



# Minnesota's Bicycle and Pedestrian Counting Initiative: Local Agency Outreach

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*Your Destination...Our Priority*



# MnDOT Strategic Directions



- ▶ **2050 Vision – Minnesota Go**
  - Multimodal transportation system maximizes the health of people, the environment and our economy.
- ▶ **Complete Streets**
  - To understand vehicle, bicycle, and pedestrian interactions
  - Helps achieve transportation goals listed in statute
- ▶ **Toward Zero Deaths**
  - To assess exposure and effectiveness of safety programs
- ▶ **Performance measures**
  - To increase bicycling, walking and transit



# Minnesota Bike & Ped Counting Initiative

## ▶ Guiding principles

- Integrate with motor vehicle count program
- Build on experience: FHWA Traffic Monitoring Guide
- Produce practical products for practitioners and local agencies
- Provide for institutional sustainability



# Minnesota Bike & Ped Counting Initiative

- ▶ Three projects: (1) Methodologies; (2) Implementation; (3) Institutionalization (+\$320,000, plus MnDOT staff time)
  - Develop non-motorized traffic monitoring methods
  - Encourage communities to monitor bikes & pedestrians
  - Test and validate commercially available technologies
  - Prepare Bicycle and Pedestrian Data Collection Manual
  - Provide training, and technical support for local programs
  - Establish statewide network of automated bicycle and pedestrian monitors (≥ \$250,000 capital investment, plus staff time)
  - Produce evidence for investments in infrastructure and safety
  - Develop performance measures









# Local Outreach Efforts

- ▶ MnDOT, SRF, UMN collaboration
- ▶ Equipment selection
  - Commercially available automated devices
  - Capable of monitoring roads, sidewalks, trails
  - Complement NCHRP studies
- ▶ Equipment deployment
  - Local agency partners in 3 of 8 MnDOT districts (inefficient, but demonstrated not just “Minneapolis” activity)
- ▶ Manual: practical “how-to” guide
- ▶ Training sessions: same day as motorized monitoring sessions; field-based



# Bicycle and Pedestrian Sensor Overview

1. What Are You Counting?						
		Bicyclists Only	Pedestrians Only	Pedestrians & Bicyclist Combined	Pedestrians & Bicyclist Separately	Cost
2. How Long?  	Permanent	Inductance Loops <sup>1</sup>	●		◐	\$\$
	Magnetometer <sup>2</sup>	○				\$-\$\$
	Pressure Sensor <sup>2</sup>	○	○	○	○	\$\$
	Radar Sensor	○	○	○		\$-\$\$
	Seismic Sensor	○	○	○		\$\$
	Video Imaging: Automated	○	○	○	○	\$-\$\$
	Infrared Sensor (Active or Passive)	○ <sup>3</sup>	●	●	◐	\$-\$\$
	Pneumatic Tubes	●			◐	\$-\$\$
	Video Imaging: Manual	○	○	○	●	\$-\$\$\$
	Manual Observers	●	●	●	●	\$\$-\$\$\$

○ Indicates what is technologically possible.  
 ● Indicates a common practice.  
 ◐ Indicates a common practice, but must be combined with another technology to classify pedestrians and bicyclists separately.  
 \$, \$\$, \$\$\$: Indicates relative cost per data point.

<sup>1</sup> Typically requires a unique loop configuration separate from motor vehicle loops, especially in a traffic lane shared by bicyclists and motor vehicles.  
<sup>2</sup> Permanent installation is typical for asphalt or concrete pavements; temporary installation is possible for unpaved, natural surface trails.  
<sup>3</sup> Requires specific mounting configuration to avoid counting cars in main traffic lanes or counting pedestrians on the sidewalk.



