2018 Missoula Bicycle & Pedestrian Count Report

Missoula County ~ City of Missoula
MPO
METROPOLITAN PLANNING ORGANIZATION

THE GARDEN CITY
MISSOULA
HUB OF FIVE VALLEYS

Pedestrians Crossing the Street in Downtown Missoula

Introduction

Background

As part of the Missoula Bicycle and Pedestrian Count Program, the Missoula Metropolitan Planning Organization (MPO) has lead 2-hour volunteer bicycle and pedestrian counts since 2010. These counts occur two times per year, once in the spring (early May) and again late in the summer (mid-September). MPO staff has selected numerous stations throughout the city where volunteers keep track of the number of pedestrians, bicyclists, and other users (e.g. skateboards, scooters, and rollerblades), the non-motorists' gender, and their direction of travel. Every four years volunteers also distribute intercept surveys which address travel behavior and preferences. Continuing the program through 2018, allowed the MPO to expand on the previous eight years of data collection.

In addition to the 2-hour volunteer counts, the MPO staff began to install permanent automated counters along Missoula's Bitterroot and Milwaukee Trails in 2014. Over the years the MPO has collaborated with partners at the Missoula Urban Transportation District (MUTD), ASUM Transportation, Missoula County, and Missoula in Motion to expand the automated count program. The Missoula region now has eight permanent counters in operation.

MPO staff and other agencies continue to use data collected through the count program for a variety of projects. During the Bicycle Facilities Master Plan kick-off, the project team used count data to demonstrate trends and benefits of bicycle and pedestrian trips. These data were also used in a number of grant applications, such as a Transportation Alternatives requests to fund sidewalk and bike lane improvements along South Avenue between Reserve and Fort Missoula Regional Park, and to install lighting along the Bitterroot Trail and remaining unlit portions of the Milwaukee Trail. New permanent counters installed along the Bitterroot Trail showed use of the path even before the project was complete.

Without an ongoing, standardized method of counting bicycles and pedestrians, those involved in bicycle and pedestrian infrastructure and planning would only be able to rely on anecdotal evidence or censuses estimates. Neither of those sources of information contains the level of detail in data that can be achieved through a local count program.

Key Findings

The results presented within this report reveal an array of interesting findings which can contribute significantly to bicycle and pedestrian planning efforts in Missoula and the surrounding areas. These findings include estimates of annual bicycle and pedestrian traffic, spatial and temporal trends, gender disparities, and bicyclist and pedestrian behavior. Below is a summary of key findings presented in the results section of this report:

- In the first few years of the count program, bicycle and pedestrian traffic counts increased steadily, but in 2014 those numbers decreased substantially. Despite the sudden decrease, non-motorized traffic counts have remained fairly stable since 2014 and total estimated annual average daily traffic (AADT) continues to fluctuate between 20 and 30 thousand at the annual count stations (stations counted every year).
- 2018 AADT at the annual count stations was estimated at 24,209 users. Pedestrians were the most common user (68 percent) followed by bicyclists (31 percent) and other users (1 percent).
- Between 2017 and 2018 bicycle traffic counts increased by 10 percent and pedestrian traffic counts increased by 15 percent.
- Non-motorized traffic continues to be heaviest in the downtown area, particularly along Higgins Avenue, and on Missoula's primary commuter paths like the Milwaukee and Bitterroot Trails.
- Weather has a significant impact on bicycle and pedestrian traffic counts, especially on the weekend. Years that experience above average temperatures tend to experience above average traffic counts, and the opposite is true for those years with below average temperatures.
- Pedestrian traffic continues to be virtually split between genders with females representing a slight majority of those walking (53 percent).
- The gender split for bicycle traffic is less balanced, with females representing just 34 percent of all bicyclists.
- Analysis of the share of female bicyclists at each count screenline (two per count station) suggests that female bicyclists in Missoula are less likely to ride on facilities outside of the urban core and facilities with higher levels of traffic stress (LTS).
- On average, automated counters located within Missoula's city limits along primary commuter paths counted more than 2,700 users per day. Bicyclists represent 56 percent of the average daily use and the share of bicyclists is greater at counters located further from the city center.
- The counter on the Milwaukee Trail near the Madison Street Underbridge was the busiest station, counting an annual average of 592 bicyclists and 692 pedestrians per day, and bicycle counts nearly double in the summer months.
- ACS 5-year estimates suggest that the share of workers over the age of 16 biking to work increased since 2012, and the trend shows that Missoula's ambitious bike share goal of 15 percent for 2045 will be well within reach with continued education and infrastructural improvements.
- Nearly 50 percent of all survey respondents reported that their current trip would have been made by car if they had not walked or biked.
- Better street crossings and wider non-motorized transportation facilities were two of the most popular desired improvements for both bicyclists and pedestrians.

Methodology

The data utilized in this report is collected from four different sources: annual volunteer counts and estimated annual average daily traffic (AADT), permanent automated counters, the US Census Bureau's American Community Survey (ACS), and bicycle and pedestrian surveys. Each source of data has inherent advantages and disadvantages, and together they enable the MPO staff to assess patterns of bicycle and pedestrian activity within Missoula and the surrounding areas.

Volunteer Counts and Estimated AADT

The Missoula MPO's count program follows the methodology established by the National Bicycle and Pedestrian Documentation (NBPD) Project. In order to estimate existing bicycle and pedestrian activity the MPO determined that conducting counts and surveys using a consistent methodology similar to those used to estimate motor vehicle counts was necessary.

Volunteer counts occur on a biannual basis, once in the spring and again in the late summer. Counts correspond with the University of Montana class schedule to ensure that traffic generated by the University is captured. For each season, counts are conducted for two hours on a Tuesday (4-6 p.m.) and Saturday (12-2 p.m.) – excluding stations near the University which are counted from 3-5 p.m. on Tuesday. These hours have been selected to capture peak commute times on the weekday and peak recreation times on the weekend. There are 29 count stations distributed within Missoula city limits covering a variety of different transportation facilities. The stations are located along shared use paths, low- and high-stress roadways, and roads capturing various levels of functional classification. Of the 29 stations, there are 17 stations which are counted each year and the remaining 12 are counted every other year (Appendix A).

For spring and summer counts each volunteer is assigned an intersection (busier intersections require two volunteers) and asked to keep count of the number of non-motorists (bicyclists, pedestrians, and other users) that travel through their assigned intersection or count station. For the most part, each count station is made up of two screenlines; screenlines are invisible lines, designated by the MPO, which allow the volunteer to keep track of the direction of travel (see Appendix B). In accordance with the NBPD Project methodology, counts are collected in 15 minute intervals. Volunteers are also asked to assign each non-motorist to a gender of male or female. While this method of tracking gender is imperfect, the data is extremely useful for exploring gender disparities in bicycle and pedestrian activity within Missoula.

Bicyclists and Pedestrians Crossing the Van Buren Bridge

Once collected, the data is entered into a database by MPO staff. The limited-duration counts are then factored to estimate bicycle and pedestrian volumes at each station for the entire year utilizing an extrapolation method developed for the NBPD Project. The factors are based on regional seasonal patterns and do not necessarily represent actual local conditions. The yearly bicycle and pedestrian volumes are then converted into an estimated measure of AADT. Missoula's count data is analyzed by the MPO staff and submitted to the NBPD, which collects bicycle and pedestrian data from cities across the country to identify national trends[1].

Automated Counters

Obtaining accurate AADT estimates based off of 2-hour counts is extremely difficult due to the large impact external factors, such as weather can have on non-motorized travel. To address this issue, the MPO began installing automated counters within Missoula and the surrounding areas. Produced by Eco-Counter, the Eco-Multi counter can differentiate bicyclists and pedestrians and is capable of determining directionality of the trail user. Throughout the year the counters collect continuous data, which is uploaded in 15-minute intervals and tracked in real-time. Data collected by the automated counters enables the calculation of localized seasonal factors, and enhanced ability to determine the effects of localized events.

The first of the MPO's eight automated counters was installed in 2014 on the Milwaukee Trail near the Madison Underbridge (Appendix A). In 2015 and 2016, an additional five counters were installed along the Milwaukee Trail and Bitterroot Trails. Two of these new counters are located in urban shared-use path locations, one on the Milwaukee Trail west of Hickory Street, and one on the Bitterroot Trail between Russell Street and Knowles Street. Two new counters were installed along the Bitterroot Trail between Missoula and Lolo, and one counter was installed just south of Lolo. Two more counters were installed along the Bitterroot Trail in 2017 and 2018.

Staff installing Automated Counter on the Milwaukee Trail

[1] More information on the National Bicycle and Pedestrian Documentation Project can be found at: http://bikepeddocumentation.org.

The first was placed along Old Highway 93 west of Reserve Street and the second was placed on the trail near MRL Park.

The quality of the data retrieved from the counters is monitored throughout the year for quality assurance and to ensure proper functionality of the technology. However, counters can experience issues due to vegetation overgrowth, blocked signal, and battery issues, which produces inaccurate data. Data segments which have been excluded from this report include: bicycle and pedestrian counts prior to July 20, 2018 from the counter west of Russell on the Bitterroot Trail and pedestrian counts prior to July 14, 2018 from the Weigh Station counter. It is also important to note that the MRL Park counter was not installed until April 1, 2018, so days prior to the first of April will be missing from that dataset. Once the data is exported and cleaned it can be aggregated and analyzed by the MPO staff to assess spatial and temporal patterns of non-motorized traffic along Missoula's more popular shared use paths.

US Census Data

The count programs operated by MPO staff and volunteers continue to provide a valuable picture of bicycle and walking patterns throughout Missoula. The data is useful for evaluating facilities and identifying trends, but the counts are not as consistent as the long-term and much larger scale commuting data provided by American Community Survey (ACS) program operated by the US Census Bureau. Of importance to this report, the ACS program annually updates their 5-year estimates of the share of individuals over the age of 16 who bike and walk to work. These figures are compiled for the Missoula Urbanized Area, the City of Missoula, Montana, the United States, and urbanized areas with similar population, climate, and culture to that of Missoula. The ACS 5-year estimates provide a context for trends relating to the full transportation system, particularly commute modes of Missoula residents.

Bicycle and Pedestrian Surveys

With fewer count stations on even years, spare volunteer efforts can be focused towards survey distribution. Once every four years volunteers are asked to distribute surveys to passing pedestrians and bicyclists. The intercept surveys can be read off to the respondent and filled out by volunteers or handed off to the respondent to be filled out independently. Volunteers are assigned to one of the 17 annual count stations located throughout the city. The surveys ask questions regarding the participants' current trip, and the questions are designed to capture information about origin and destination, trip purpose, route choice decisions, mode choice, and desired route improvements (Appendix C). Once the data is collected it is entered into the same database as the volunteer count data. Analysis of the survey data provides a useful glimpse of types of bicycle and pedestrian trips in Missoula and the preferences and decision making processes of those taking the trips.

Bicyclists and Pedestrians Crossing the Van Buren Bridge

Results

Volunteer Counts and Estimated AADT

Since 2014, total annual average daily traffic (AADT) at our 17 annual count stations has fluctuated between 20 and 30 thousand (Figure 1). During these years we have seen an increase in pedestrian counts and estimated pedestrian AADT; from 2017 to 2018 estimated pedestrian AADT increased by 15 percent. Annual bicycle counts and estimated bicycle AADT appear to be less steady, but also increased from the previous year. Pedestrians continue to account for the largest share of total non-motorized AADT (68 percent), followed by bicyclists (31 percent), and finally other users which includes individuals riding skateboards, rollerblades, scooters, or some other mobility device (1 percent). Although these estimates are extremely helpful for looking at non-motorized transportation trends within the city, they are an estimate extrapolated from the 2-hour volunteer counts, and therefore have some limitations. Various external factors, such as weather, construction, and special events (e.g. University of Montana Graduation and football games and concerts) can have a significant impact on bicycle and pedestrian traffic counts, which will ultimately impact AADT estimates; thus, the results must be interpreted carefully.

