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# Inventorying Amenities and Usage of Lewiston-Auburn Trails

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# Inventorying Amenities and Usage of Lewiston-Auburn Trails

Completed in Partnership with LA Trails

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December 6, 2019

# ACKNOWLEDGMENTS

# EXECUTIVE SUMMARY

Trails provide numerous benefits to the community and the environment, and give a space for people to engage with the outdoors. Safe and well maintained trails promote healthy lifestyles by increasing the physical activity of the public, mitigate climate change by encouraging clean means of travel and promote community building by creating a space for people to interact with each other. While trails provide overarching benefits to the community at large, each trail presents unique benefits, challenges and usage patterns, and every trail user has their own relationship with the trails that they use. The L/A Trails organization found a need to collect more data on the usage and opinions of the trails in the Lewsiton/ Auburn area and to find out more information about the various features and amenities that each trail provides to the community. In this report, we detail an investigation of four pillars of study that come together to provide a comprehensive look at the trails, the usage and the public opinions of the trails in the Lewiston Auburn area.

Our first pillar of study details a methodology for collecting usage information from trails in Lewiston and Auburn, and provides proof-of-concept data from two trails in the area, Whitman Spring Road in Auburn, ME and the Riverside Greenway Trail in Lewiston, ME. Our second pillar of study gives survey feedback from trail users with graphs that display trends in public understanding and use of the trails. Our third pillar of study provides information about the various amenities that each trail offers and compares this data to the information listed online in order to assess the accuracy and availability of public information about the trails in the L/A area. Our fourth pillar of study expands upon this amenities data and provides a sample section of a possible public facing web map that would inform users about the location, the available amenities and the directions to all of the L/A trails. Each of these pillars come together to provide preliminary data about the physical trails in the area, the people who use the trails and the connection between the trails and the public. We encourage L/A Trails to continue to expand on the data gathered in this study to find new ways to improve the trails in response to usage and

feedback patterns, and to make the information about the trails more accessibility to the public in order to increase community engagement with the trails.

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# INTRODUCTION

Rapid urbanization in the 21st century presents a number of significant public health and well-being challenges (Giles-Corti, 2016). However, a principal theory suggests that increasing physical activity and social interaction has positive impacts on both of these factors (Hunter et al., 2019). Research indicates that multi-use trails can aid in this by creating accessible, reliable, and communal recreation and transportation methods, while decreasing social inequity and environmental impact (Shafer et al., 2000). Community trails are effective in increasing physical activity. Studies have found that those who use trails at least once a week are twice as likely to meet recommended physical activity guidelines (Librett et. al., 2006). Many trail users also feel that trails contribute to their quality of life by fostering natural and social connections (Shafer et al., 2000). Trails also can improve active transportation opportunities and the connectivity of a city. Access to walking and biking trails can reduce air pollution from motorized vehicles, as well as improve active transportation opportunities for those with decreased mobility (Tzortzi-Georgi, 2019). Additionally, the health benefits of active transportation (walking or cycling) heavily outweigh common risks, such as injury from motorized traffic or health dangers from air pollution (Mueller et al., 2015). Spaces with more natural sounds and greenery have a positive effect on mental health as well, by improving tranquility and reducing stress (Watts, 2018). While improving public greenways can result in a number of benefits, city planners must also stay cautious of unintentional harms, such as gentrification or disproportionate downsides for vulnerable groups. This is particularly important for trails in or near low-income residences, as green gentrification can raise housing costs. Because income, education, and housing access gaps are often divided spatially, introducing or improving green spaces, such as trails, can sometimes deepen an area's racial, ethnic, or class divisions (Cole et al., 2017).

When planning trail expansions or redevelopment, trail managers must examine how the trails are being used in order to ensure continued public use and satisfaction (Shafer et al., 2000). For example, they would want to know who is using the trails and why they are using the trails in order to respond to this information. Proximate and distant trail users may vary in their reasons

for visiting a trail and attach different meanings to the trails; trail management can improve experiences by understanding those differences (Kil et al., 2015).This information can also be used in attempts to increase accessibility of trails for certain demographics or types of use (Chen et al., 2019). Outreach for trail systems is also important for increasing usage. Literature indicates that in addition to physical access to green spaces, the degree of impact of a trail system depends on the ways in which those spaces are perceived; perceived differences between the users of various trails, such as race or class, may impact which trails are used and for what purpose (Lindsey, 2001). Access to walking trails may also help improve discrepancies in health between communities, since walking is a relatively easy way to exercise for people with lower physical activity rates (Siegel et al., 1995).

The cities of Lewiston and Auburn have a number of publicly accessible trails. LA Trails is a recently reconstituted organization that aims to promote these trails and advocate for healthy lifestyles that involve trail usage. Although the current LA Trails website includes an interactive map of the Lewiston-Auburn trail system, certain information on amenities is absent and uses a multitude of external links, making it difficult to use. In this study, amenities refers to the physical features of the trails (such as trail surface), the activities allowed on the trails, and the added elements (such as parking, bathrooms and trash cans) that trail owners provide to the public. The Lewiston-Auburn trails are owned by various establishments, both public and private, thus they offer different amenities, accessible maps, and levels of publicity. *View Appendix 1 for a list of trail owners.* There is also a lack of data available on the general usage of the trails. Usage knowledge is essential in creating a more streamlined information center for the trails, raising publicity and usage of the trails, and in making decisions about future improvements for the trails. Having amenities data more available will allow potential trail users to have a better idea of which trails are accessible to them, as well as inform L/A Trails of the barriers to entry to specific trails. Increasing the usage of the Lewiston-Auburn trail system by improving active transportation routes will allow residents greater access within the city; Lewiston had over double the percentage of workers bicycling or walking to work than Androscoggin County or the state as a whole in the last census (Anderson et al., 2012). Although our study will not directly change the physical trails, the information and methods gathered for

this study will inform trail owners and L/A Trails about who the beneficiaries of these green urban spaces are, and will likely be used in the future to help make decisions about improving the trails.

# RESEARCH AIMS AND OBJECTIVES

This study aims to increase the usage and amenities knowledge of the trails in the Lewiston/Auburn area, gain feedback about the trails from the users, and make this information more publicly accessible. We hope to help our partners increase public engagement with the L/A trails system in order to benefit the overall public health of the greater L/A community.

**Objective 1**: Quantify the usage of three trails, and refine a methodology for gathering this information from larger trail systems in the future. This process will aid our community partner in gaining future support, such as grant funding, and will allow trail owners to cater their trail improvement to each trail's specific use patterns.

**Objective 2:** Consolidate existing information about each trail's amenities and facilities, and fill in gaps in this information by contacting trails owners and going out into the field. With the information gathered from this process, we made a plan for updating the public web map in order to make the site more user friendly and visually appealing, and to help our community partner with public outreach.

# METHODOLOGY

In order to complete our project goals, we divided our investigation of the Lewiston/Auburn trails into four primary pillars of study, and simultaneously engaged in methods specific to each pillar throughout the course of the study. Following this general overview, we will expand on the details of each pillar below. The **first pillar** of this study focused on the installation and use of motion sensing trail cameras to quantify the usage of our three primary trails of focus: Riverside Greenway Trail, L/A Riverwalk and Whitman Spring Road. With this information, trail owners and organizations can respond to usage patterns and apply for grant money and funding for trail improvements.The **second pillar** of our project aimed to collect feedback from trail users and the local community in order to find out how the L/A Trails organization and the trail owners could increase public interest in and use of the L/A trails. The **third pillar** of our project worked to gain information from the trail owners about various amenities offered at each of their trails in the L/A area and to take 360 degree pictures of the trailheads in order to provide this information to the public.The **final pillar** of our study consisted of finding a method for enhancing the user experience on the L/A Trails website. The primary way we achieved this goal was by looking at options to embed a map in the current website, rather than using ArcGIS online to host the map, as the current website does.

