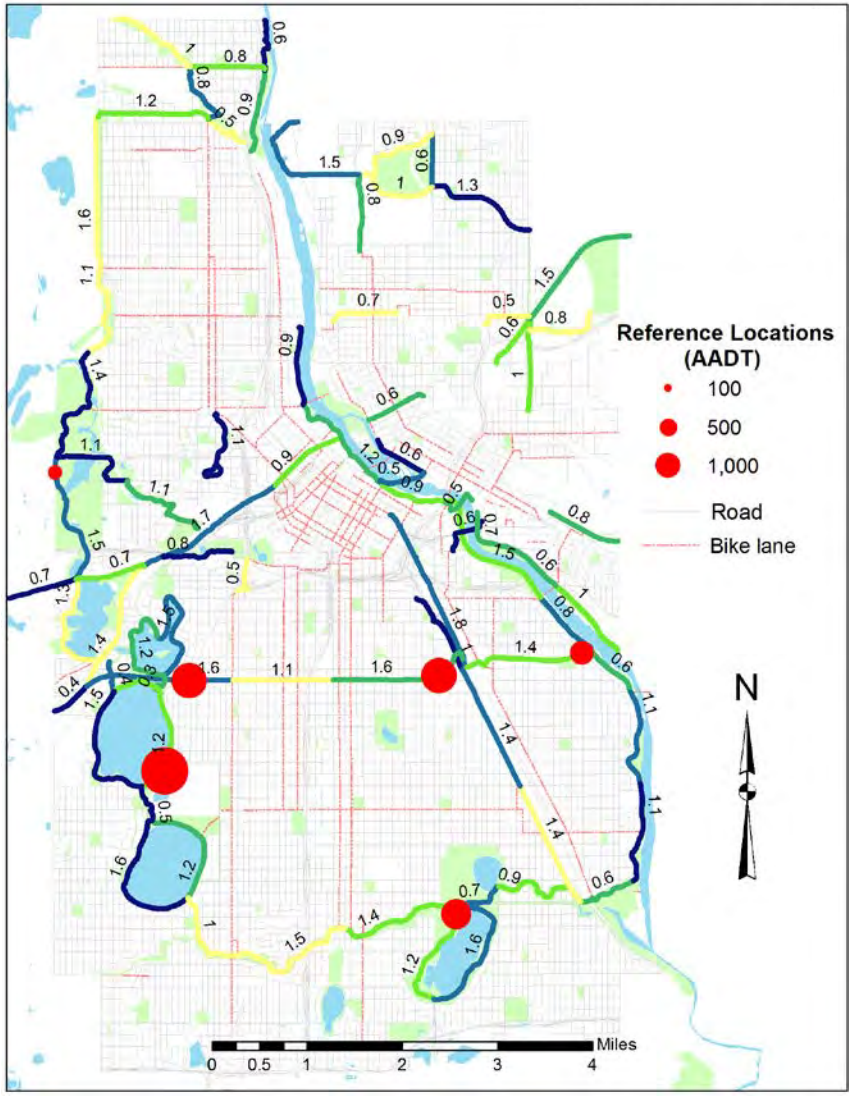
Monthly Average Daily Traffic (MADT)



MADT/AADT (normalized traffic)