Figure 2A and 2B portray the annual fluctuation in weekday and weekend bicycle and pedestrian AADT as well as the average temperature of the days on which the 2-hour counts were held. Changes in bicycle and pedestrian activity appears to be correlated with changes in average temperature, especially during the weekend. Some years, such as 2013 and 2016, experienced warm and sunny weather and also saw above average counts, suggesting that these conditions may entice more people to commute or recreate by foot or bicycle. Conversely, other years, such as 2014 and 2017, experienced colder weather and below average

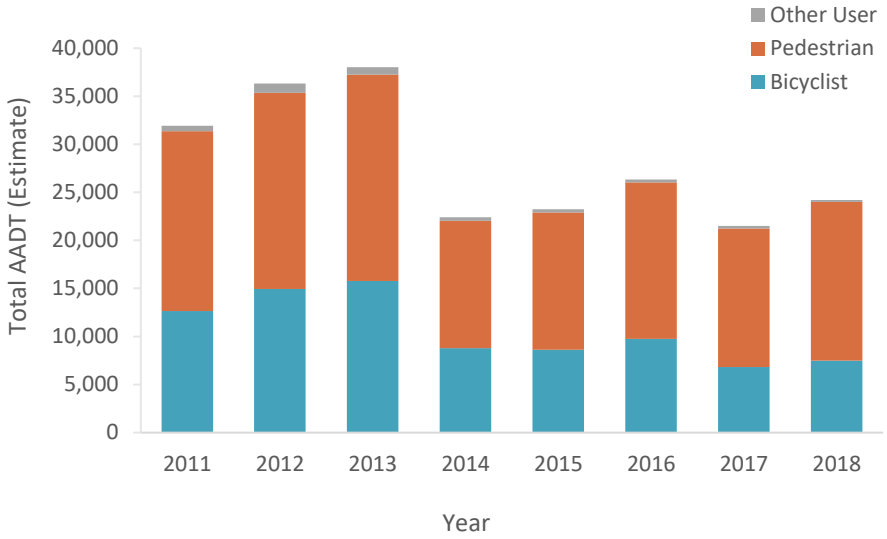


Figure 1: Total AADT by Mode

bicycle and pedestrian AADT. These results suggest that, within Missoula, weather likely serves as both a deterrent and promoter of active travel and recreational walking and biking.

When compared, Figure 2A and 2B highlight the stark differences in mode split from weekday to weekend. During the weekend bicycle activity accounts for an average of only 22 percent of total AADT, yet during the weekday pedestrian and bicycle activity remain fairly even. Although there is a stark decline in the proportion of bicyclists in the 2017 weekday estimates, estimated proportions of bicycle travel during the weekday continue to far exceed those on the weekend. Such large pedestrian estimates on the weekend are likely attributable to weekend community events such as the Saturday Farmers Market, concerts, and UM Grizzlies sporting events.

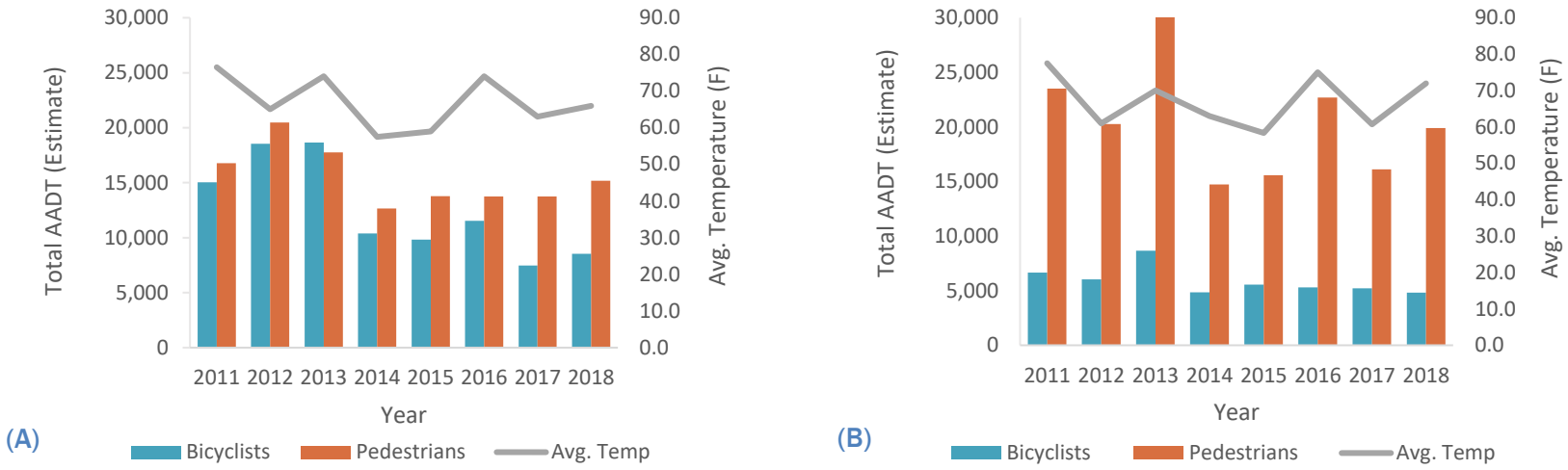


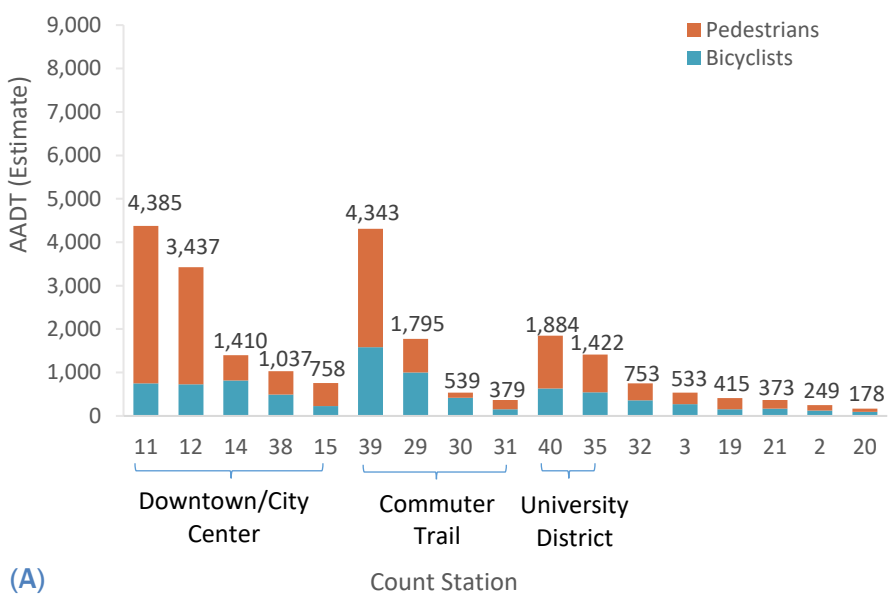
Figure 2A & 2B: Impact of Weather on Weekday (2A) and Weekend (2B) Bicycle and Pedestrian AADT

The annual count stations are located along a variety of different facilities, amongst a variety of different land uses, and various distances from the city center, so we might expect to see differences in volume and mode choice. Figure 3A and 3B show total weekday and weekend AADT at each of the 17 annual stations broken down by bicycle and pedestrian AADT. Most stations have been grouped by their general location (Downtown/City Center, University District, and Commuter Trail) and then ordered by total AADT. Stations which have not been grouped are located along arterials outside of the city center. According to the AADT estimates, bicycle and pedestrian traffic continues to be heaviest on Missoula's primary commuter trail network and in the downtown core. Count stations located in the city center and along commuter trails experience the highest estimated AADT during the week and weekend. The two stations located along the Milwaukee Trail experienced the greatest amount of bicycle traffic in 2018, and in general, stations located along commuter paths tend to experience a greater ratio of bicyclists to pedestrians than the others. These findings demonstrate the important role the trail system serves to bicycle commuters in Missoula, especially those located outside of the city center.

The high levels of non-motorized traffic at the Madison Underbridge, located at the nexus of the commuter trail system and the University of Montana, portrays the university's position as a driver of bicycle and pedestrian activity. This is further illuminated by the high levels of non-motorized traffic at stations located within the surrounding neighborhood; during the week these stations see more bicycle and pedestrian activity than some downtown locations and on the weekend pedestrian traffic at University Ave. and Arthur Ave. jumps considerably and ranks 4th for total AADT. Stations located outside of the city center and along arterials tend to have lower non-motorized traffic counts, but bicycle and pedestrian activity are more evenly split than in the downtown locations. Similarly to stations along commuter trails, weekdays at these stations are far busier than weekends, where the opposite is true for a few stations in the city center. Bicycle and pedestrian counts in these outer locations decrease by two times from weekday to weekend. When comparing the two figures it becomes clear that there is less variability between stations during the week, while on the weekend a few stations experience extremely high bicycle and pedestrian activity and the rest of the stations experience significantly lower daily counts.

Count Locations by Station Number

2: Reserve St. & Northern Pacific St.
3: Reserve St. & Mullan Rd.
11: Higgins Ave. & Front St.
12: Higgins Ave. & Spruce St.
14: Orange St., Front St. & Main St.
15: Orange St. & Spruce St.
19: Russell St. & 3rd St.
20: Brooks St. & Fairview Ave.
21: Brooks St., Sussex Ave. & Oxford St.
29: Bitterroot Trail & Milwaukee Trail
30: Bitterroot Trail & Russell St.
31: Brennan's Wave
32: Broadway St. & Burton St.
35: Higgins St., Hill St., & Beckwith Ave.
38: N 2nd St. & Greenough Dr.
39: Madison Underbridge & Riverfront Trail
40: University Ave. & Arthur Ave.



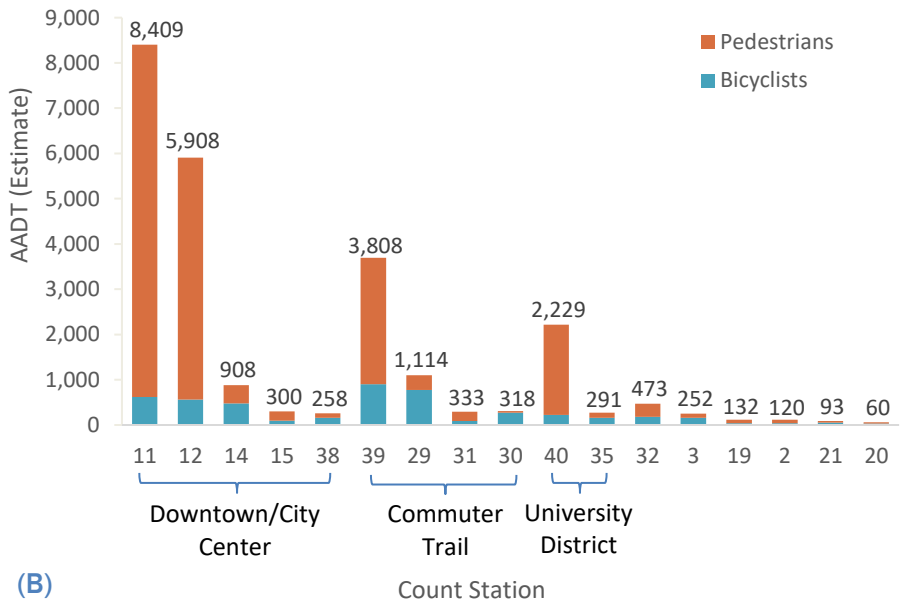


Figure 3A & 3B: Weekday (3A) and Weekend (3B) Bicycle and Pedestrian AADT Separated by Station (2018)

As noted in the 2016 Bicycle Facilities Master Plan, the presence of women on bicycles is an important measure of the accessibility and comfort level of a community's bicycle facility network. In the United States women represent only 24 percent of all bicycle trips and 51 percent of walking trips[2]. AADT estimates from 2011 to 2018 suggest that females represent just over one-third of annual bicycle trips and just over a half of annual walking trips in Missoula (Figure 4A & 4B). It is estimated that the share of female bicyclists in Missoula (at these locations) is more than 10 percent higher than the national average. While these figures appear to portray Missoula as a rather accommodating place for bicyclists, there is still a large disparity in the share of male and female bicyclists in Missoula that deserves attention. It is critical to consider these disparities when planning for and implementing future transportation projects. It is expected that the guidance from the Complete Streets Policy (Resolution #8098), Long Range Transportation Plan, Active Transportation Plan, Bicycle Facilities Master Plan, and Pedestrian Facilities Master Plan will help enhance safety measures and perceived comfort levels along the city's facilities and help minimize the gender gap.