**Trail Cameras:**

After communicating with the trail owners and gaining approval to set up our cameras, we placed one motion sensing camera (sold as a hunting camera) at each of our three trails of interest: Riverside Greenway Trail, L/A Riverwalk and Whitman Spring Road. For each of the three trails, we attached one motion sensing cameras to a tree on the edge of the trail in an area of high pedestrian traffic and activity. These cameras took pictures of passing people and animals and allowed us to quantify trail usage and to observe trail users' methods of travel (such as walking a dog, riding a bike or pushing a baby stroller, ect.). We did not publicize any images of identifiable people and respected the privacy of all trail users.
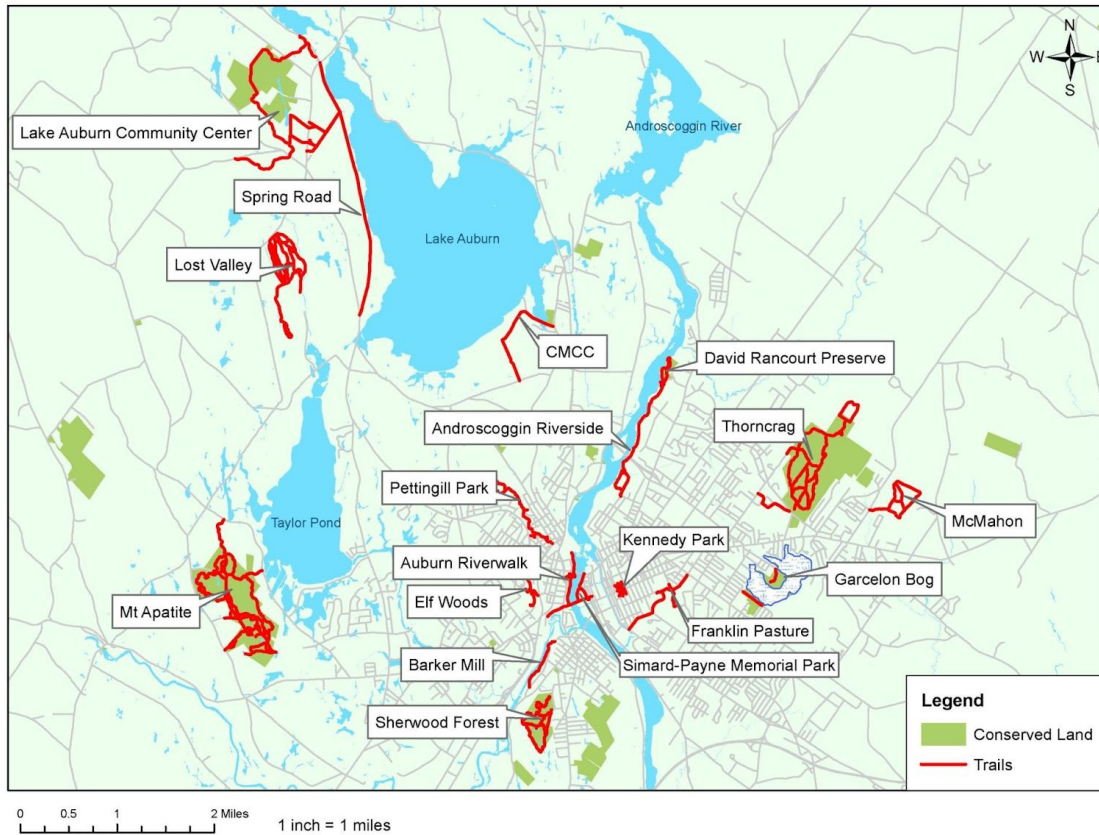
Figure 1: A map that shows the trails in the Lewiston-Auburn area that this study worked with. Our three trails of interest (Riverside Greenway Trail, L/A Riverwalk and Whitman Spring Road) are visible in this map; however, this map labels the Riverside Greenway Trails as Androscoggin Riverside. Map from the Androscoggin Land Trust Website: https://androscogginlandtrust.org/places/trail-maps/

While originally we placed the cameras at foot level in order to conceal the identity of trail users, we experienced issues with camera theft throughout our study. We found that attaching cameras high up on trees, approximately 12ft off the ground, eliminated the problem of camera theft at one of our trails, the Riverside Greenway Trail. The Spring Road camera, our most visible and least secured camera, did not experience any theft problems and remained at the trail for the duration of the study. However, two cameras were stolen at the L/A Riverwalk and this obstacle prevented us from gaining usage data for this trail. The first camera at this location

was chained at foot level, while the second camera was concealed in a camouflaged box; however, neither of these methods prevented theft.

At the Riverside Greenway Trail and Whitman Spring Road, we placed laminated signs at each trailhead and with each camera. These signs detailed the purpose of the cameras and the organizations associated with the trail cameras, and provided contact information for questions and concerns about the cameras. We did not place these notices at the L/A Riverwalk location because we were concerned that the signs would call attention to the camera and increase the risk of theft.

Approximately once a week, we checked on our cameras and retrieved that weeks worth of picture data. The camera at Whitman Spring Road remained up for around 8 weeks, while the Greenway camera stayed in place for about 3 weeks. We manually sorted the camera data by downloading the pictures onto our computers and separating the images into the following categories: people, dogs, bikes, strollers and wild animals. If one image contained multiple people or fit into multiple categories, we copied the image as many times as each element was present, and then placed the copied image in its respective category. The bike and stroller categories imply the presence of one person per each transportation device. For example, if an image showed two people walking two dogs with a person on a bike, we would place two copies in the person folder, two copies in the dog folder and one copy in the bike folder. From this sorting method we were able to construct our graphs and learn about the usage patterns of the trail users.

**Surveying the Public:**

We used both intercept surveying and an online survey to gain information about the public perception, use and knowledge of the L/A trails. We kept the questions identical for both methods of surveying and made clear to the participants, both in person and online, that every question was optional. *View Appendix 2 for the specific survey questions*. We engaged in intercept surveying by stopping trail users at our three primary trails and asking them if they would be willing to answer a few brief questions about the L/A trails. We spent one hour at each trail on a weekend, and one hour at each trail during the week (2 hours total at each of the 3

trails). We also conducted intercept surveys with willing trail users every time we checked on our cameras. We expected that intercept surveying with trail users would provide the most diverse sample and minimize response bias by allowing us to engage with everyone at the source; however, we found that many trail users were unwilling to participate in our survey. We also avoided asking runners and bikers since we found that stopping them was difficult and often unproductive.

Our online survey responses contributed substantially more data than the intercept surveys. We distributed this survey by placing QR codes at trailheads and at various places throughout the Lewiston/ Auburn area and around Bates College. We also used social media platforms, such as Facebook (group and personal pages), newsletters and Bates College forums to distribute the survey. While we realize that these survey methods target specific groups of people and excluded non-English speakers and illiterate individuals, we believe that the surveys still provides valuable information about the trails.

**Amenities Data Collection:**

We collected amenities data for the 19 trails in the L/A area by contacting the trail owners and asking them to answer questions about each of their trails. We created a uniform survey with standardized questions and sent this survey to all trail owner for them to complete for each of their trails. We asked questions regarding the surface of the trail, parking availability, bathroom availability, pet policy, biking accessibility, trail distance, signage availability, trash and recycling receptacles, and limited mobility accessibility. *View Appendix 3 for the specific questions*. Once we gained all of the responses from the trail owners, we cross referenced this information with the information that public websites provide about these trails in order to determine the accuracy of these sites. We then added some of this amenities data to our sample web map in order to demonstrate the potential of an online, interactive map that provides potential trail users with easily accessible and accurate information about the various features of the trails.

To take interactive pictures of the trailheads, we used a GoPro Fusion 360 camera to take street view images at the 19 trails in the L/A area. We then uploaded the images to Google

Photos since this platform supports displaying 360 degree images. Once embedded into a public web map, these images will allow online viewers to see the trails from the perspective of a user before arriving at the trail, so that they are better equipped to recognize and engage with the trail when they arrive.

**Mapping Platform:**

In order to create a beta map for the trails, we first decided which mapping platform to use. We chose a plug in, Maps Marker Pro, that works with the website that L/A Trails already uses. Because this platform requires GPX files rather than shapefiles, we then separated out a file for each trail from the shapefile we previously got from L/A Trails and converted those shapefiles into GPX files. Because each map that is displayed can only show one GPX file at a time, we uploaded a GPX file with all the trails as the overview map and then created links for each individual trail. We uploaded the GPX files for each individual trail into the program and added the amenities data we collected previously, as well as icons for parking and trailhead markers. We linked the parking icons to their location on Google Maps so that when website users click on them, it opens to directions to the trailheads.