# Equipment Selection

Counter Type	Modes Counted	Installation Difficulty	Partners	Vendor & Equipment
Inductive Loops	Bikes	Difficult, contractor installation required	MnDOT	Eco Counter Eco-Zelt
Multi	Bike and Ped Separately	Difficult, contractor installation required	MnDOT & Rochester Duluth	Eco Counter Eco-Multi
Tubes	Bikes	Intermediate	Hennepin County	TimeMark & MetroCount
Active Infrared	Bike & Ped Combined	Simplest	Minneapolis Park & Rec	TrailMaster TM1550
Passive Infrared	Bike & Ped Combined	Simplest	MnDOT	EcoCounter Pyro
Microwave	Bike & Ped Separately	Simplest	MnDOT, Grand Marais	Chambers RBBP

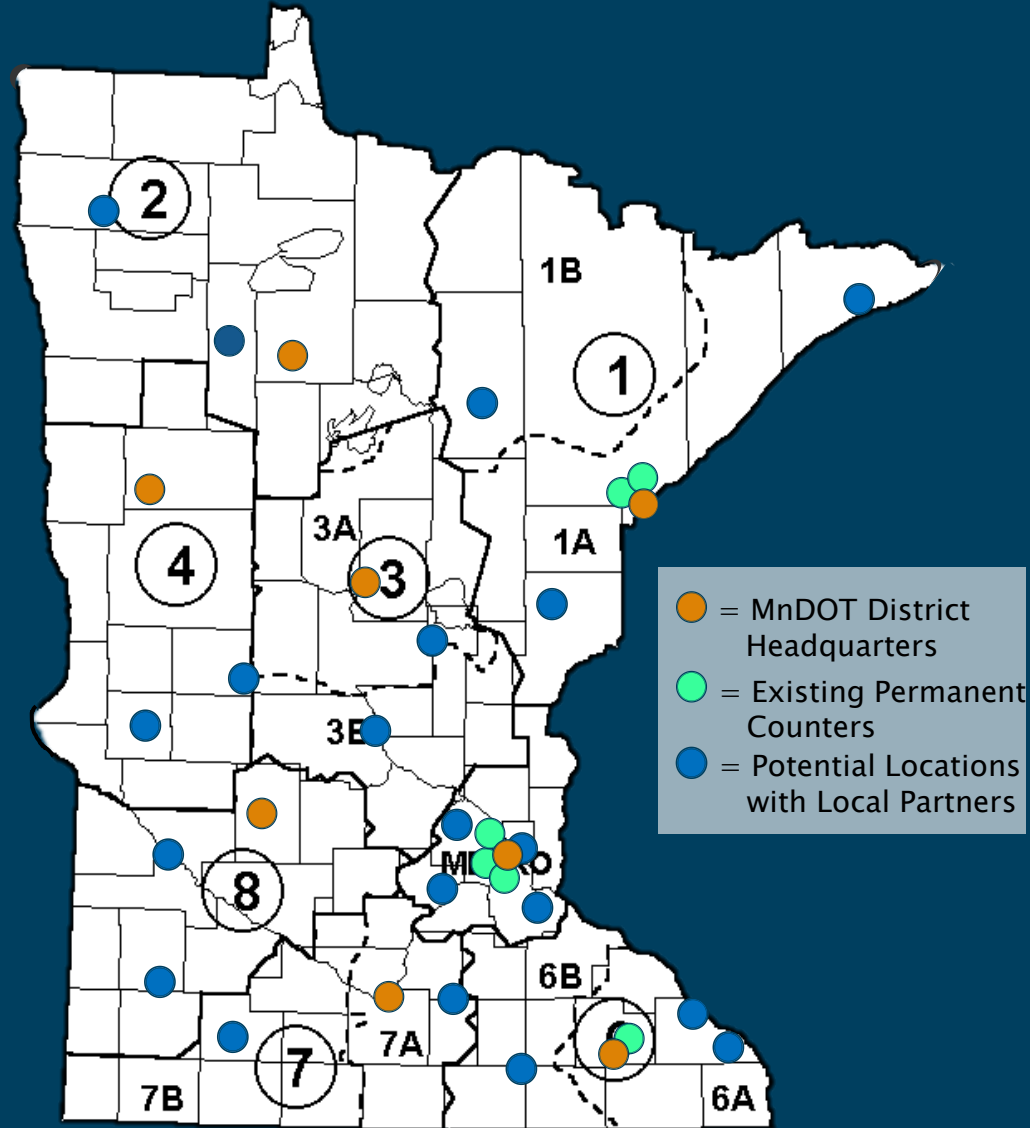


# Statewide Involvement



## MnDOT CO providing

- ▶ Portable equipment in each district
- ▶ Data collection support for districts and local jurisdictions