[2] Summary of Travel Trends: 2009 National Household Travel Survey (NHTS). US DOT.

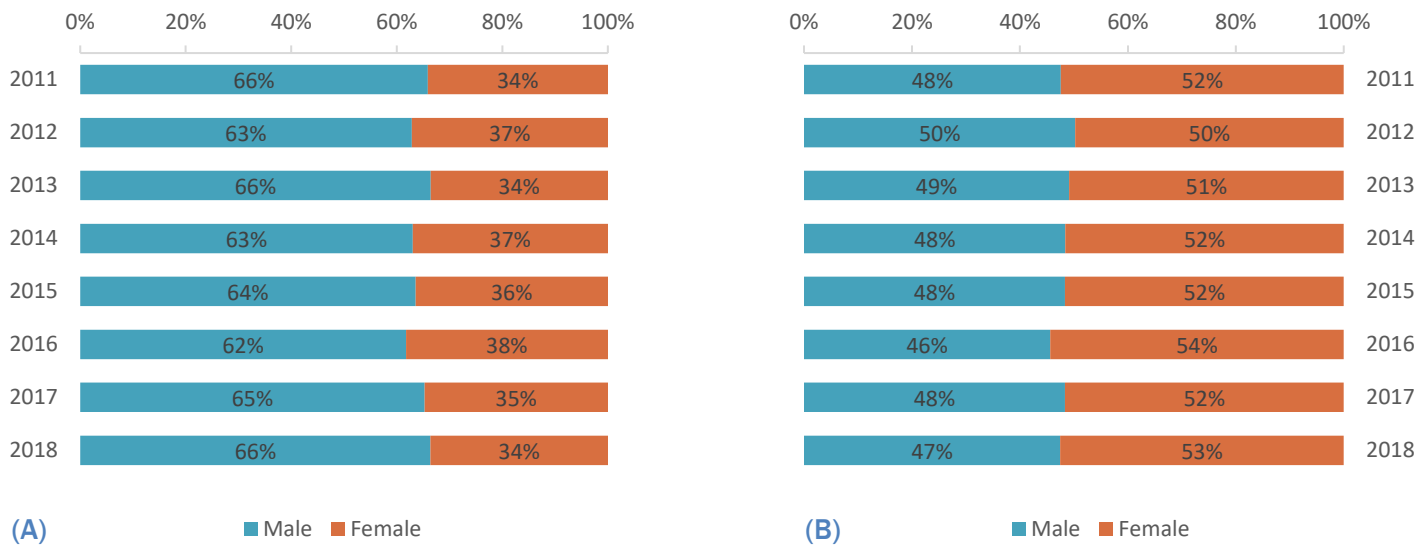


Figure 4A & 4B: Bicycle (4A) and Pedestrian (4B) Gender Split

Figure 5 depicts the distribution of males and females at each of the annual count stations. It appears that the share of female bicyclists tends to decrease as stations get further from the urban core and from shared use paths. This geographic difference shows up for both bicyclists and pedestrians, suggesting that there may be barriers deterring females to walk and ride outside of the city center and away from the primary commuter paths like the Milwaukee and Bitterroot Trails. Some potential barriers include scheduling (time), comfort of facilities (traffic stress), and concerns for personal safety. As Missoula continues to evaluate different types of facilities and locations, this should be a key consideration.

The 'Bicycle Level of Stress' map, developed for the Bicycle Facilities Master Plan, provides an opportunity to explore how disparities in gender may be related to the level of traffic stress (LTS) of a specific facility (Appendix D). The first step of this process was to assign each screenline (two per count station, excluding station 31) a rating of 1 (All Ages and Abilities), 2 (Average Adult), 3 (Intrepid Adult), or 4 (Not Comfortable) corresponding to the LTS of the facility on which it is located. Shared use paths did not receive an LTS rating but are considered part of the low-stress network; thus, stations located on shared use paths received a score of 1. The next step was to then aggregate the count data so that each observation represents a 2-hour count from a single screenline. This then allowed staff to compare bicycle volumes at each screenline with the specific LTS factor assigned to the associated facility (Figure 6). The inverse relationship between bicycle volume at a specific location and the level of traffic stress associated with that facility reveals that, on average, facilities with a lower LTS (more comfortable facilities) experience higher bicycle volumes. As one might suspect, the findings suggest that bicyclists tend to rely more on facilities with improved bicycle infrastructure and lower traffic speeds while avoiding areas with higher levels of traffic stress. While this is true for both male and female bicyclists in Missoula, the impact on ridership is not proportionate.

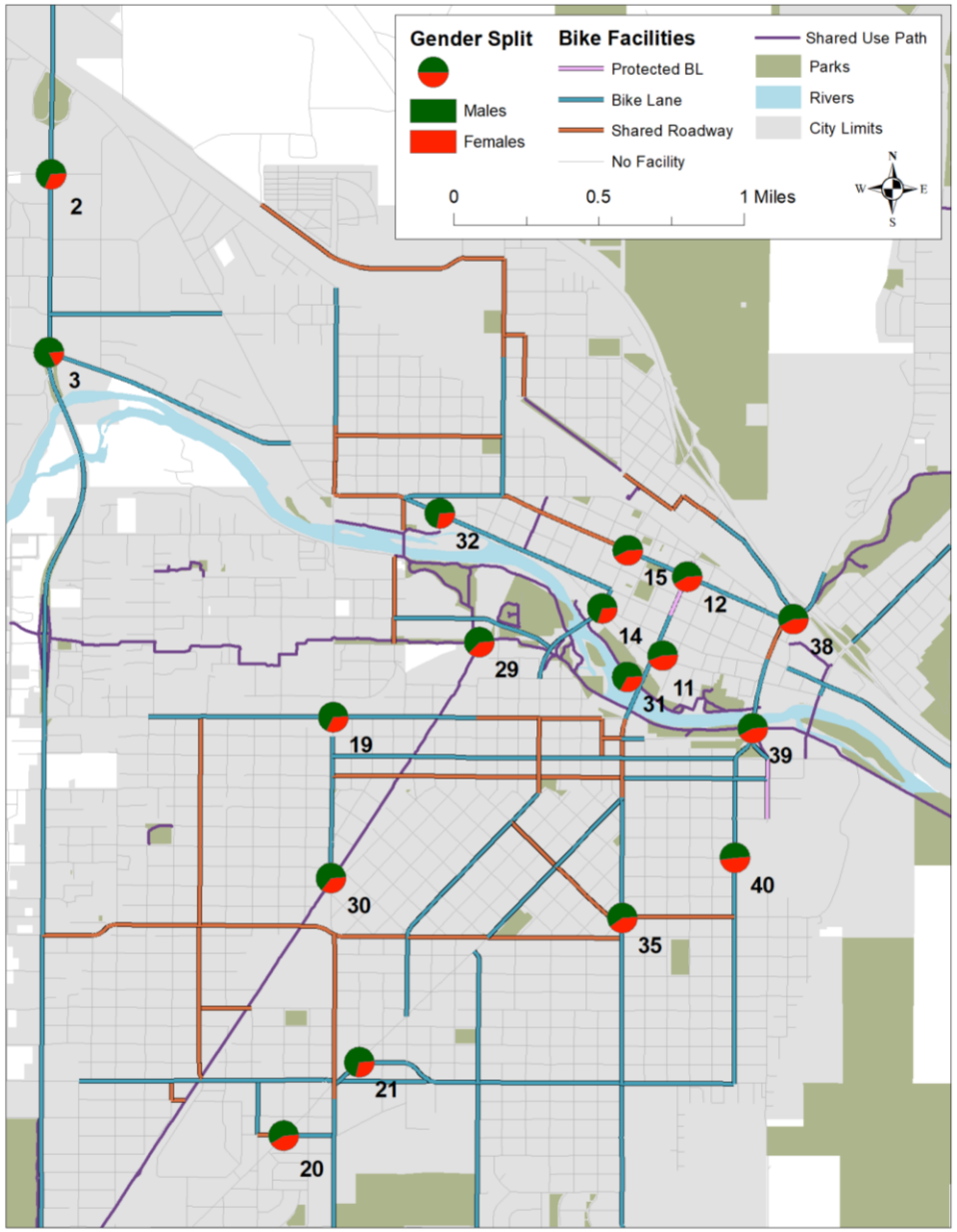


Figure 5: Bicycle Gender Split by Count Station

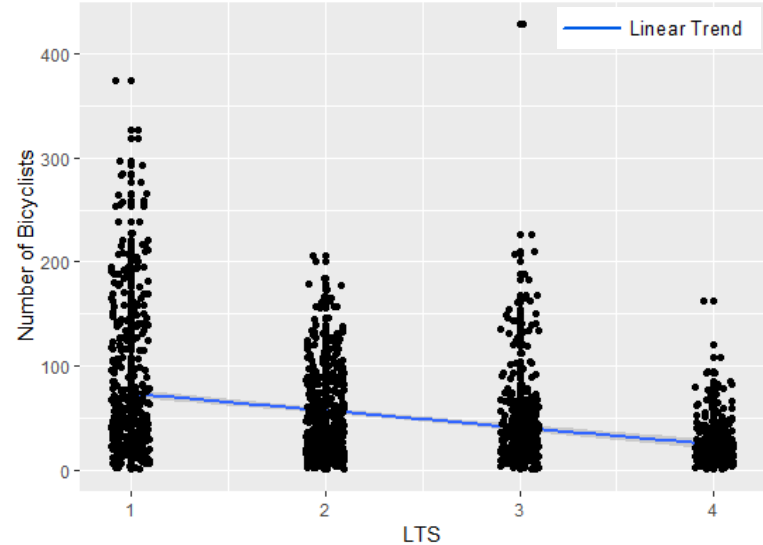


Figure 6: Bicycle Volumes by Level of Traffic Stress (LTS)

Figure 7A depicts an inverse relationship between the LTS of a specific facility and the share of females counted at that facility or count station. This relationships suggests that we should expect to count a lower share of females along facilities with high levels of traffic stress and a greater share along facilities that are comfortable for riders of all ages and abilities. The opposite is true for males, suggesting traffic stress and facility comfort are a greater detterent for females than they are for males (Figure 7B). Table 1 further supports this finding, showing a steady decline in the average share of females counted as LTS increases. There is also a stark decrease in the raw counts, the average number of females counted during a 2-hour period decreases from 30 at LTS 1 screenlines to 9 at LTS 4 screenlines. Table 1 also shows the differences of female ridership at facilities which are comfortable for ages and abilities (35 percent female) and those which are not (32 percent female) and facilities that would be comfortable for an average adult (34 percent female) and those which would not (30 percent female). Together, these findings provide evidence that, in Missoula, the level of traffic stress along a facility has a greater impact on female ridership than it does male ridership and that female bicyclists are significantly less likely to ride along facilities with a high LTS. They also highlight the important role infrastructure will play as Misssoula works to reach the ambitious regional non-motorized mode share goals.