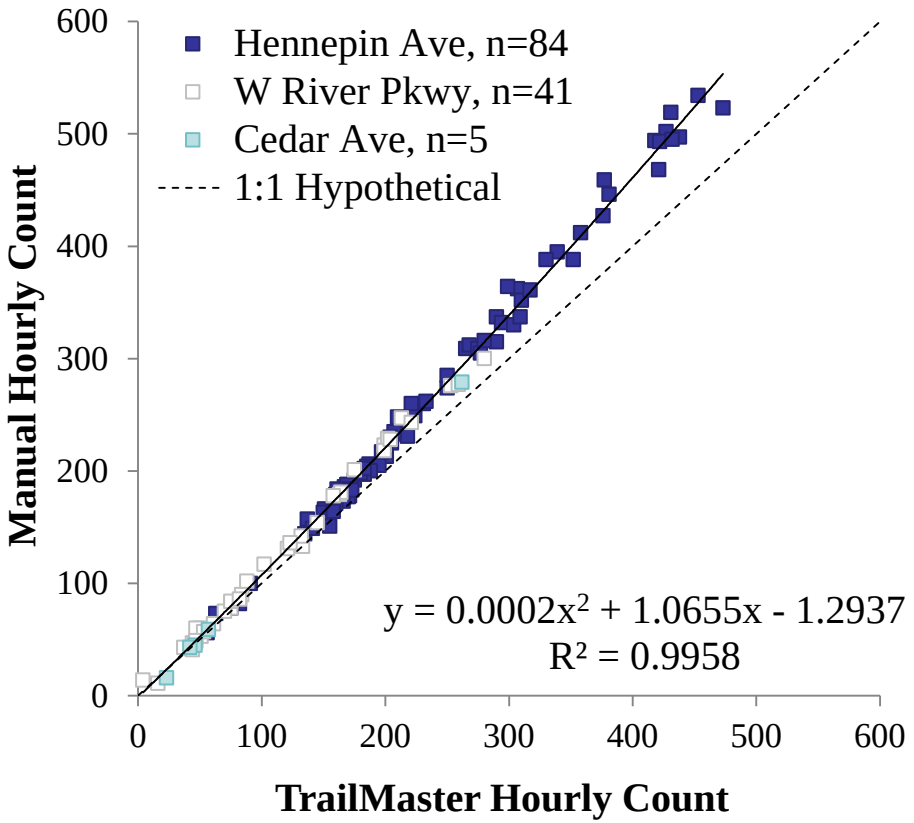


Designing a count campaign



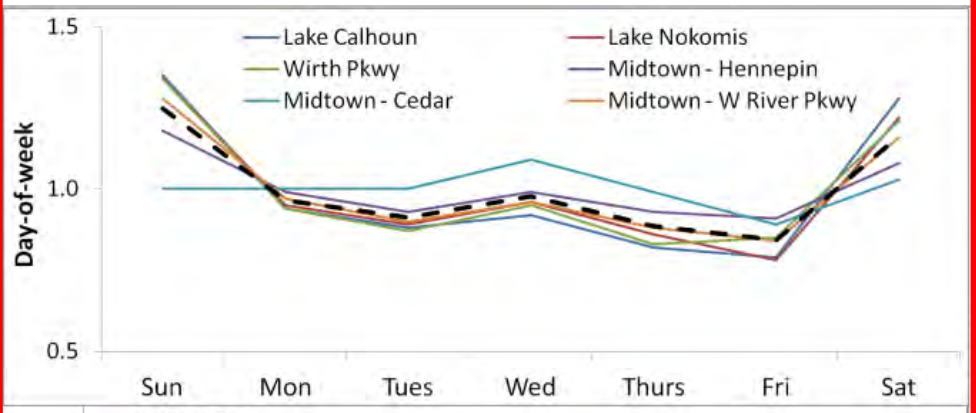
No. of segments = 82
Sum = ~80 miles
Mean = 0.98 miles
Min = 0.17 miles
Max = 1.8 miles