# RESULTS AND DISCUSSION

**Trail Cameras:**

## Whitman Spring Road
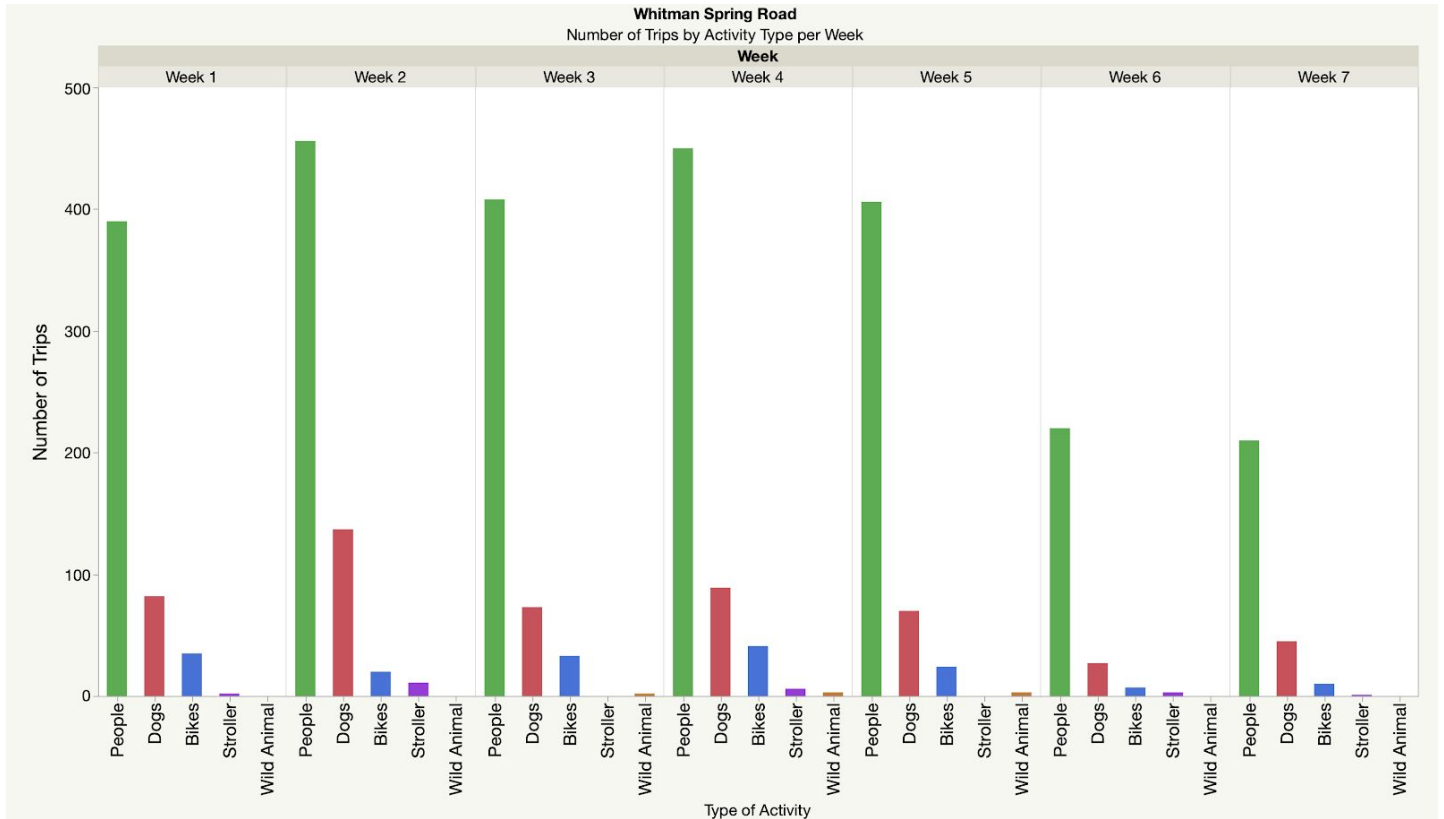


Figure 2: A graph showing the number of trips for each mode of activity over the seven weeks that the trail camera was present at Whitman Spring Road, in Auburn ME. One trip equates to the passing of one person or animal past the camera. This camera went up on September 21, 2019 and came down on November 11, 2019.

Figure 3: A frequency diagram showing the most popular times of day at Whitman Spring Road. This figure presents a cumulative activity pattern (rather than an average) and encompasses every day that the trail camera was up at Spring Road from September 21, 2019 to November 11, 2019.

Figure 4: A graph showing the average trips per day at Whitman Spring Road, in Auburn ME from September 21, 2019 to November 11, 2019. Each trip represents one person passing the camera.