# Bike & Ped Data Collection Manual

- ▶ Introduction
- ▶ Glossary & Acronyms
- ▶ Identify Count Purpose and Select Site
- ▶ Bicycle and Pedestrian Data Sensors
- ▶ How to Perform Counts
- ▶ Data Management and Analysis
- ▶ Conclusions and Next Steps
- ▶ Appendixes
  - A – Sensor Selection Flow Chart
  - B – MnDOT Standard Manual Screenline Count Form
  - C – Sensor Accuracy Assessment
  - D – Adjustment Factors



# Counting Bicycles and Pedestrians



# Count Location Categories

- ▶ Targeted Locations
- ▶ Representative Locations
- ▶ Control Locations
- ▶ Random Locations
- ▶ Index Locations



# Facility Types

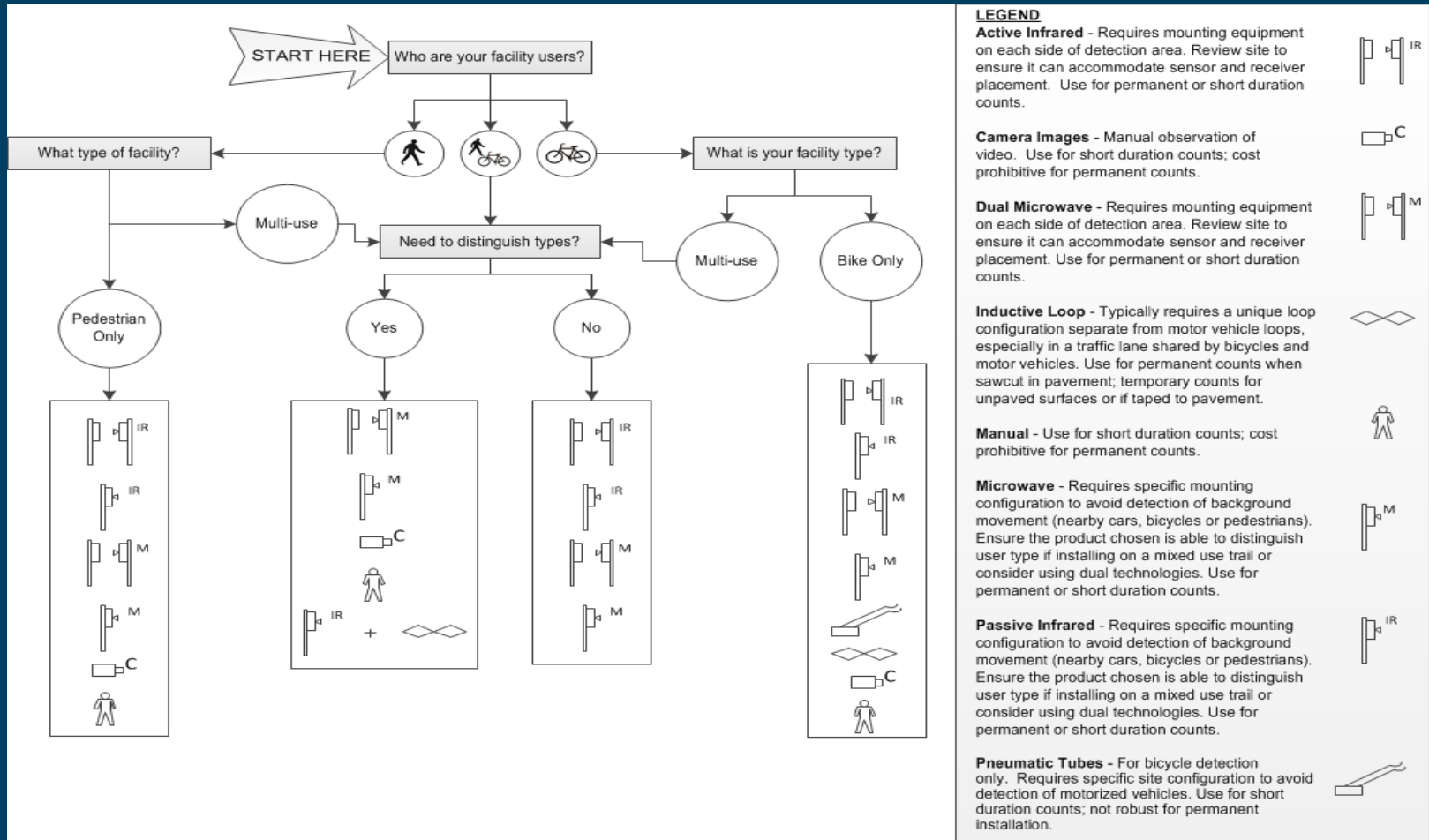
## ▶ Street and roads



## ▶ Trails and sidewalks



# Sensor Selection Flow Chart



# How to Perform Counts

- ▶ Chapter subsections for each technology
- ▶ Subsection contents
  - Site design
  - Calibration
  - Data collection
  - Maintenance and troubleshooting
- ▶ Manual to be updated in 2016
  