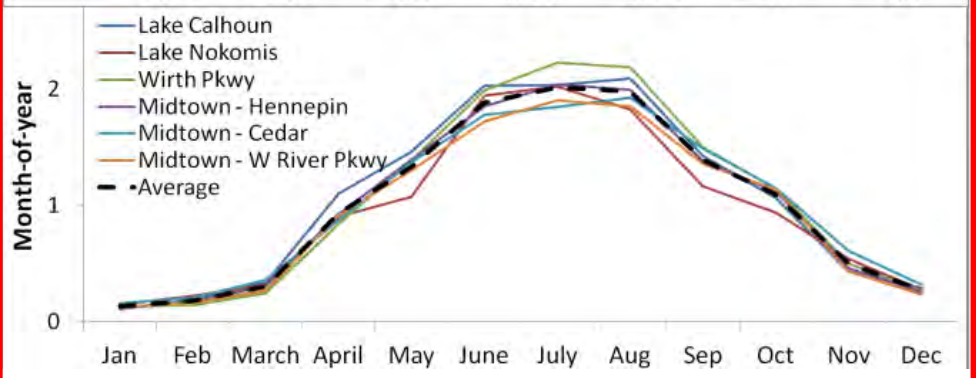
Count equipment: mixed-mode



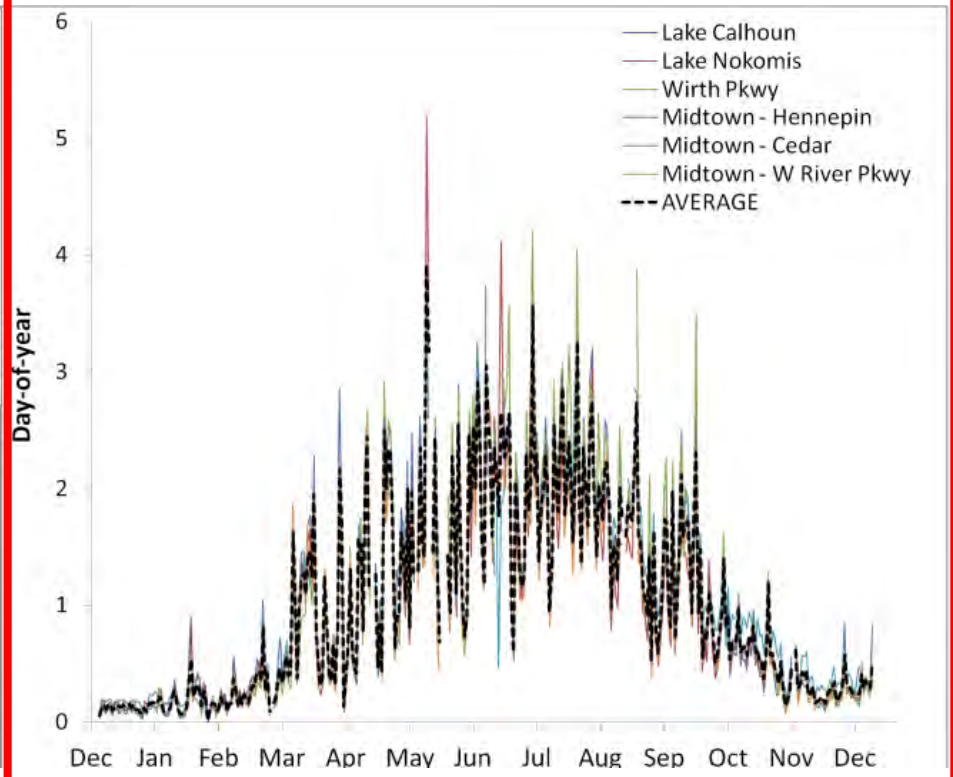
Scaling factors

Approach 1: “Traditional”