## Riverside Greenway Trail

**Number of Trips by Activity Type per Week**
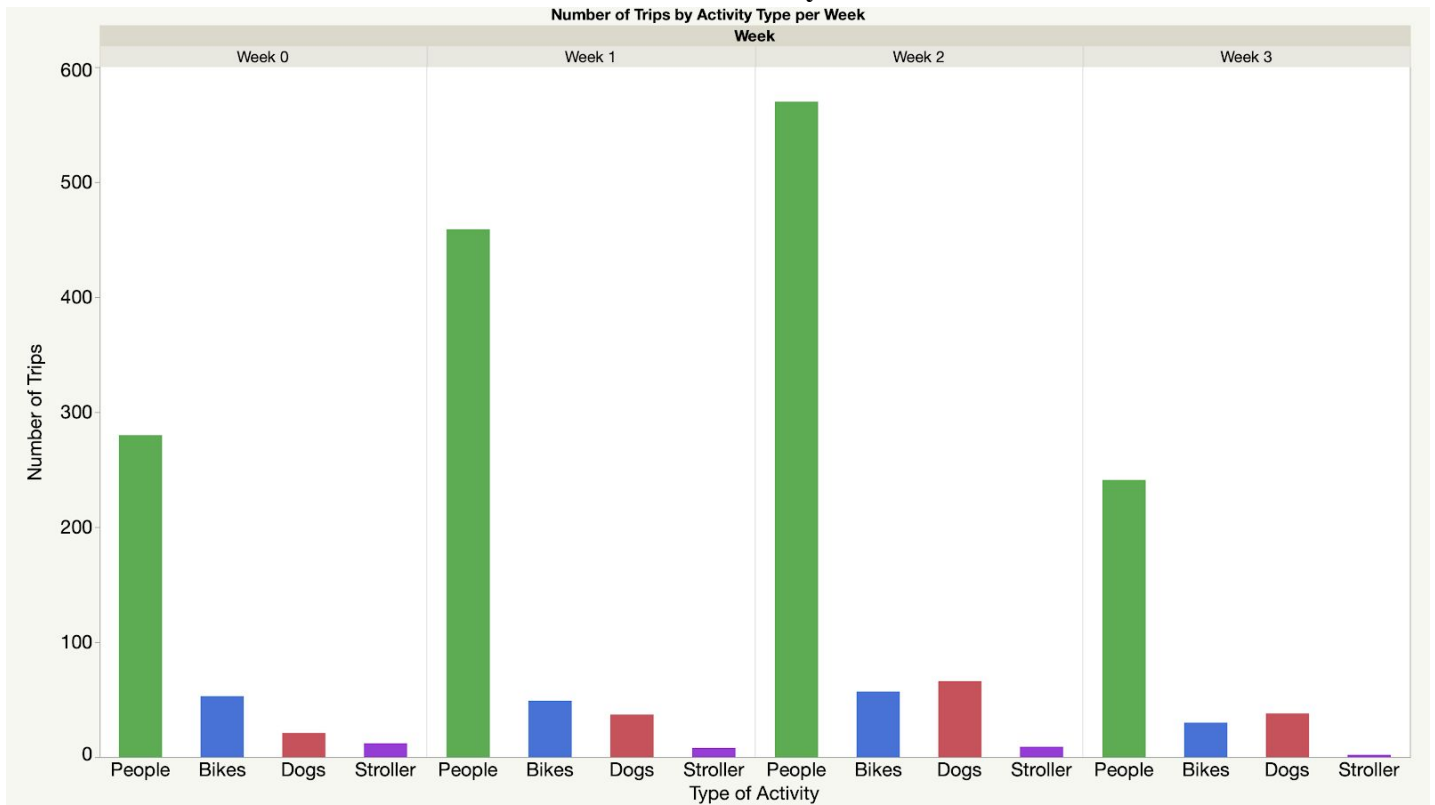


Figure 5: This graph displays the number of trips for each mode of activity over the three and a half weeks that the trail camera was present at the Riverside Greenway Trail, in Lewiston ME. One trip equates to the passing of one person or animal past the camera. This camera went up on October 24, 2019 and came down on November 16, 2019.
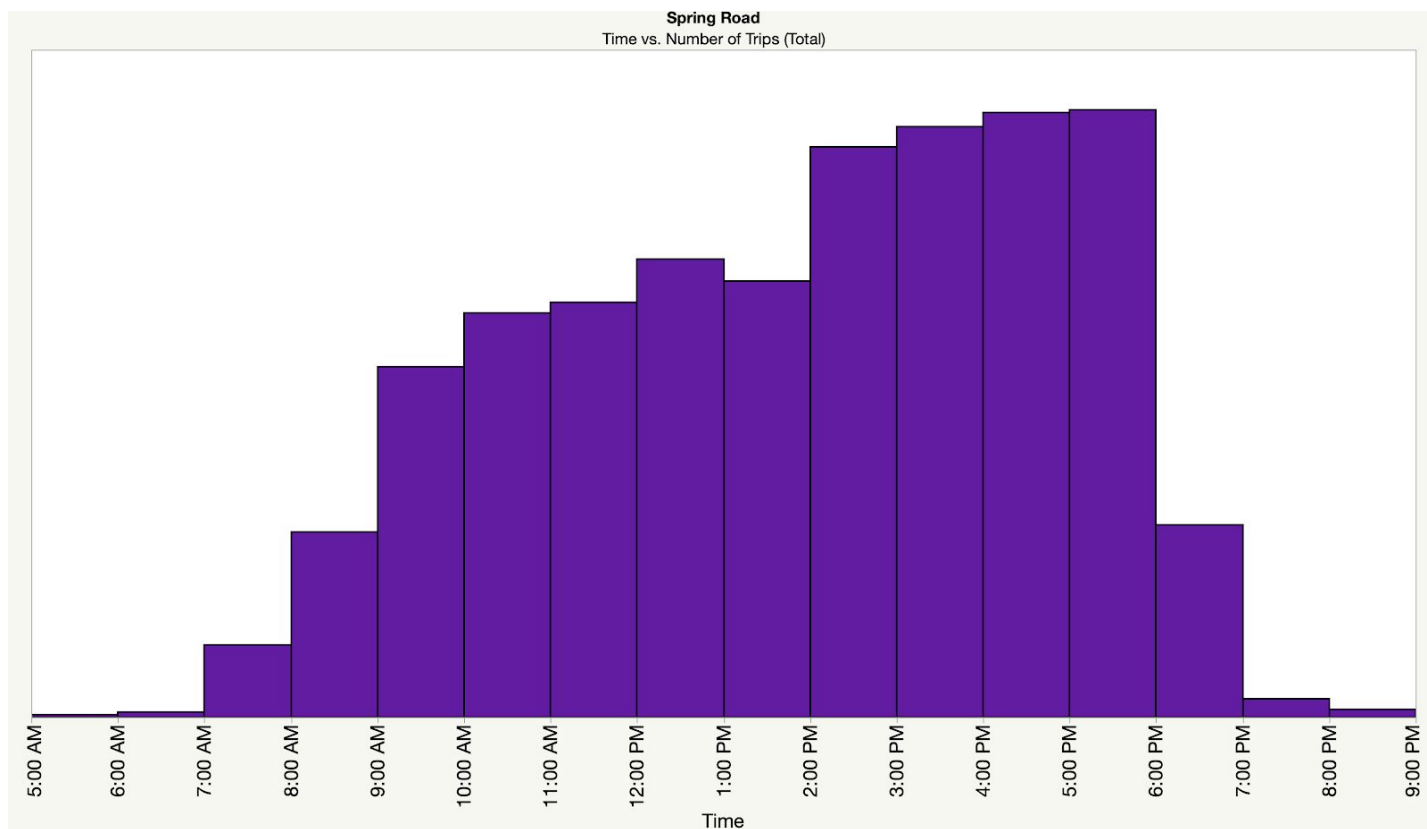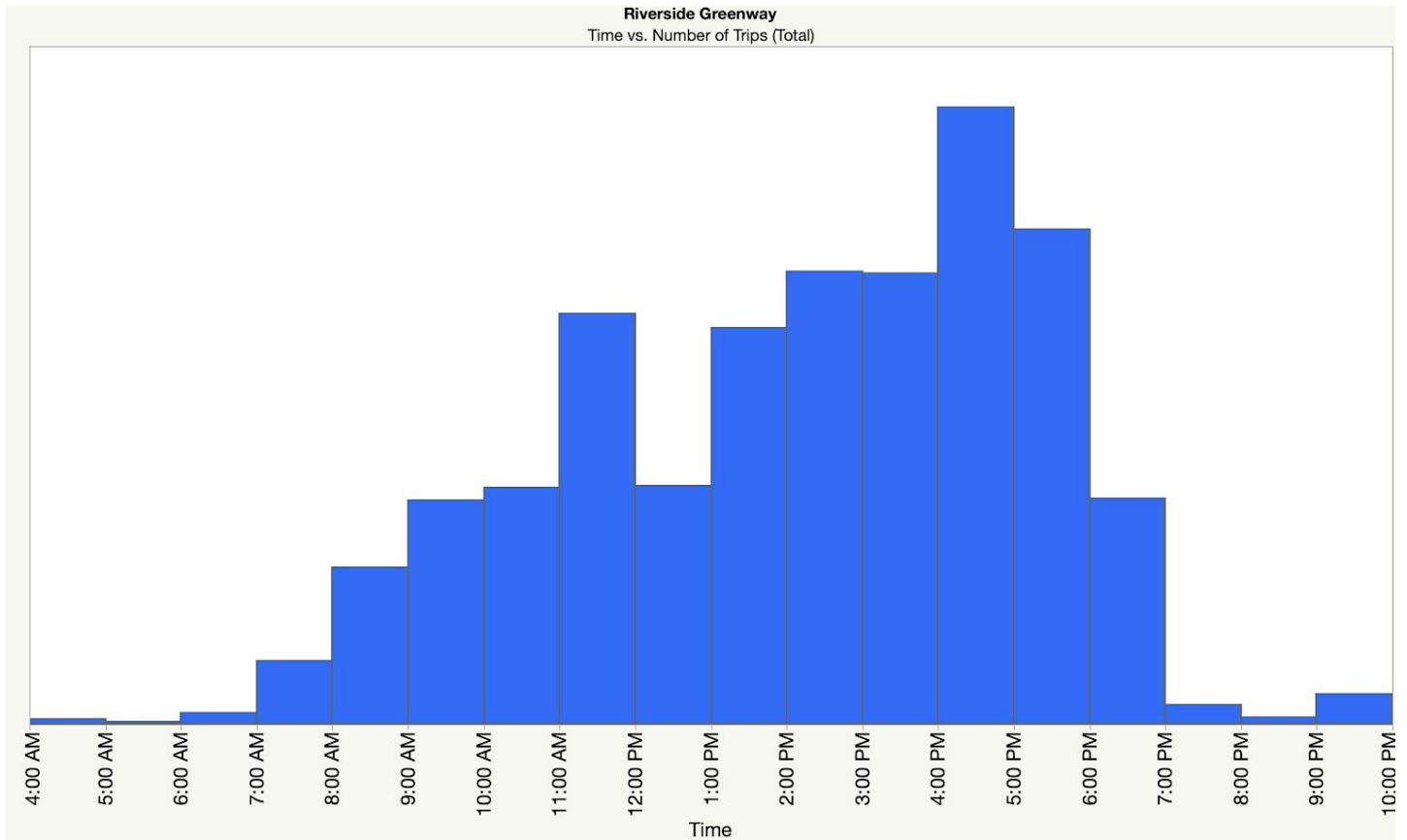