- ▶ <http://www.dot.state.mn.us/research/TS/2015/201533.pdf>



# Inductive Loop – Tape Down



# Summary





# MN Bike and Ped Monitoring Plan

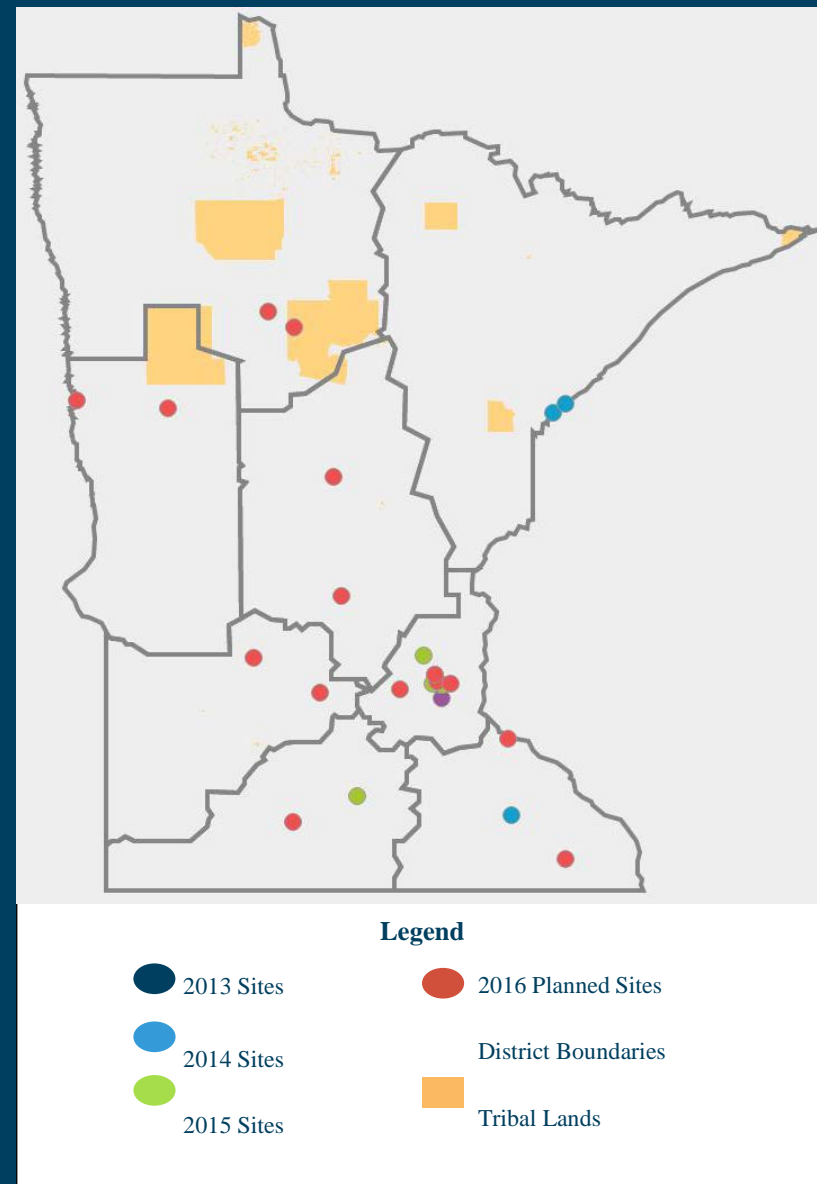
## ± 20 Permanent continuous sites

- Minimum 2 / district
  - 8 road (inductive loops)