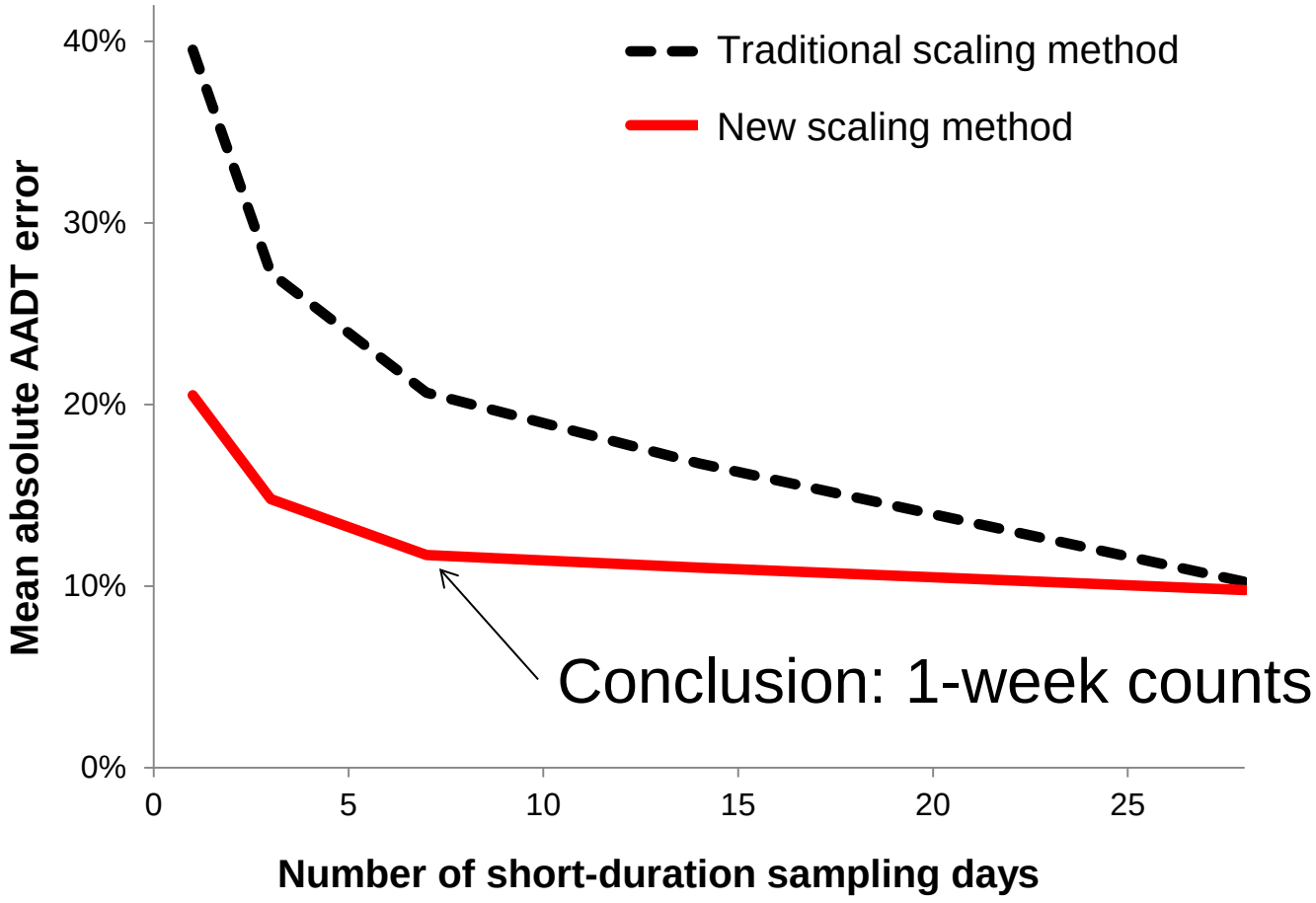
Approach 2: “New”



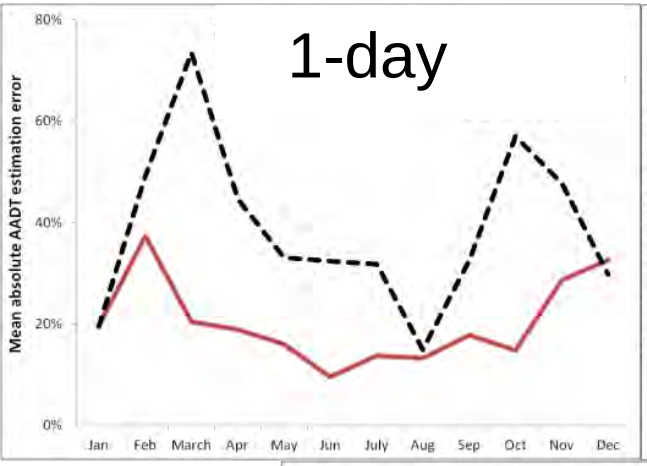
Designing a short-duration count campaign based on long-term reference site data