Figure 6: This frequency diagram shows the most popular times of day at the Riverside Greenway Trail. This figure presents a cumulative activity pattern (rather than an average) and encompasses every day that the trail camera was up at Riverside Greenway from October 24, 2019 to November 16, 2019.
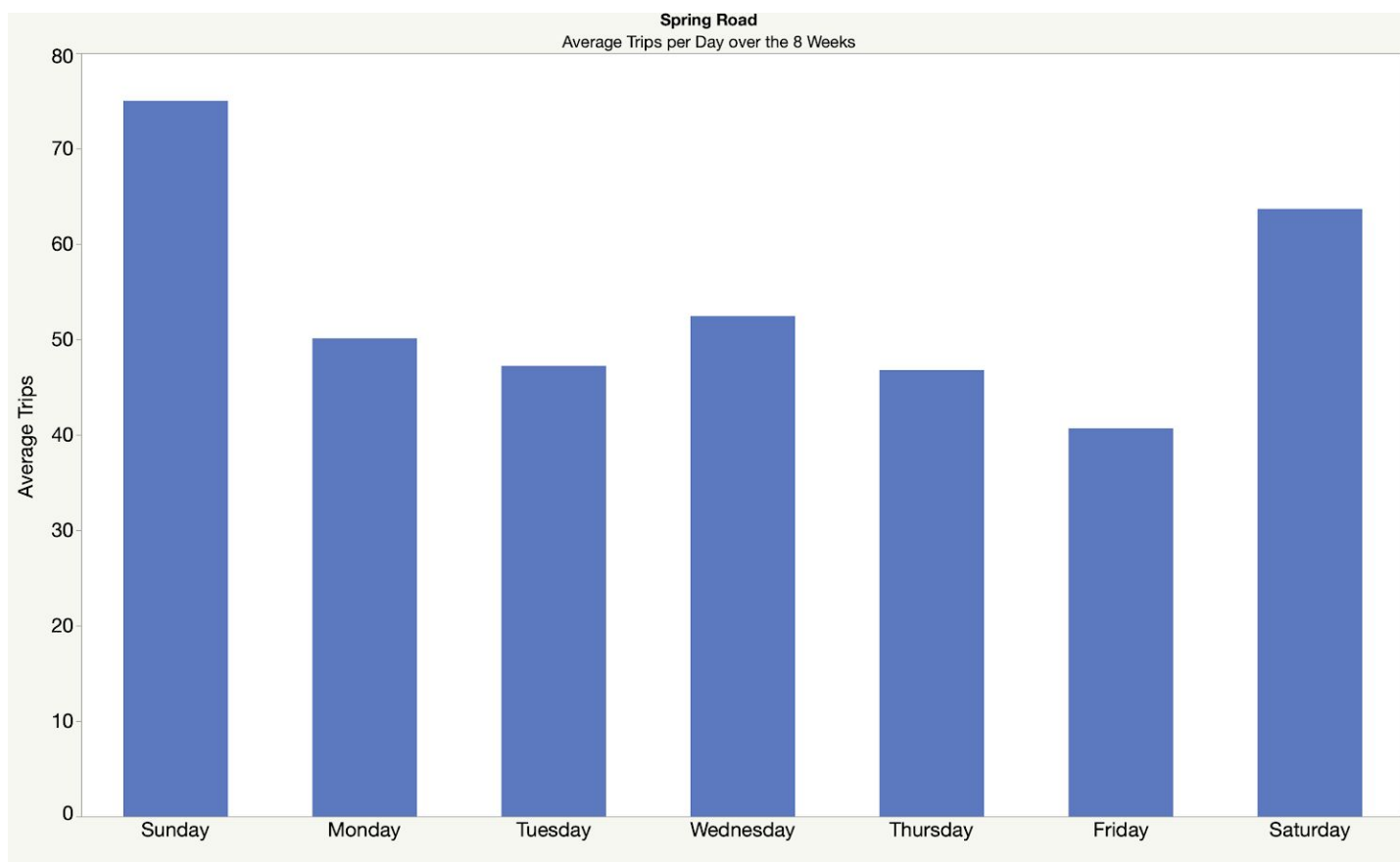
**Riverside Greenway**
Average Trips per Day over the 4 Weeks
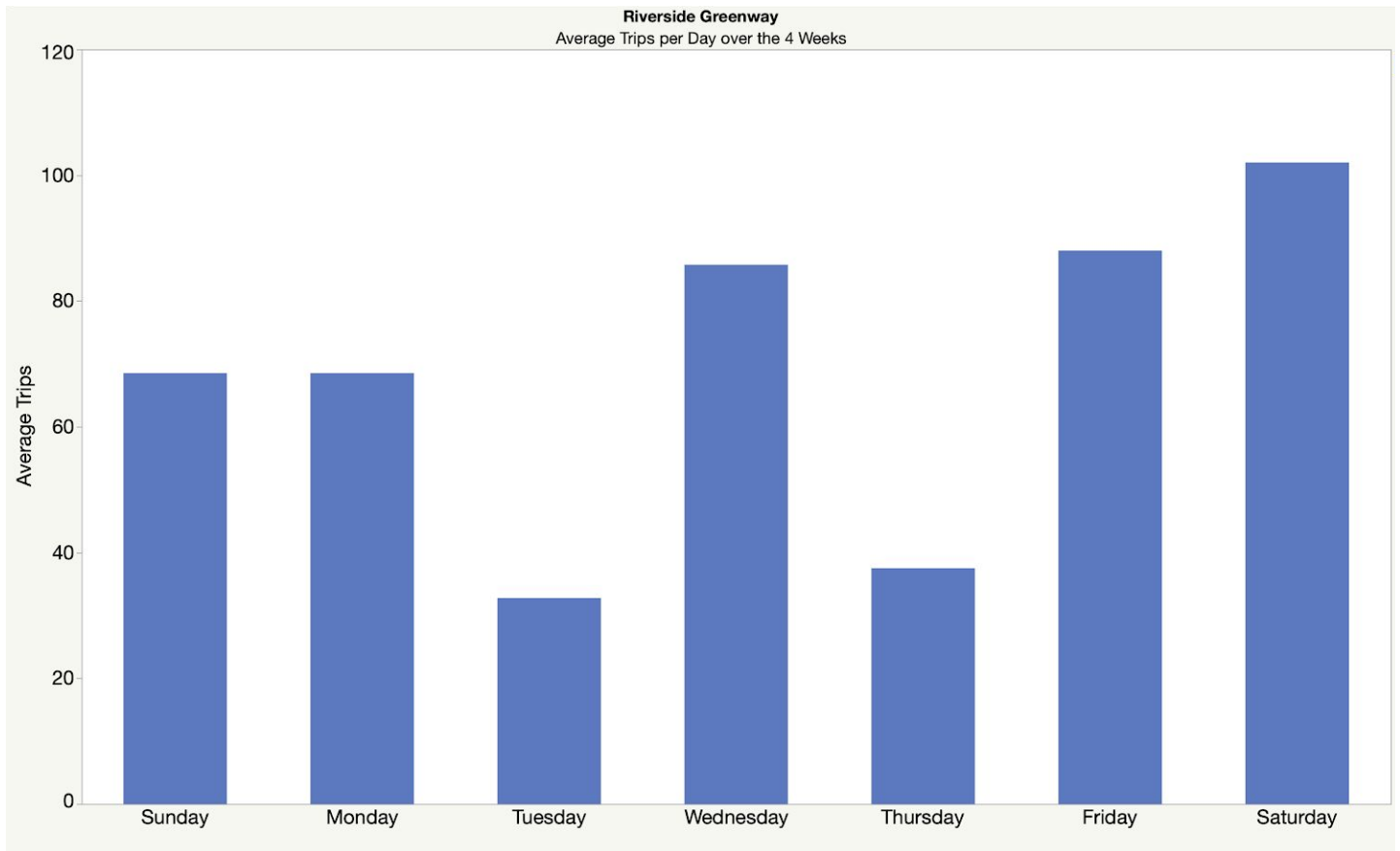
Figure 7: This graph shows the average trips per day at the Riverside Greenway Trail, in Lewiston ME from October 24, 2019 to November 16, 2019. Each trip represents one person passing the camera.