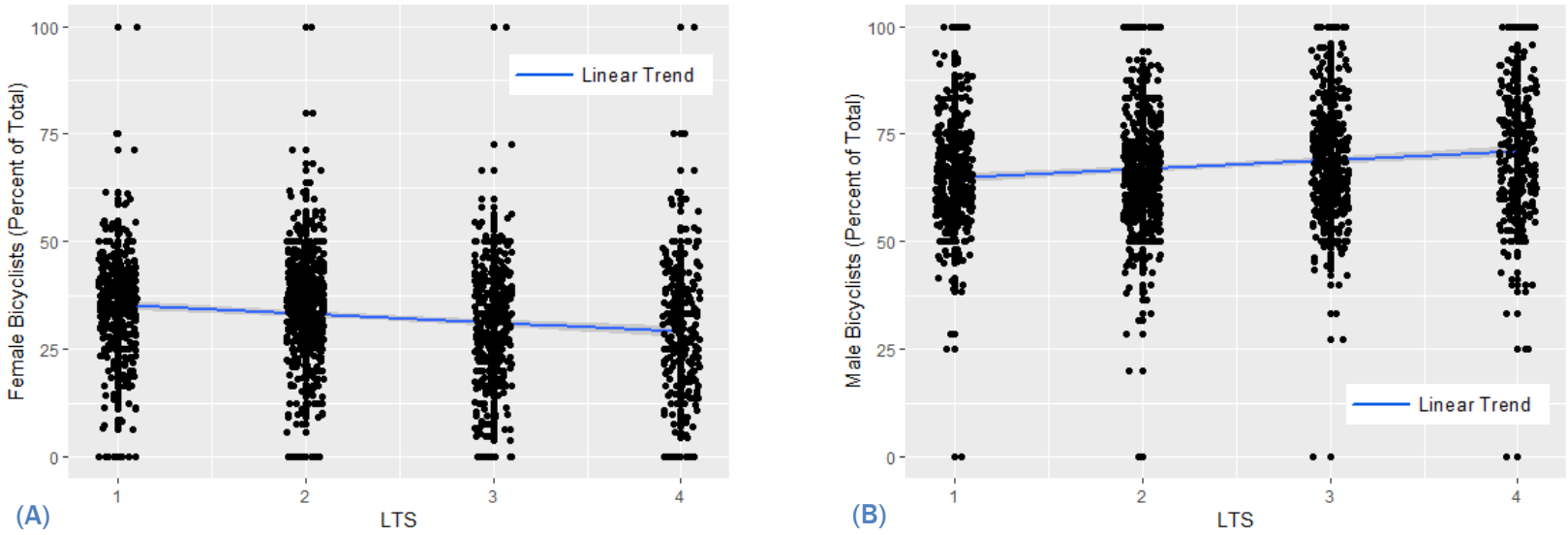


Figure 7A & 7B: Share of Female (7A) and Male (7B) Bicyclist by Level of Traffic Stress (LTS)

Table 1: Impact of Traffic Stress on Facility Use by Gender

	Averages				Totals	
LTS	Female (Count)	Male (Count)	Female (Percent)	Male (Percent)	Female (Count)	Male (Count)
1 (n=382)	29.9	51.2	34.8	65.2	11,405	19,572
2 (n=518)	16.9	30.1	33.8	66.2	8,761	15,601
3 (n=364)	15.5	30.3	30.8	69.2	5,643	11,016
4 (n=245)	8.8	18.2	28.9	71.1	2,166	4,460
Total (n=1,509)	18.5	33.6	32.5	67.5	27,975	50,649
Facility is Comfortable for 'All Ages and Abilities' (LTS 1)						
Yes (n=382)	29.9	51.2	34.8	65.2	11,405	19,572
No (n=1,127)	14.7	27.6	31.8	68.2	16,570	31,077
Facility is comfortable for the 'Average Adult' (LTS 1 and 2)						
Yes (n=900)	22.4	39.1	34.2	65.8	20,166	35,173
No (n=609)	12.8	25.4	30.0	70.0	7,809	15,476

Automated Bicycle & Pedestrian Counts

Figure 8 maps the location of the MPO's eight automated counters and shows the combined bicycle and pedestrian AADT. As expected, the more highly trafficked locations are located near the city center. In 2018, the counter located at the Madison Street Underbridge experienced the most non-motorized traffic, counting an average of more than 1,300 pedestrians and bicyclists each day. As you move outwards the volume of pedestrian and bicycle traffic decreases steadily. The most southern counters located along the Bitterroot Trail experienced the lowest volume of non-motorized traffic. However, these paths continue to serve as a critical part of the non-motorized network, hosting close to 100 trips per day on an annual basis.

Figure 9 breaks total non-motorized AADT down by mode. As seen with the volunteer counts, it is clear that the primary commuter trail network is a valuable asset for individuals who travel by non-motorized modes, especially bicyclists. Where there is sufficient data, bicyclists outnumber pedestrians at all but two stations. The first exception is the counter near the Madison Underbridge, and its high pedestrian activity is likely attributable to its proximity to downtown, the university, and multiple city parks. The other station is located along the Bitterroot Trail south of Mormon Creek Road, which provides access to Travelers' Rest State Park, a popular spot for nature walks, picnics, and community events; additionally, access to the park is available from the Bitterroot Trail by foot just north of the counter.

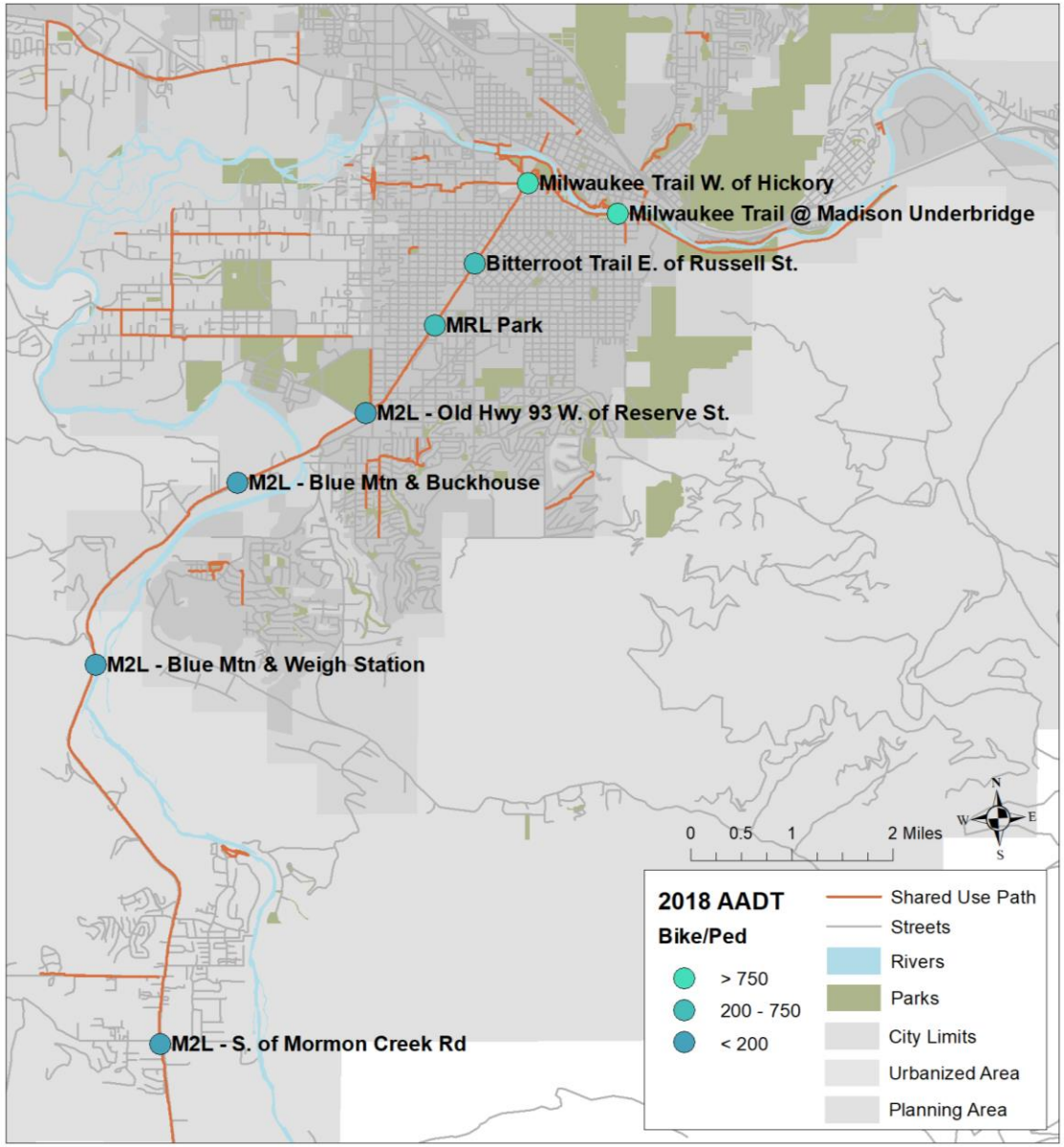


Figure 8: Automated Counter Locations and Combined Bicycle and Pedestrian AADT

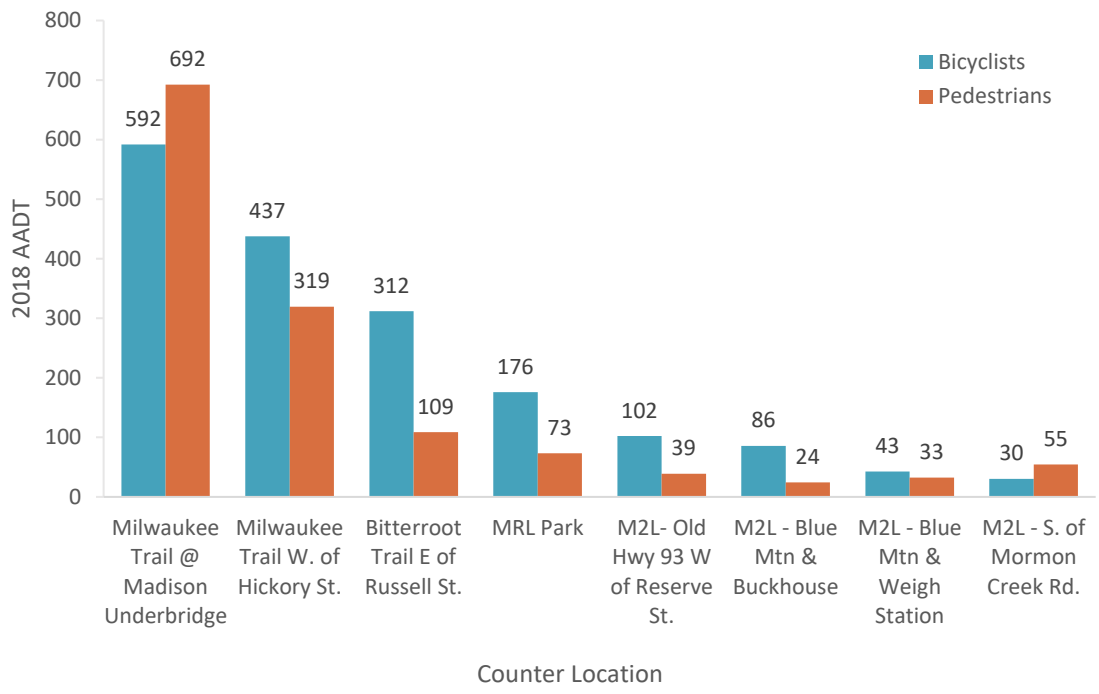


Figure 9: AADT Mode Split by Automated Counter (2018)

As one may expect, bicycle and pedestrian traffic fluctuates over the course of the year. Figure 10A shows monthly bicycle and pedestrian volumes at the centrally located automated counters. Non-motorized traffic generally begins to increase in the early spring and eventually peaks in the summer months. Bicycle and pedestrian traffic are lowest during the late fall and winter months. Figure 10B shows monthly bicycle and pedestrian traffic counts at the stations located along the Missoula to Lolo (M2L) portion of the Bitterroot Trail. Despite much lower volumes, patterns of non-motorized traffic are similar to those located within the city limits. One exception is the peak in pedestrian activity at the count station located south of Mormon Creek Road, which is likely in part due to its close proximity to Travelers' Rest State Park. When comparing monthly fluctuation of bicycle and pedestrian traffic, it is evident that pedestrian traffic tends to be much more consistent, which is likely due to the additional barriers faced by bicyclists in the winter, such as snow and ice, visibility, and colder temperatures. At the Milwaukee Trail near the Madison Underbridge, both bicycle and pedestrian traffic varies considerably more than it does at other locations, which is likely caused by its close proximity to the University of Montana and higher share of traffic for recreational purposes.