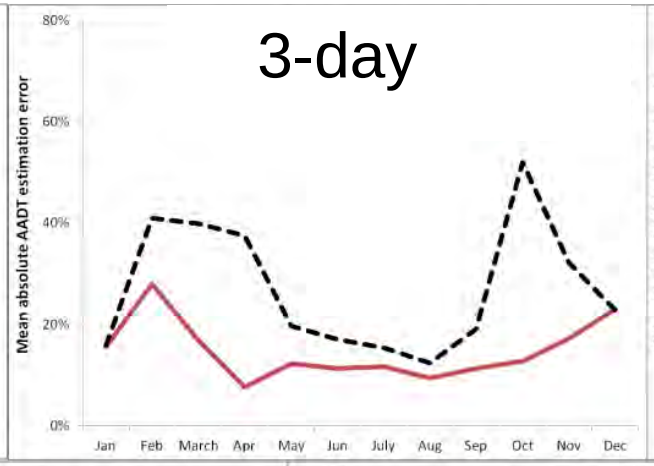
- Compute traditional (day-of-week, month-of-year) and new day-of-year factors for five of six reference sites.
- Randomly select 50 different 1 day, 3 day, 5 day, 7 day, 14 day, 30 day counts from sixth site
- Use both factoring approaches to estimate AADT and TMT for sixth site
- Compare extrapolation error from two factoring approaches