The usage data collected from the trail cameras at Whitman Spring Road and the Riverside Greenway Trail establishes a foundation of understanding about the usage patterns of these trails and provides preliminary data that can inform future data collection at other trails in the area. These results remain specific to the locations and times of collection, and cannot necessarily be extrapolated to the usage patterns of other trails or to the usage patterns of these trails during other times of year. While we intended to compare the results of these two trails with our third trail, the L/A Riverwalk, issues with camera theft prevented us from collecting data at this site.

Our data (Figure 2) indicates that roughly 400 trips were made on Whitman Spring Road each week during the early fall months in September and October, but toward the start of November, when the weather begins to get colder, the activity at the trail drops to around 200 trips each week. However, activity at the Riverside Greenway trail peaks at almost 600 trips (Figure 5) in the beginning of November. The Riverside Greenway trail likely experiences more traffic because this trail offers both recreational and transportation opportunities and remains closer to the center of town than Whitman Spring Road; the Greenway trail also offers paved pathways, unlike Spring Road, which encourages people on bikes and people with limited mobility to engage with this trail, instead of other, unpaved areas. As a rustic destination trail on the outskirts of town, Whitman Spring Road requires most users to drive to the trailhead and in doing so, deters people without the time or the means to get to the area from engaging with the trail. Given that most people use this trail on the weekends (Figure 4) and that more people bring their dogs to this trail (Figure 2 in comparison to Figure 5), we believe that Whitman Spring Road primarily offers recreational use to trail users and that people use Spring Road during their leisure time, instead of when they need to get from one place to another.

While the Riverside Greenway trail, along with Spring Road, demonstrates high activity on Saturday, the usage data for the Greenway trail also presents increased activity on Wednesdays and Fridays (Figure 7). The Riverside Greenway Trail, given its close proximity to town at both trailheads, allows users to utilize the area for transportation and for recreation during lunch hours and after school or work. The spike in activity between 11am and 12am may

indicate use during lunch periods or midday breaks from work (Figure 6). Between 4pm and 5pm presents the most popular time of use at the Greenway trail (Figure 6). This peak afternoon usage time likely correlates to the sunset and the warmest times of day, since our study extends into November, when the sun starts to set early and the weather is cold. If this study were conducted in the summer, we would expect to see different usage time distributions. Facing the same constraints of sunlight and weather, Spring Road presents similar peaks during the day, especially in the afternoon, but does not share the peak at lunchtime, since the location of the trail demands more time and forethought than the Greenway trail (Figure 3).

While we cannot determine the true accuracy of this usage data, we have high levels of confidence in this data since we informally tested the reactivity of the motion sensing trail cameras and manually sorted all of the images. One similar study, evaluating usage patterns of cyclists at a popular trail in New Zealand, encountered problems with lack of specificity in their data, since their sensors could not distinguish between cyclists, runners, animals, ect. (Ryan et al., 2014). In our study, however, we separated pictures based on the activities within them, and had specificity down to the level of each individual passerby. Our data collection process provides one of the most detailed methods of quantifying usage data, but also demands significant processing and sorting time.
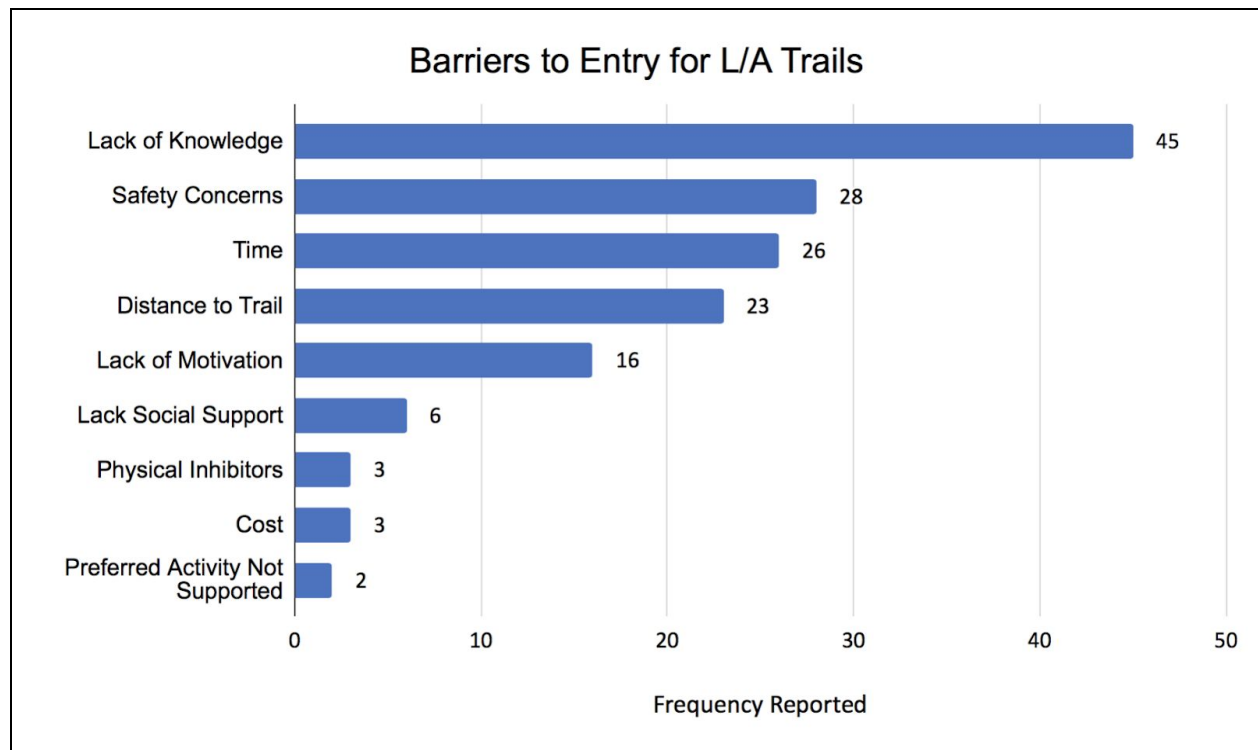
**Surveying the Public:**



Figure 8 : A graph demonstrating the self reported barriers to entry that our survey participants reported. These barriers address the various factors that prevent or deter people from engaging with the trails in the Lewiston/ Auburn area more fully. This question was presented to every survey participant and each participant could select more than one barrier.
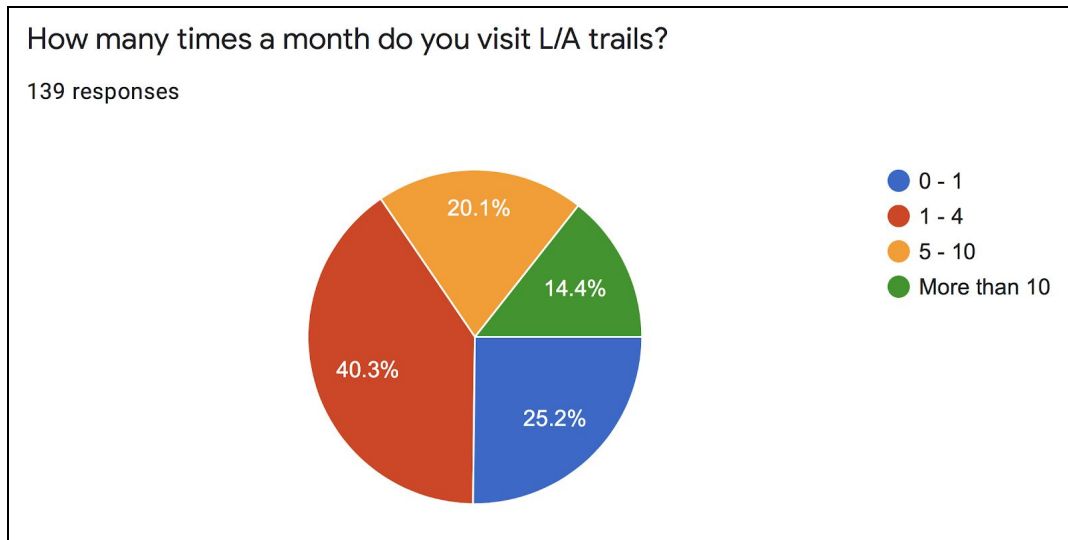
Figure 9: This chart reveals the distribution of usage frequency that our survey participants self reported. The survey only asked this question after participants reported that they are aware that trails in the Lewiston/ Auburn area exist.
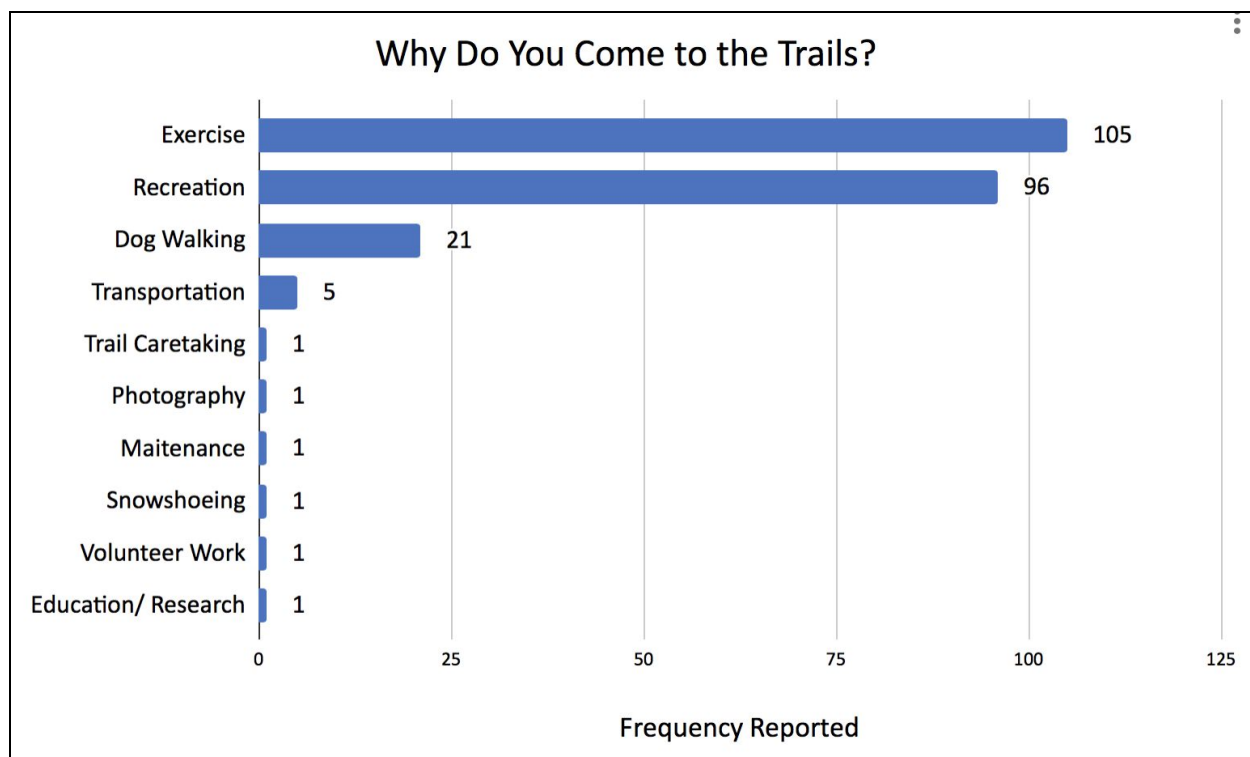