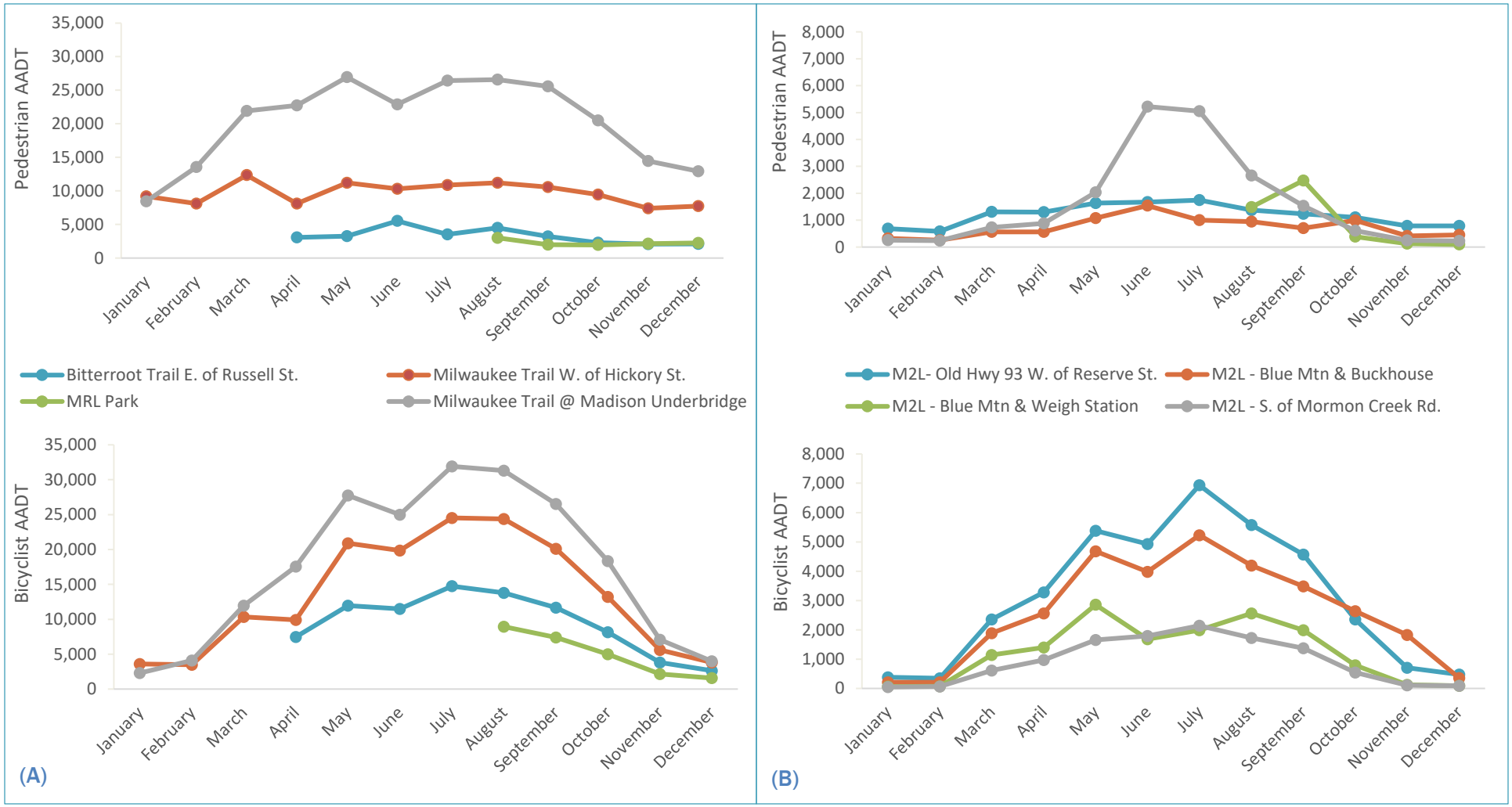
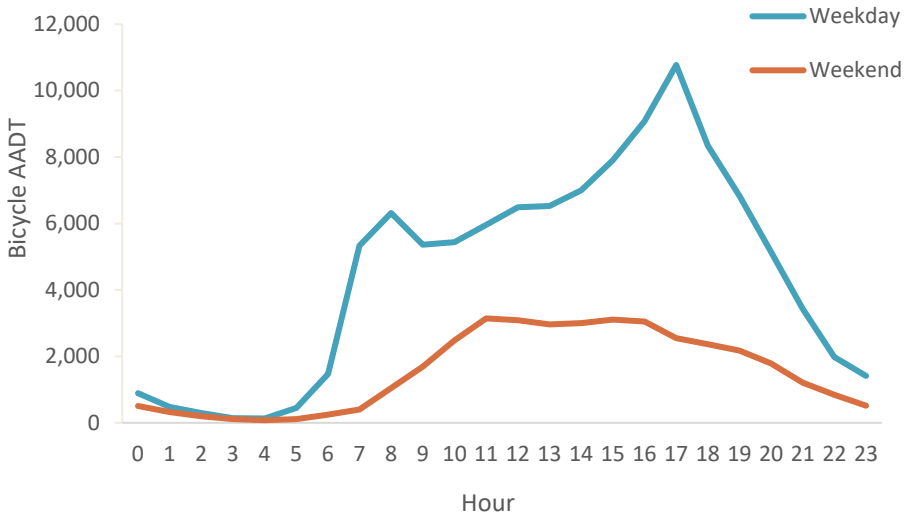
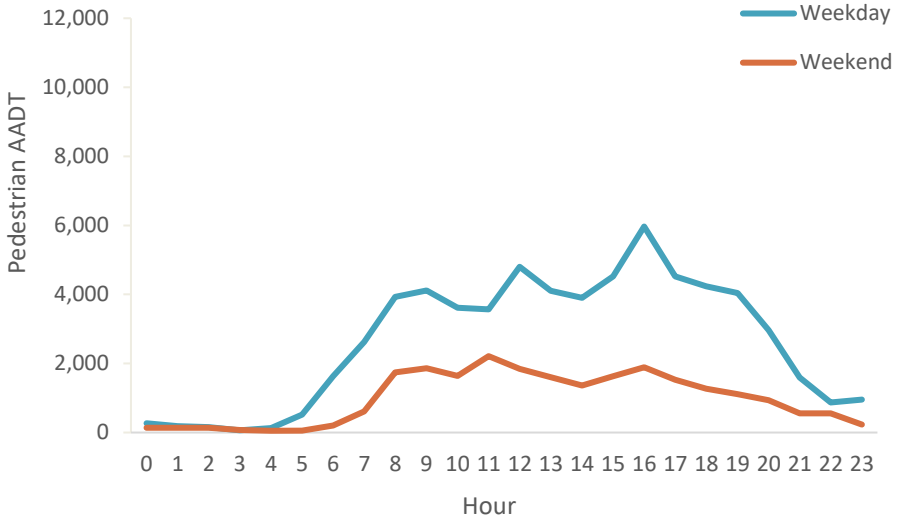


Figure 10A & 10B: Monthly Bicycle and Pedestrian AADT for Centrally Located (10A) and M2L (10B) Automated Counters

Visualizing the hourly variation in bicycle and pedestrian traffic can be useful for illustrating differences in weekday and weekend non-motorized traffic patterns (Figure 11A and 11B). Weekday traffic patterns (blue lines) clearly depict spikes in bicycle and pedestrian activity that are consistent with a.m. and p.m. peak commute times. Interestingly, peak travel times for bicyclist occur an hour earlier in the morning (8 a.m.) and an hour later in the evening (5 p.m.) than they do for pedestrians (9 a.m. and 4 p.m., respectively). The results also show a peak in bicycle and pedestrian traffic at noon, which is likely due to recreational use of the paths and adjacent parks during lunch break. On the other hand, variation in weekend bicycle and pedestrian volumes (orange lines) are much more uniform and are representative of recreational activity patterns. However, Figure 11B does show minor peaks in weekend pedestrian activity which may be in part due to the large number of people walking to summer events in downtown Missoula.



(A)

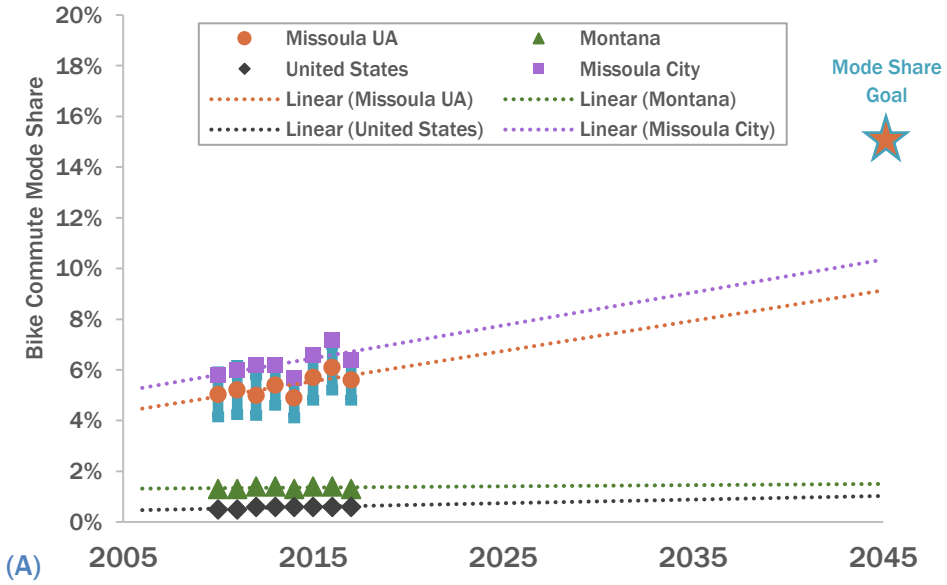


(B)

Figure 11A & 11B: Bicycle (11A) and Pedestrian (11B) Hourly Profiles at Centrally Located Counters (August & September)

US Census Estimates

According to recent trends in ACS 5-year estimates, an increasing number of Missoulians are riding their bicycles and walking to work. In Figure 12A and 12B bicycle and walk commute mode share estimates for the City of Missoula are compared to those for the Missoula Urbanized Area, the State of Montana, and the United States. The most recent estimates indicate that when it comes to bicycle commuting the City of Missoula (6.4 percent) and the Urbanized Area (5.6 percent) outpace both the State of Montana (1.3 percent) and the United States as a whole (.6 percent); not only are current estimates of bicycle commuting in Missoula more than two times greater than they are in the state and nation, but rates are progressing at a much faster pace (Figure 12A). Similarly, walk commute mode share within the City (7.4 percent) and Urbanized Area (7.4 percent) are trending upwards and at a progressive pace (Figure 12B). The slight difference in walk and bike rates when comparing the City and Urbanized Area highlights the challenge of encouraging non-motorized travel outside of the city center. The extended trendlines pictured in these figures reveal that accelerating rates of bicycling and walking is required in order to meet the ambitious mode split goals set out in the region's Long Range Transportation Plan, Activate Missoula. However, they are also encouraging, especially for bicycle commuting; Missoula's ambitious bike share goal of 15 percent and walk share goal of 18 percent (orange stars) are likely accessible targets as long as the City, MPO, and other public and private agencies continue to pursue innovative programs and policies and cutting-edge infrastructural improvements which promote the accessibility and connectivity of Missoula's non-motorized transportation network.



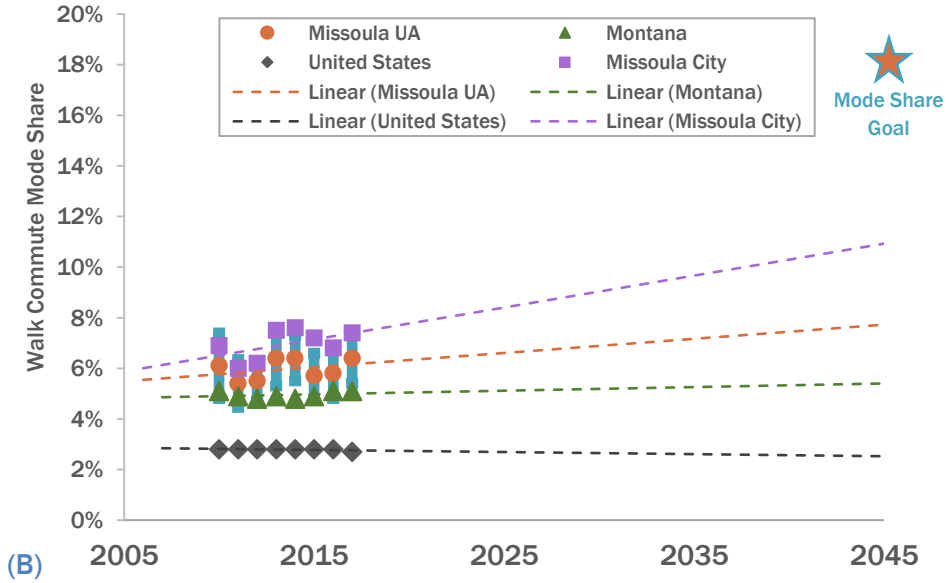


Figure 12A & 12B: Bike (12A) and Walk (12B) Commute Mode Share (Source: ACS 5-year Estimates 2010-2017)

When considering the share of individuals who actively commute to work, Missoula performs well, relative to similar urbanized areas and cities. Figure 13A and 13B compares Missoula's bike and walk commute mode share to other urbanized areas with similar population, topography, and recreational opportunity – these urbanized areas also host a college or university (The City of Bozeman, MT is not part of an urbanized area but is included for reference). Amongst the comparable urbanized areas, Missoula maintains the highest bike commute mode share (5.6 percent), followed by the City of Bozeman (4.5 percent), and Fort Collins (4.1 percent). The City of Bozeman has the highest walk commute mode share of the six locations (9.4 percent), followed by Missoula (6.4 percent), and Bellingham, WA (6.3 percent). Missoula boasts the second highest rate of non-motorized commuting out of these locations and the highest when excluding non-MPOs. While these numbers are impressive and illustrative of a suitable non-motorized transportation network, continuous effort will be needed to encourage more people to commute by bike or foot, and to do so more often.