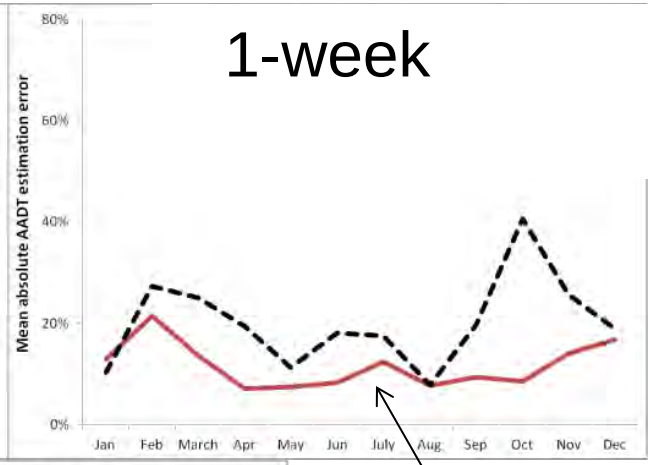
Short-duration counts: Duration

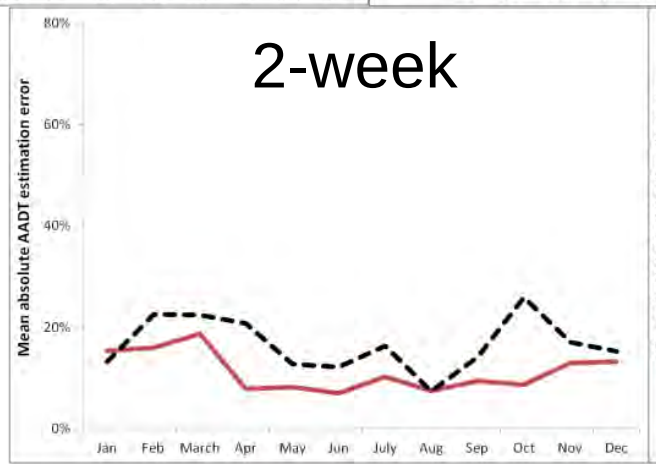


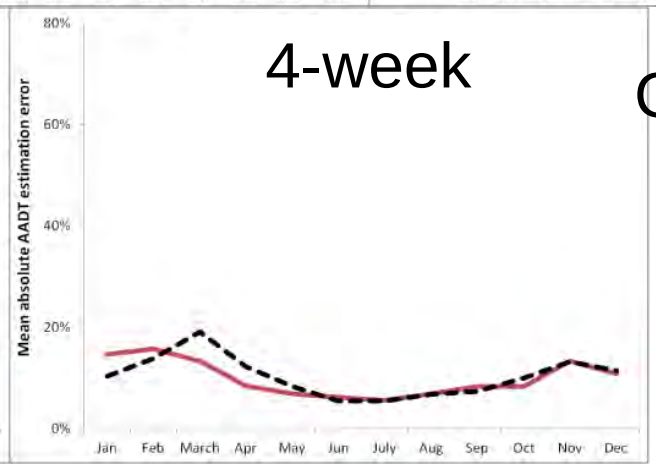
Short-duration counts: Time of year











Conclusion: April-Sep

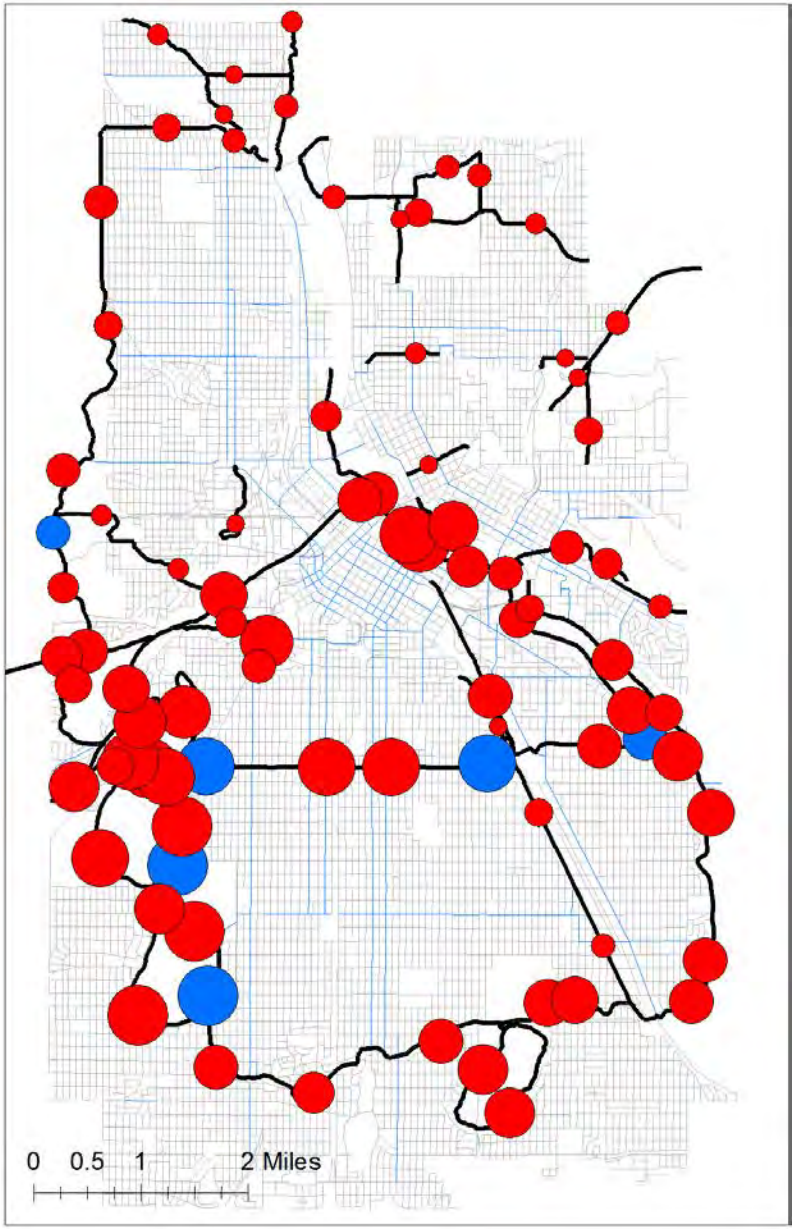
Traditional scaling method

New scaling method

Traffic estimates:

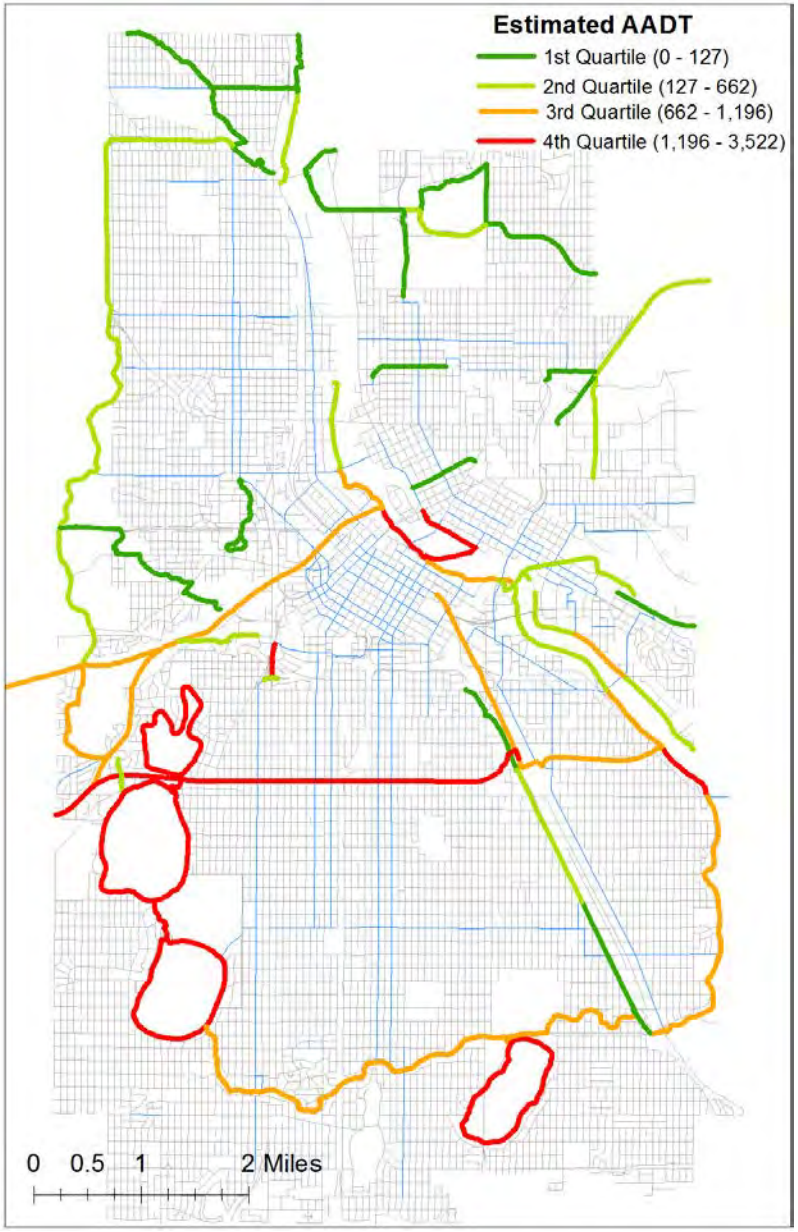
Map of point estimates of AADT

Segment	AADT
Mean	954
Median	750
Max	3,728
P90	2,321
P75	1,264
P25	142
P10	81
Min	39



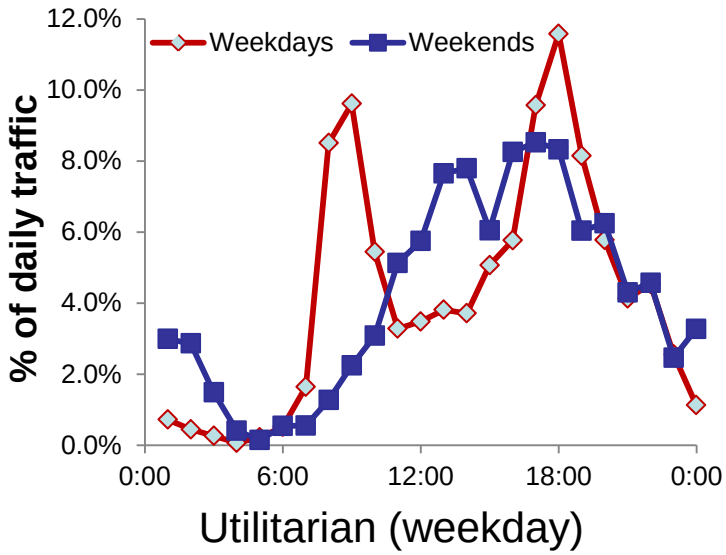
Traffic estimates:
AADT by trail segment