Figure 10: A graph indicating the reasons why participants engage with the trails in the Lewiston/ Auburn area. The participants could select more than one reason for visiting the trails, and could write in their own responses. Each activity with only one response shows a reason that was written in by a participant for why they come to the trails (these options are not part of the original survey).

Figure 11: A graph demonstrating which trails the survey participants visit in the Lewiston/ Auburn area. Each participant could select more than one trail or no trails.

While our survey data provides interesting insights into the public perceptions of the trails in the Lewiston/ Auburn area, these responses do not reflect an exhaustive analysis of all of the L/A trail users and only represent the viewpoints of the people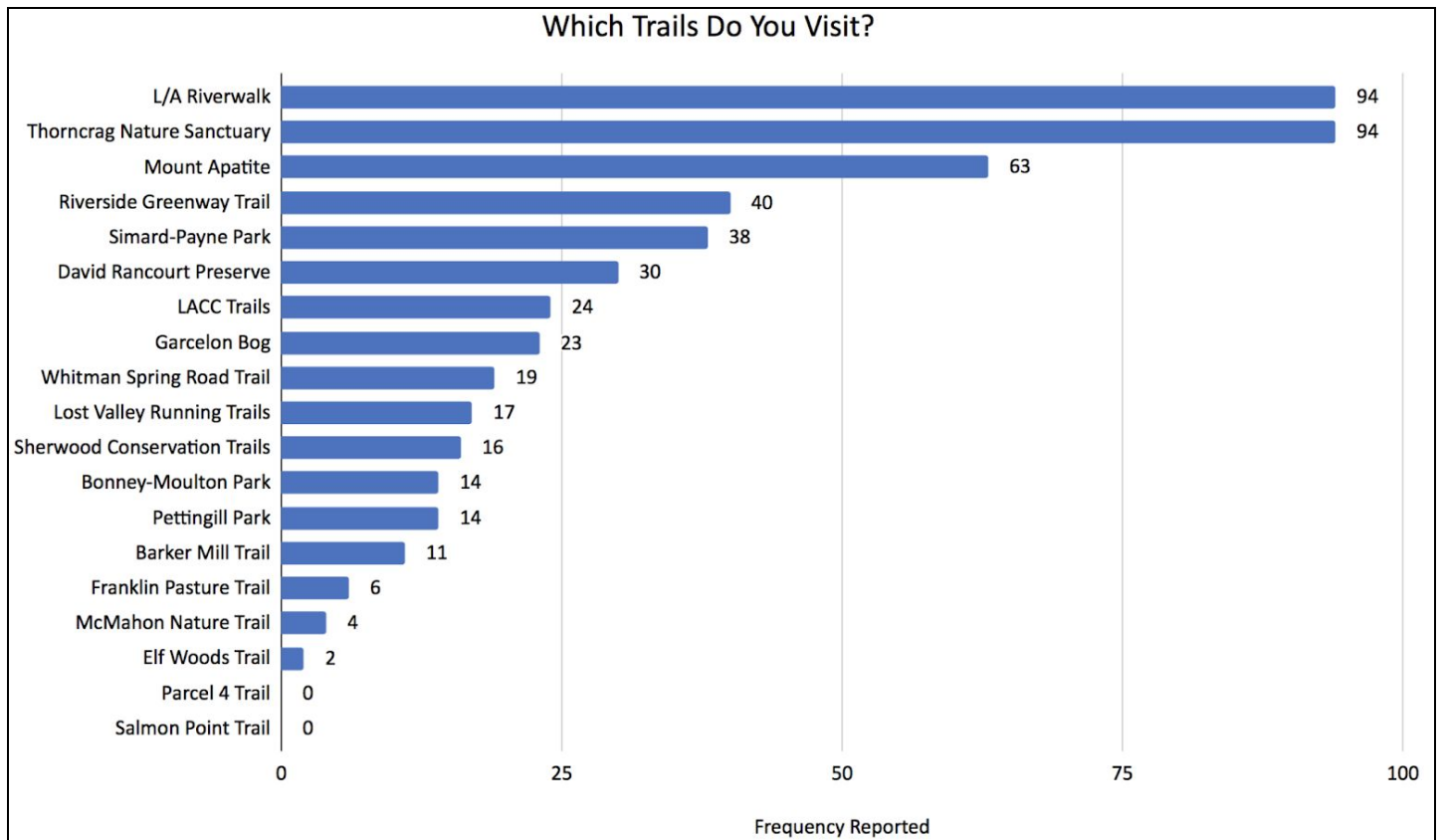 who took our survey. We know that our survey disproportionately reflects Bates College respondents, white people (approximately 96% of the respondents identify as white), and women (approximately 64% of the respondents identify as female). Our survey was also not accessible to people who do not speak English.

Despite not representing the entirety of the Lewiston/ Auburn trail community, our data presents clear trends in the public engagement with and opinions about the L/A trails, and suggests areas of focus for trail improvements in the future. In this study, barriers to entry refer to the factors that prevent or deter individuals from engaging with the L/A trails more fully. The largest barrier to entry that we found was a lack of knowledge about the L/A trails (Figure 8). Our in-person intercept survey dialogs also supported this finding since many of the people we talked with asked about the other trails in the area and wanted to know more about specific trails. If the advertisement of the L/A trails (especially the lesser known trails) were increased and people were informed about trails in their area, we would expect to see greater usage of the trails in the future.

The second most popular barrier to entry for the L/A trails was safety concerns (Figure 8). While a deep investigation of these concerns falls beyond the scope of our project, we suggest exploring whether these concerns relate to negative perceptions of the trails or coincide with actual reported crimes. One study, analyzing the reliability of intercept surveys at trails in South Carolina, surveyed a population of trail users and then re-surveyed the same people in order to compare the two sets of responses. While generally finding high reliability of survey data, this study reported that perceived safety presented the least consistent results between the two surveys events (Troped et al., 2009). Similarly, safety concerns at the trails in the L/A area likely vary significantly based on a variety of flexible factors, including the time of day, the accompaniment of a friend or a dog, and the presence of the other trail users.