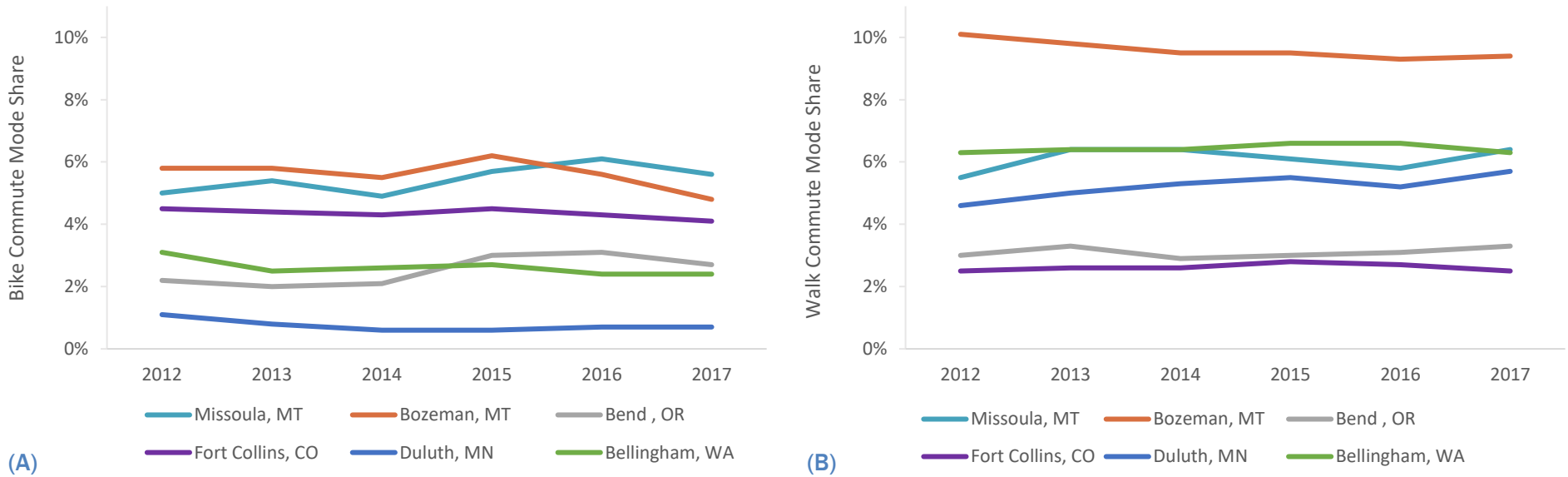


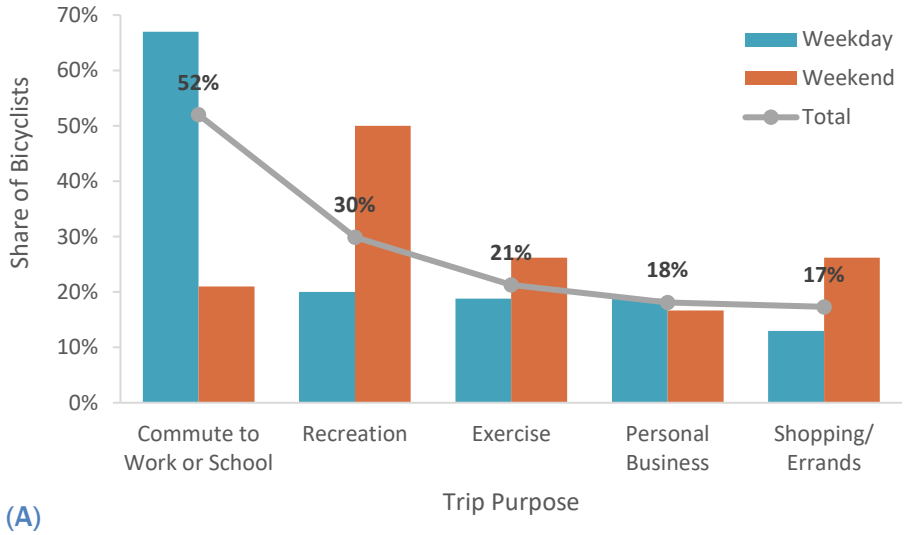
Figure 13A & 13B: Bike (13A) and Walk (13B) Commute Mode Share of Comparable Urbanized Areas[3]

[3] The City of Bozeman, MT is not part of an urbanized area but is included for reference

Bicycle & Pedestrian Surveys

In 2018, a total of 302 surveys were distributed by volunteers, 175 of the respondents were pedestrians and 127 were bicyclists. The sample of pedestrian respondents was 47 percent female and 46 percent male with an average age of 34. The sample of bicycle respondents was less evenly split at 39 percent female and 57 percent male and a few years older with an average age of 39. This section will highlight and compare key findings from the bicycle and pedestrian surveys.

Figure 14A and 14B show respondents' answers to the question "What best describes the purpose of this trip?" and separates weekday and weekend respondents (multiple purposes could be recorded for a single trip). Commute trips to work or school were the most commonly selected responses amongst bicyclists and pedestrians, yet bicyclists were far more likely to be on a commute trip (52 percent) than pedestrians (33 percent). Recreation trips were the second most common trips. Unsurprisingly, the proportion of respondents who reported commuting and recreating differ substantially on the weekday and weekend. Exercise, personal business, and shopping and errands were less common trip purposes but were cited for more than half of the reported trips. Exercise was more commonly selected by bicyclists (21 percent) than it was pedestrians (14 percent), and, interestingly, was reported less frequently on the weekend by pedestrians.



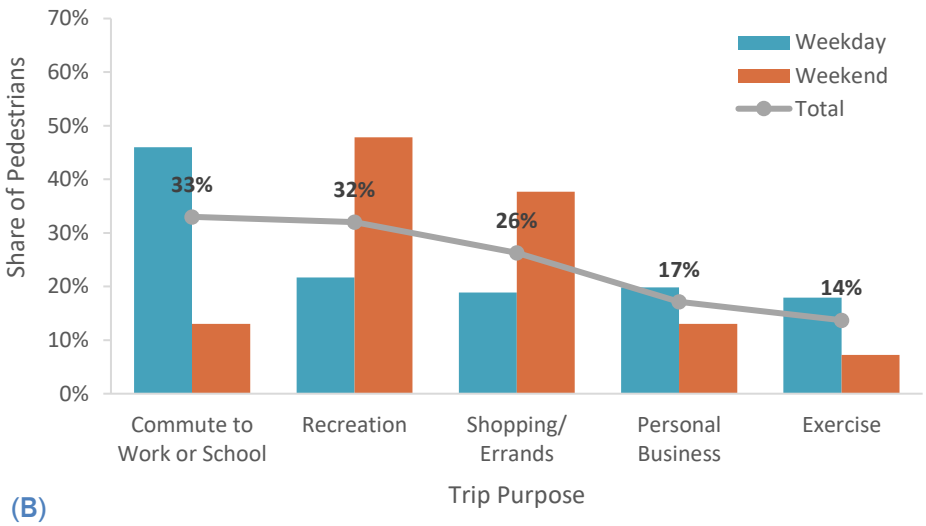


Figure 14A & 14B: Types of Trips Made by Bicyclists (14A) and Pedestrians (14B)

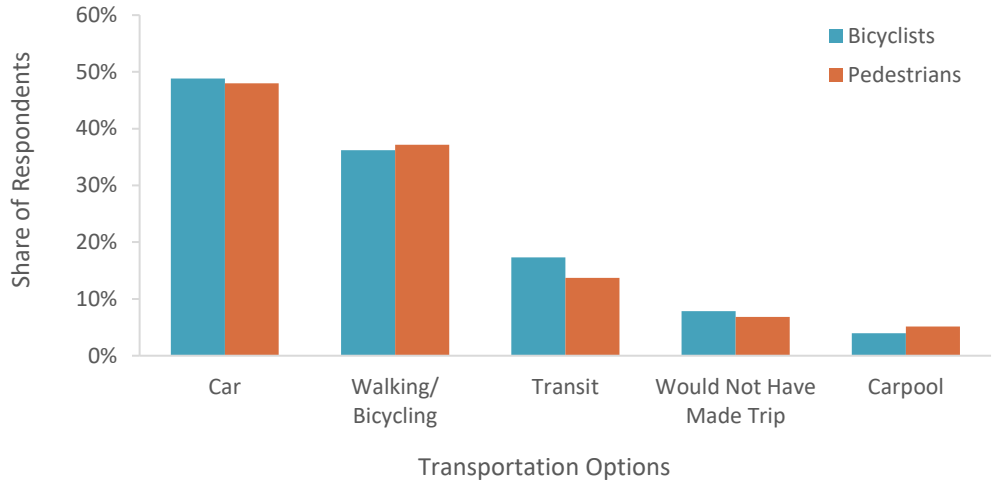


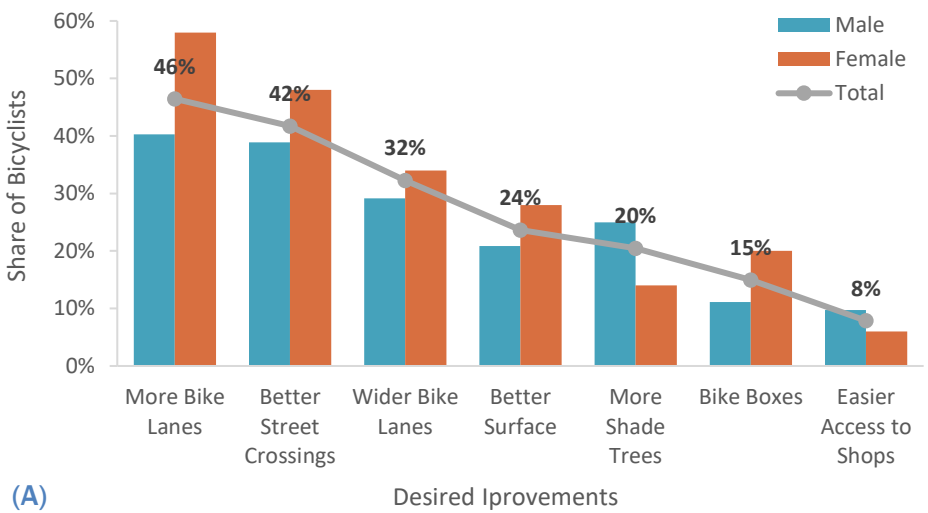
Figure 15: Modes Replaced by Walking and Biking

Figure 16: Bicycle and Pedestrian Route Choice Factors

To get a better understanding of the transportation options being replaced by biking and walking respondents were asked "If you were not biking/walking for this trip, how would you be traveling?" (Figure 15). A total of 146 bicyclists and pedestrians, nearly half of the respondents, reported that they would have traveled by car if they had not walked or biked; motor vehicle trips were the most commonly replaced trips, followed by 'walking' or 'bicycling,' 'transit,' 'I would not have made this trip,' and 'carpool.' The order was the same for both bicyclists and pedestrians. The average reported trip distance for those who rode a bike in lieu of driving was 5.2 miles and the average trip distance for those who walked instead of driving was about half of that (2.3 miles). These findings suggest that biking and walking help to reduce a considerable number of vehicle miles within Missoula.