  - 8 trail (inductive loop, infrared)
- Purpose: pattern identification, factoring, trend analysis

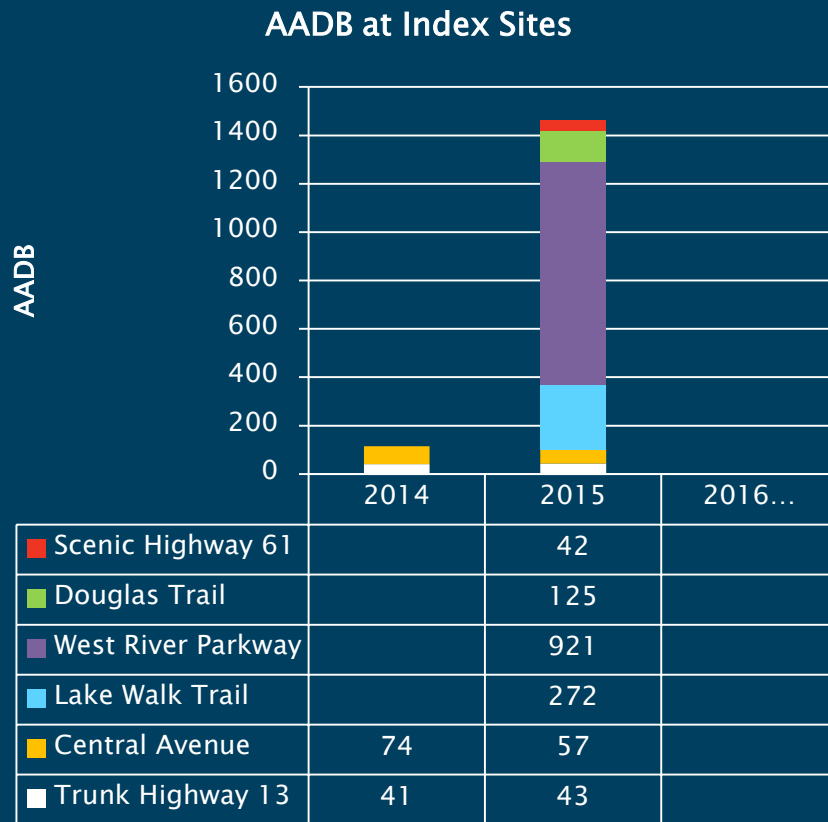
## Short duration sites

- Portable equipment set / district
- 1 Infrared (trails, sidewalks)
- 1 pneumatic tube (roads, trails)