Estimate: ~28 million
Trail Miles Traveled (TMT)



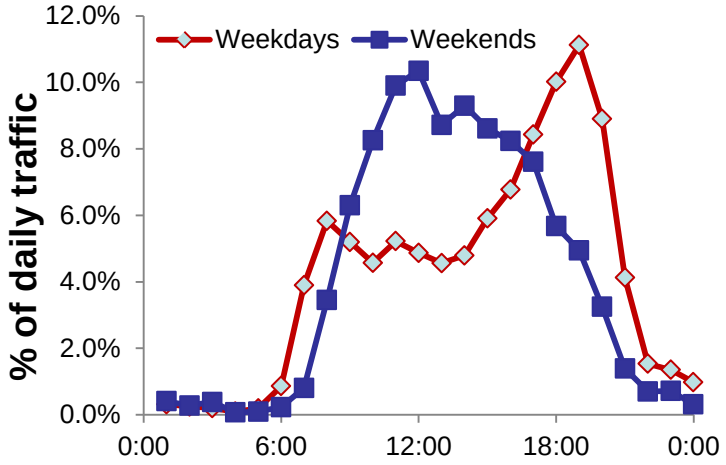
Top/Bottom 5 count locations

Top five	
Location	**AADT**
Lake Calhoun (north side)	3,728
Stone Arch Bridge	3,613
Lake Calhoun (east side)	3,480
Lake Harriet (east side)	3,451
Lake Harriet (west side)	3,282
Bottom five	
Location	**AADT**
Diagonal Trail (Stinson to Broadway)	39
University Ave Trail	40
3rd Ave Trail NE	43
Van White Parkway	50
N 49th Ave Tr (Humboldt to I94)	57

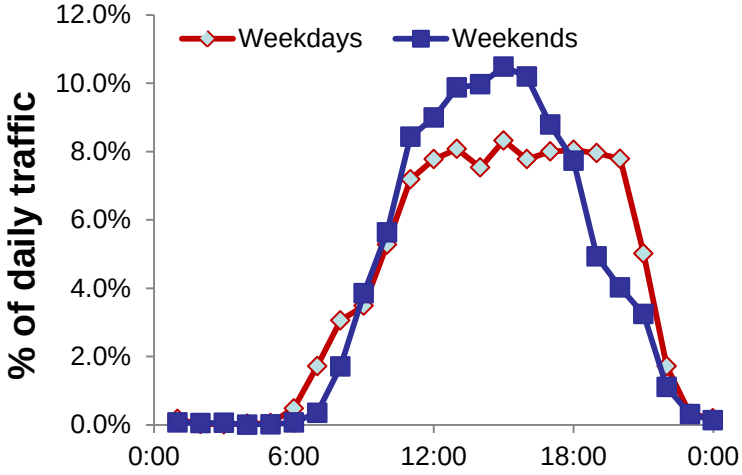


Utilitarian (weekday)

Short-duration monitoring identified three different traffic patterns (factor groups). Need new reference monitoring sites.



Mixed Recreational – Utilitarian
(all current reference locations)



Recreational

Conclusions

1. Possible to estimate AADT and TMT for trail network.
2. Day-of-year scaling factors reduce estimation error (10-15%).
3. Traffic volumes on trails are significant and follow seasonal, daily, and hourly patterns.

Next steps/limitations

1. Need to re-site of reference network (factor groups).
2. Day-of-year factors can only be applied retroactively.
3. Need to re-assess segment breaks.
4. Design monitoring systems that separate bikes/peds.
5. How best to integrate to planning (i.e., track progress, distribute maintenance funds, etc.)?