Figure 16 shows the share of bicycle and pedestrian respondents who selected each of the prescribed route choice factors when asked why they chose their current route over alternatives. The convenience and directness of the route were the most important factors for both bicyclists and pedestrians. When comparing the two groups, there is a vast difference in the proportion of respondents who selected 'low traffic' and 'personal safety,' whereas bicyclists where significantly more likely to report these as factors contributing to their route choice. The fact that bicyclists were more likely to select 'low traffic' may not come as a surprise because they are inherently more likely to interact with motorized traffic without separation. Bicyclists' sensitivity to traffic and surface conditions and other risks associated with speed and elevated riding likely contribute to the importance of personal safety. It is worth noting that bicyclists were more likely to select each of the prescribed options, excluding accessibility and word of mouth, which affirms that, on average, bicyclists selected more route choice factors (avg.=2.3) than pedestrians (avg.=1.5).

Respondents were also asked to report which improvements they would like to see along their route and within the community. For bicyclists, the most commonly desired improvements were more bike lanes (46 percent), better street crossings (42 percent), and wider bike lanes (32 percent) (Figure 17A). Female bicyclists were more likely than their male counterparts to cite improvements regarding bicycle infrastructure, such as the quantity and width of bike lanes, the quality of street crossings, and the presence of bike boxes, and they were more apt to select a greater number of improvements. These disparities are reminiscent of the findings presented that suggest women attribute a higher value to improved bicycle infrastructure and that addressing these improvements could foster a more inclusive and comfortable transportation network. The top three desired improvements for pedestrians were more shade trees (30 percent), better street crossings (22 percent), and benches (17 percent). Male pedestrians were more likely than females to report the desire to increase the presence of shade trees, the provision of more and wider sidewalks, and improved street crossings. The latter two are contrary to the findings from the bicycle surveys. However, like female bicyclists, female pedestrians were more likely to select better surface quality. When comparing Figure 17A and 17B it becomes evident that improving street crossings within Missoula is primary concern for both bicyclists and pedestrians; better street crossings were the second most commonly desired improvement for both groups. This finding highlights the importance of intersection improvements within the non-motorized transportation network, which is a primary issue addressed in the Pedestrians Facilities Master Plan. Additional infrastructure improvements appear to be of greater concern to bicyclists than they are to pedestrians, whereas more bike lanes and wider bike lanes ranked much higher than more sidewalks and wider sidewalks. On the other hand, improvements which incite more leisurely activity such as benches and shade trees were amongst the most desired improvements for pedestrians. More generally, comparing the two charts shows that the average bicyclist selected more improvements than the average pedestrian. These results highlight some of the differences in the travel needs and desires of bicyclists and pedestrians as well as differences in attitudes and preferences, both of which are essential for planning successful bicycle and pedestrian infrastructure.



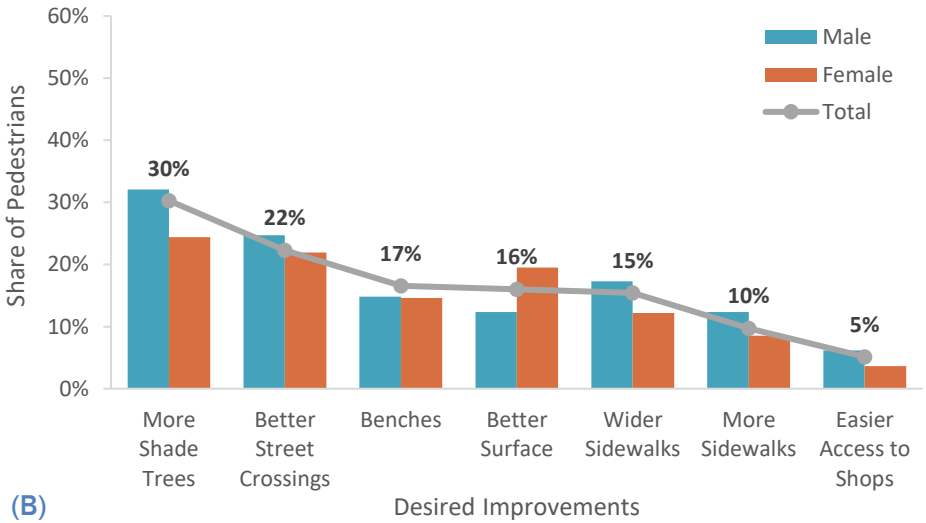


Figure 17A & 17B: Transportation Network Improvements Desired by Bicyclists (17A) and Pedestrians (17B)

Moving Forward

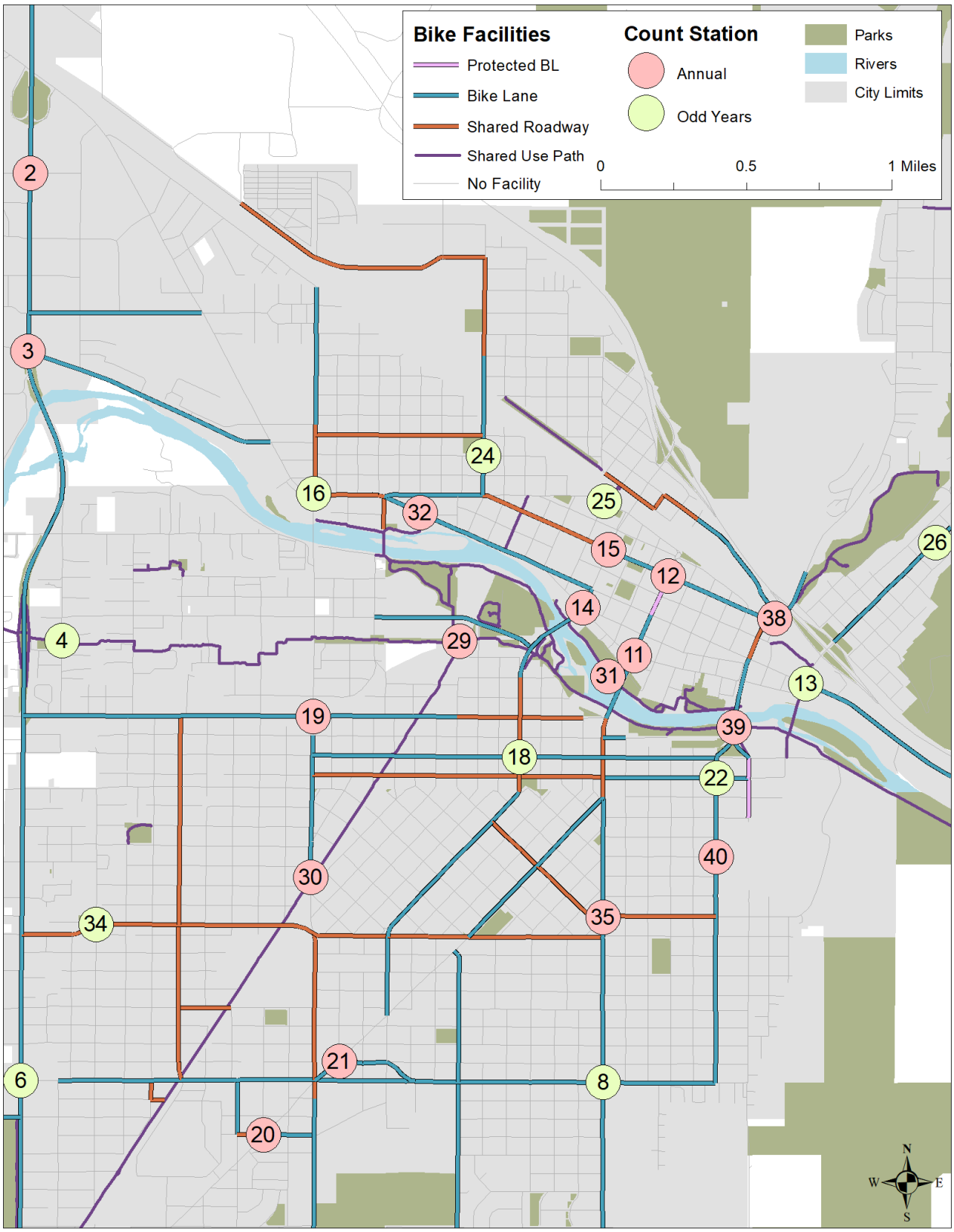
The Missoula MPO has acquired six new Mobile MULTI Eco-Counters which will allow the staff to expand and enhance the data collection and analysis processes for the Bicycle and Pedestrian Count Program. These counters will be utilized to make temporary automated counts at various intersections, along the proposed neighborhood greenways, and along streets with varying bicycle and pedestrian facilities. The duration of counts and location of the temporary counters will be selected utilizing methods cited by the National Cooperative Highway Research Program[4]. The temporary count program will be beneficial to the overall Bicycle and Pedestrian Count Program in numerous ways, including but not limited to: providing non-motorized traffic data at locations not previously studied and providing more accurate date at those which have; allowing the staff to calculate more accurate mode share estimates for specific streets and corridors by coordinating count locations with the Missoula Urban Traffic Count Program; and permitting pre- and post-project studies to measure the benefit of bicycle and pedestrian projects. The first deployment of these counters is planned to take place during the spring months of 2019 and they will be relocated periodically throughout the summer. This data will enhance the staff's ability to interpret bicycle and pedestrian travel trends within the City of Missoula and sorrounding areas.

Bicyclists Crossing Signalized Intersection along the Bitterroot Trail

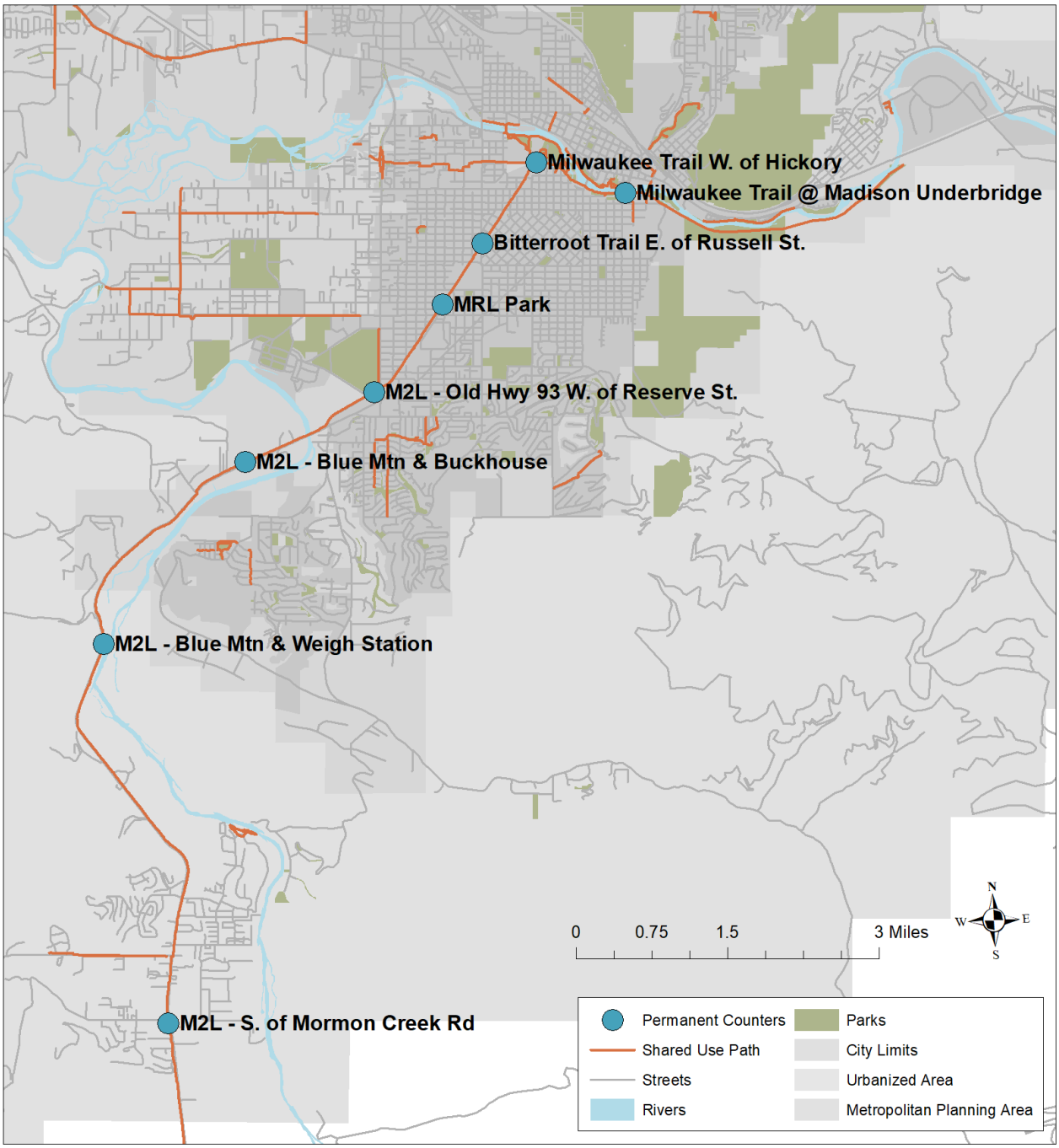
[4] Guidebook on Pedestrian and Bicycle Volume Data Collection. NCHRP. 2014.