## ▶ Phased installation (2014–2017)



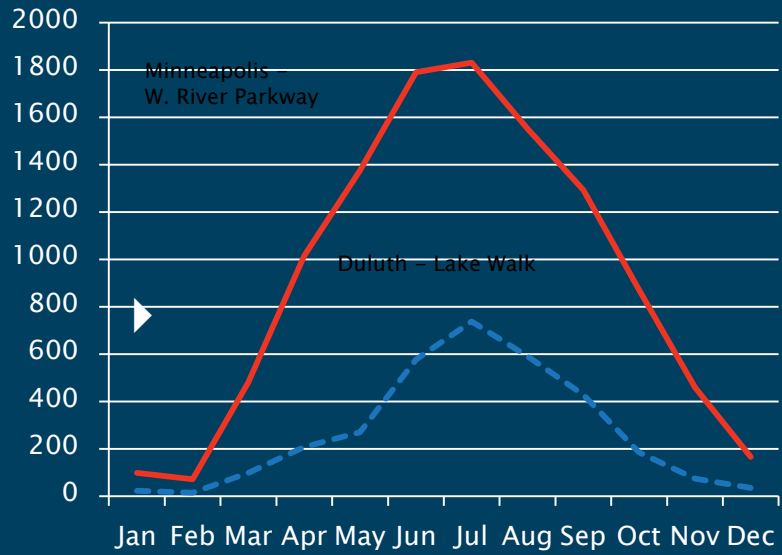
# 2015 Permanent Index Site Results: Annual Average Daily Bicyclists



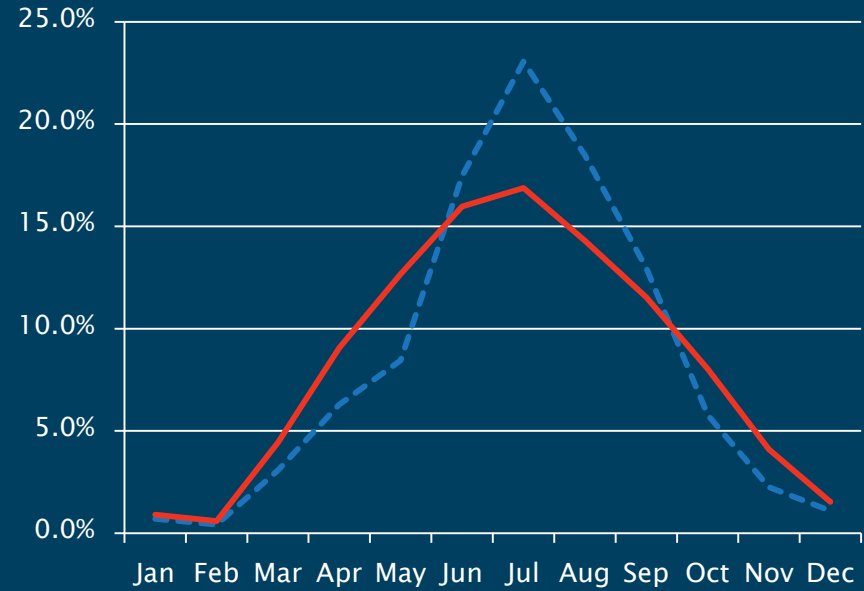
- AADB at 6 index sites ranged from 43 – 921
- Summer ADB approximate double AADB
- Highest volumes on trails
- +10 more sites to be installed in 2016



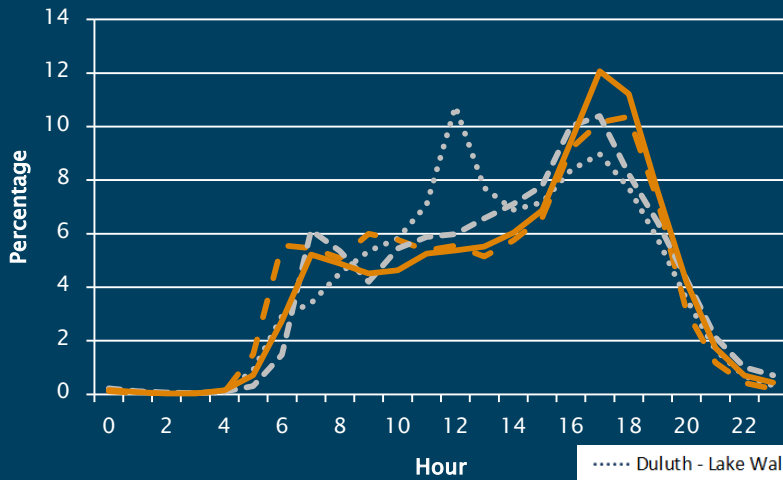
### 2015 AADB Trails: Minneapolis, Duluth