Appendix A: Count Station Locations

Volunteer Count Stations

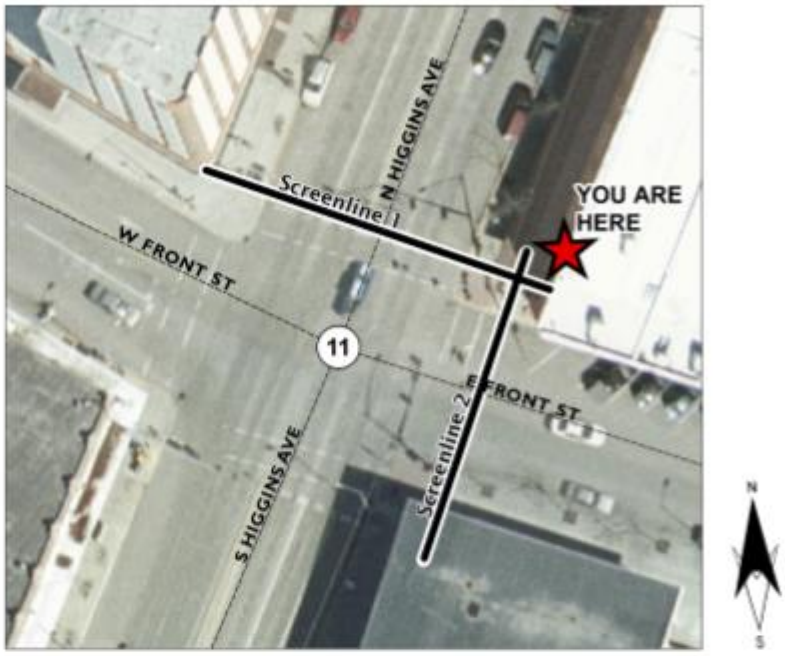


Automated Counter Locations



Appendix B: Example Count Station

Station 11 Diagram



Street View - Location A

Appendix C: Bicycle and Pedestrian Surveys

BICYCLE SURVEY

B

Interviewer Name: _____ Weather: *Sunny Cloudy Rainy Windy Hot Cold*

Location: _____ Location No. _____

Date: _____ Start Time: _____ End Time: _____

"Excuse me, but may I ask you a few questions? I'm with the Missoula Planning Office and we want to learn more about why people bike where they do. This will take less than two minutes and the information will be kept confidential."

1. What is your home intersection?

Home intersection: _____ &_____

2. How long is your trip (start to finish) in miles or minutes, and what're your origin and destination?

A. Distance: _____ miles *and/or* B. Time: _____minutes

C. Where are you coming from? (Required) *and* D. Where are you going next? (Required)

_____ _____

Address, intersection, landmark, etc. *Address, intersection, landmark, etc.*

3. (a) What is your age? **(b) What is your gender?**

Age: _____ Gender: (b-1) ☐ Male (b-2) ☐ Female

4. What best describes the purpose of this trip?

❑Exercising (a) ❑ Work commute (b) ❑ School (c)

❑Recreation (d) ❑ Shopping/doing errands (e)

❑ Personal business (medical, visiting friends, etc.) (f)

5. In the past month, about how often have you ridden a bicycle here?

❑First time (a) ❑0 - 5 times (b) ❑6 -10 times (c) ❑11- 20 times (d)

❑Daily (e)

6. In what season do you bicycle?

❑All Year (a) ❑Summer (b) ❑Fall (c) ❑Winter (d) ❑Spring (e)

7. Will any part of this current trip be taken on the bus or on foot or by car?

❑ Yes (a) ❑No (b)

8. If you were not biking for this trip, how would you be traveling?

❑ Car (a) ❑ Carpool (b) ❑ Transit (c) ❑ Walking (d) ❑ I would not make this trip (e)

9. Why are you using this route as opposed to riding somewhere else? (please check all that apply)

❑ Convenient (a) ❑ Direct (b) ❑ Lower traffic volumes (c)

❑ Heard about it through friends, media, etc. (d) ❑ Scenic qualities (e)

❑ Universally accessible (f) ❑ Personal safety (g)

10. What would you like to see improved <u>along this route</u> (mark with an 'X'); **and <u>in the community in general</u>** (mark with an '0')**? (Please check all that apply)....:.**

❑ Wider bike lanes (a) ❑ Better surface (b) ❑ Better street crossings (c)

❑ More shade trees (d) ❑ Bike boxes (e) ❑ Easier access to shops, etc. (f)

❑ More bike lanes (g)

11. What ethnic group do you belong to? (please check all that apply) (OPTIONAL)

❑ Hispanic (a) ❑ Black (b) ❑ White (c) ❑Asian (d) ❑ Native American (e) ❑ Other (f)

12. (a) What is your name? **(b) Contact information? (phone # or email**

Name: _____ Contact:_____

PEDESTRIAN SURVEY

P

Interviewer Name: _____ **Weather**: *Sunny Cloudy Rainy Windy Hot Cold*

Location: _____ Location No. _____

Date: _____ Start Time: _____ End Time: _____

"Excuse me, but may I ask you a few questions? I'm with the Missoula Planning Office and we want to learn more about why people walk where they do. This will take less than two minutes and the information will be kept confidential."

1. What is your home intersection?

Home intersection: _____ &_____

2. How long is your trip (start to finish) in miles or minutes, and what're your origin and destination?

A. Distance: _____ miles and/or B. Time: _____minutes

C. Where are you coming from? (Required) *and* D. Where are you going next? (Required)

_____ _____

Address, intersection, landmark, etc. *Address, intersection, landmark, etc.*

3. (b) What is your age? **(c) What is your gender?**

Age:_____ Gender: (b-1) ☐ Male (b-2) ☐ Female

4. What best describes the purpose of this trip?

❑Exercising **(a)** ❑ Work commute **(b)** ❑ School **(c)**

❑Recreation **(d)** ❑ Shopping/doing errands **(e)**

❑ Personal business (medical, visiting friends, etc.) **(f)**

5. In the past month, about how often have you walked here?

❑First time **(a)** ❑0 - 5 times **(b)** ❑6 -10 times **(c)** ❑11- 20 times **(d)**

❑Daily **(e)**

6. In what season do you walk?

❑All Year **(a)** ❑Summer (b) ❑Fall **(c)** ❑Winter **(d)** ❑Spring **(e)**

7. Will any part of this current trip be taken on the bus or by bike?

❑Yes **(a)** ❑No **(b)**

8. If you were not walking for this trip, how would you be traveling?

❑ Car **(a)** ❑ Carpool **(b)** ❑ Transit **(c)** ❑ Bicycling **(d)** ❑ I would not make this trip **(e)**

9. Why are you using this route as opposed to walking somewhere else? (please check all that apply)

❑ Convenient **(a)** ❑ Direct **(b)** ❑ Lower traffic volumes **(c)**

❑ Heard about it through friends, media, etc. **(d)** ❑ Scenic qualities **(e)**

❑ Universally accessible **(f)** ❑ Personal safety **(g)**

10. What would you like to see improved <u>along this route</u> (mark with an 'X'); **and <u>in the community in general</u>** (mark with an '0')? **(Please check all that apply)...:.**

❑ Wider sidewalks **(a)** ❑ Better surface **(b)** ❑ Better street crossings **(c)**

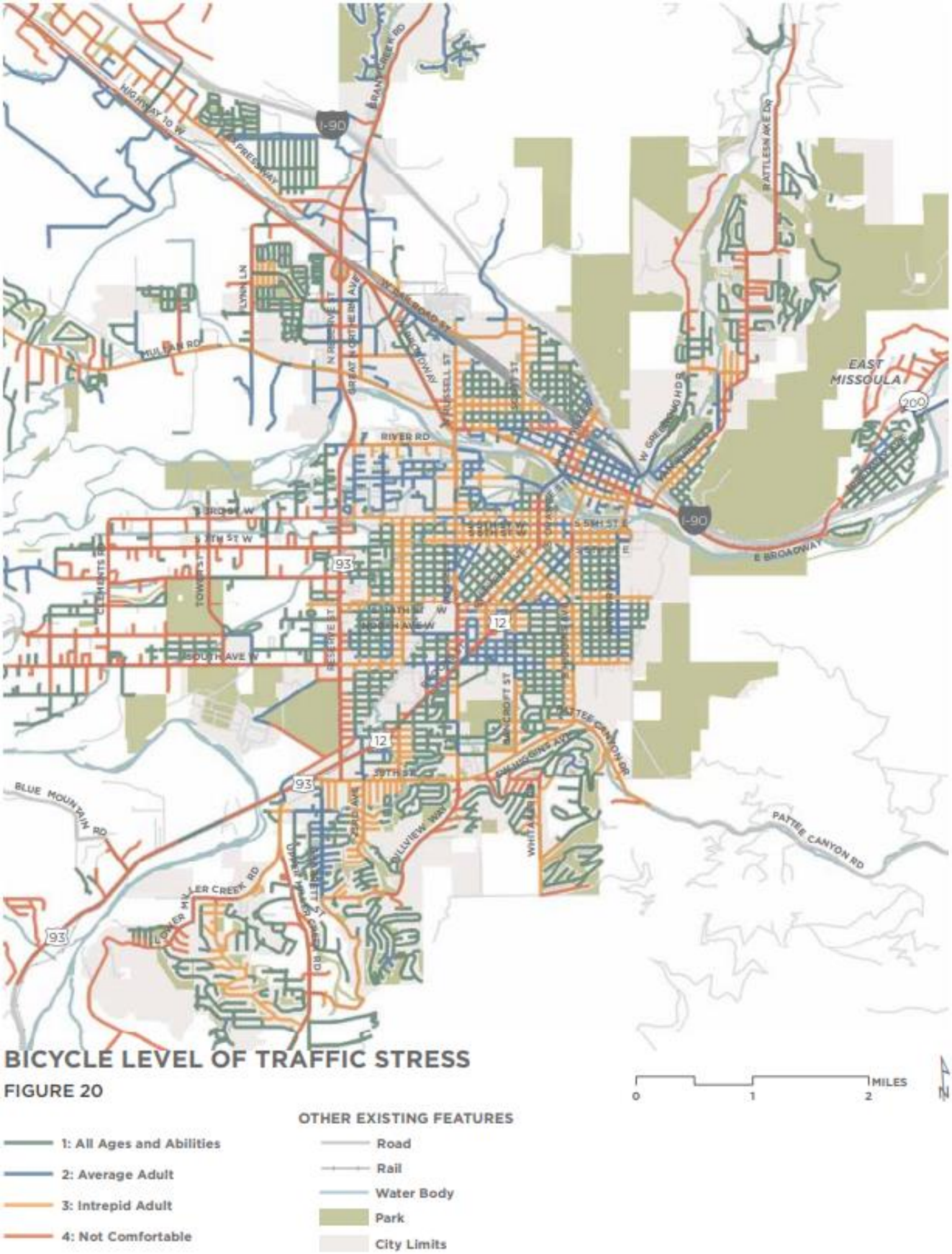
❑ More shade trees **(d)** ❑ Benches **(e)** ❑ Access to shops, etc. **(f)**

❑ More sidewalks **(g)**

11. What ethnic group do you belong to? (please check all that apply) (<u>OPTIONAL</u>)

❑ Hispanic **(a)** ❑ Black **(b)** ❑ White **(c)** ❑Asian **(d)** ❑ Native American **(e)** ❑ Other **(f)**

12. (a) What is your name? **(b)Contact Information? (Phone # or email)**

Name:_____ Contact:_____

Appendix D: Bicycle Level of Traffic Stress (LTS) Map