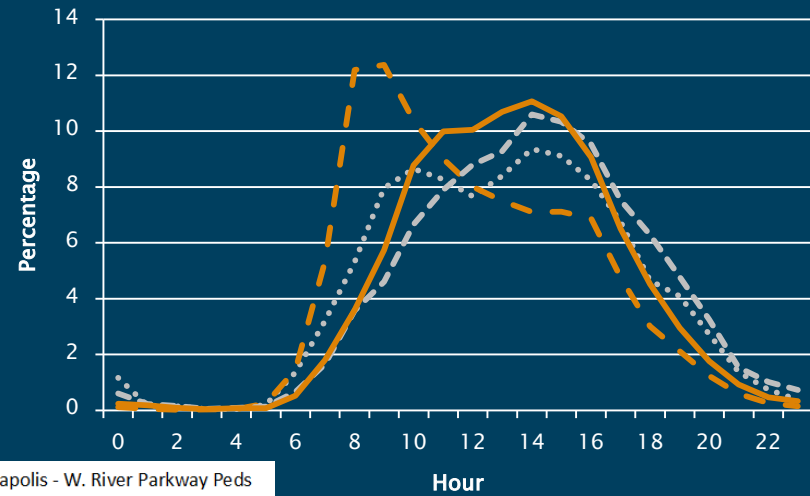
### Annual AADB Proportion by Month



### Weekday Volumes



### Weekend Volumes



# 2015 Short Duration Monitoring Results

- ▶ 8 local and regional partners
  - Bemidji (Headwaters Regional Development Commission)
  - Cass Lake Reservation (Leech Lake Band of Objibwe)
  - Fergus Falls
  - Grand Marais (Sawtooth Mountain Clinic)
  - Mankato
  - MnDOT Metro District
  - Morris
  - St. Paul
- ▶ 58 installations, 33 sites



# 2015 Short Duration Monitoring Results: Average Daily Traffic (sample)

			Sidewalks (n=4)			Shared Use Paths (n=35)		
	On-Street (n=4)	On-Street Bike Lanes (n=5)	Bikes (n=2)	Peds (n=1)	Mixed (n=1)	Bikes (n=19)	Peds (n=5)	Mixed (n=11)
Maximum	105	89	19	201	406	460	201	752
Mean	55	27	14	201	406	148	80	316
Median	52	13	14	201	406	99	26	322
Minimum	13	7	8	201	406	18	17	23



# Local and regional monitoring initiatives

	Sites	Traffic Measures	Counting Methods
Arrowhead Regional Development Commission	23	Mixed mode trail traffic, Summertime average daily traffic	Active infared
Hennepin County	65	Bicycle traffic, roads, trails, AADB	Pneumatic tubes
Minneapolis Department of Public Works	53	Bikes: streets, trails; Ped: trails, sidewalks, peak hour (2 hours)	Manual (infrared, inductive loop on trails)
Minnesota Parks and Trails Council	25	Trail Traffic (12 hours)	Manual
St. Paul Department of Public Works	33	Bikes: streets, trails; Ped: trails, sidewalks, peak hour (2 hours)	Manual
Three Rivers Park District		Mixed mode trail traffic, Trail AADT	Passive infared



# Gitchi Gami Trail Monitoring Results: 2015 Summer Average Daily Traffic



Issue: MnDOT funding for trail extension

- 25 sites
- Active infrared monitors
- 1 reference site each "half"
- Minimum 7 days at short duration sites
- Day-of-summer factoring
- Study to be replicated in 2016



# Minnesota Bike & Ped Counting Initiative

- ▶ Statewide commitment to bike & ped counting
- ▶ New collaborations with local governments, tribes: MOUs for lending portable equipment
- ▶ New collaborations within MnDOT
- ▶ New automated bicycle and pedestrian monitoring programs (state and local)
- ▶ Better data for decision-making
- ▶ Better decisions
- ▶ Progress in institutionalization
- ▶ Many challenges yet to overcome