Along with the safety concern sentiment, many of the open response answers indicated anxiety about the homeless population in the area and wanted to see these people moved to a

different location. The state and the country holds the responsibility to do justice to the homeless community and trail organizations cannot combat this issue on their own; however, information about this concern can encourage creative solutions that respect all of the various groups of people that use and depend on the L/A trails.

Most of our respondents reported visiting the trails for exercise and recreation (Figure 10). These responses indicate significant voluntary engagement with the trails, and demonstrate a public desire to connect L/A trails with positive health benefits for the community, such as better fitness. The question on the survey that addressed the frequency of participants' trail use found that over ⅓ of the survey respondents use the trail more than once a week (5 times or more in a month) (Figure 9). This information suggests that using the trails becomes a part of peoples' routines, and creates a community experience in which frequent users likely see familiar faces on the trails. This knowledge might motivate upkeep and defense of the trails, since many people clearly value the trails and continue to return to them.

With respect to the various trails in the Lewiston/ Auburn area that people visit, our respondents most frequently reported going to the L/A Riverwalk and the Thorncrag Nature Sanctuary (Figure 11). These trails, interestingly, present nearly opposite experiences to the user, yet share the same frequency rating in our survey. The L/A Riverwalk connects the two major towns of Lewiston and Auburn and exists as a transportation route, an exercise space and a hangout spot for the community; this trail provides a brief escape from the cars, buildings and noise in the surrounding area. The Thorncrag Nature Sanctuary, however, occupies the edge of town and provides an expansive natural and removed space for recreation, exercise and learning. Given the popularity of both of these types of trails, our study suggests that all different types of trails provide valuable services to the community and one type of trail should not gain priority over another.

**Amenities Data and Mapping:**

The information gathered on the amenities of the trails allows L/A Trails to consolidate standardized data to make easily available what trail users or potential trail users can expect from any certain trail, before and while using the trails. This information is important because certain amenities may make specific trails attractive or unattractive to certain people, depending on their needs and desires for the trails. Not all sites or organizations with information regarding trails in the L/A area have the same or correct amenities information. Since L/A Trails now, with our help, has access to L/A trail amenity information, they can upload the data in a consistent way so that people interested in the trails can easily find the information that they are looking. After cross referencing the amenities information collected from the trail owners to the information listed on external sites linked through the L/A Trails website, we found that 16.4% of the information did not match. We also found that 39.1% of the amenities information we asked for was not listed on the external sites and seven trails did not have amenities data linked. Including the correct amenities data in the future map/website of L/A Trails gives L/A Trails more control over what information is available and how accurate it is. In the amenities survey, we also asked each trail owner whether they had GPS/GPX or shapefile data for each trail and whether they had source maps for each trail; there is GPS/GPX/shapefile information for thirteen of the trails and there are source maps for seven of them. *View Appendix 4 for specific trails with GPS/GPX/shapefile data and source maps.* L/A Trails can contact the trail owners for this data in the future in order to display the information in their improved online map. The 360 degree photos, giving an interactive street view image of all of the trial heads, may also be included in the future map in order to help trial users make decisions about which trails they want to use and how to find the trailheads.

This amenities data that we collected can eventually be entered into the new L/A Trails website map. L/A Trails wished to change the way that their online map was presented in order to make the site more visually appealing and user friendly. Looking at the benefit of trail maps in Yoho National Park in Canada, one study found that users who engaged with easy to read and colorful maps found more benefit in the trails and took better advantage of the trails (Careen et al., 1982). The L/A Trails organization, hoping to increase public engagement and enjoyment of

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the trails in the area, would benefit from an improved trail map. For their new online map, L/A Trails wants a site that works well for mobile users, is more interactive, and lists as much information as possible directly on the LA Trails website, rather than linking to external sources. This, as previously stated, allows LA Trails more control over the trail information. We chose the Map Marker Pro rather than an entirely new platform because it is relatively less expensive, easily implemented into the existing LA Trails website, and easily accessible so that someone with little to no programming experience can manage the map.
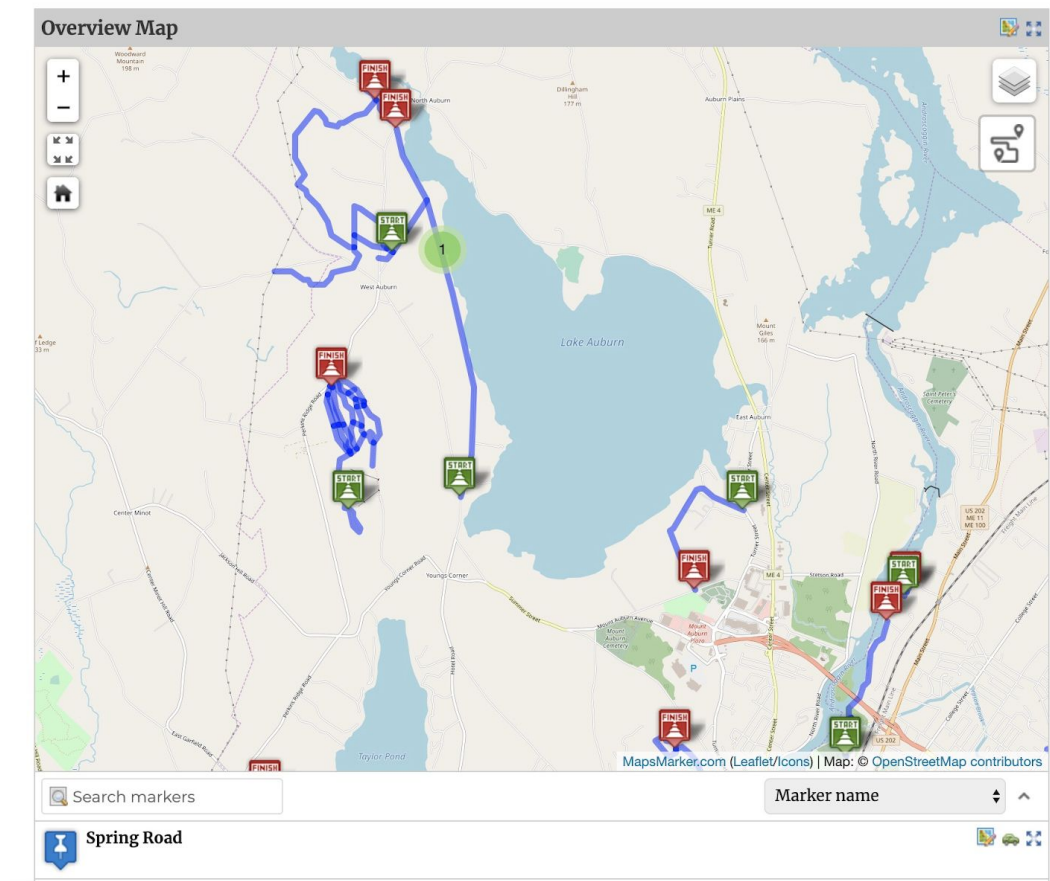


Figure 12: A sample of the beta map for the LA Trails new website. In the actual site, users can click on a trail and view amenities information and directions to the trail heads.

# RECOMMENDATIONS FOR NEXT STEPS

We will categorize our recommendations for the steps that will follow this report into three sections: continuing data collection, making data accessible, and increasing trail usage. Continuing data collection involves investing in a system for counting trail users and applying this system to trails beyond the three that we focused on in our report. This system could be motion activated trail cameras like the ones we used; however, we found our cameras were easily stolen when left at ground level with a small chain and padlock. Therefore, if cameras are used, it would be ideal to have a more secure mechanism for locking the cameras into place in order to avoid theft. We found that placing the camera well above eye level was effective; there are also a number of security boxes on the market for trail cameras. In contrast, there are a number of trail counters, which use infrared technology, that could also be used to determine trail usage. One potential downside to this solution is the lack of information available regarding the type of activity the user is doing; however, this method does not require someone to sort and count the data, as with the trail cameras, so it may be beneficial in regards to labor. Another possibility is a closed-circuit television camera system. However, there are a number of privacy and safety concerns to be aware of regarding these systems, particularly for marginalized groups, and this may result in some trail users feeling less safe on the trails.

Our next recommendations regard increasing accessibility to data. First, we recommend informing the external trail sites of the inaccuracies regarding information for trails in the Lewiston-Auburn area and providing the correct information. *View Appendix 5 for a list of external site inaccuracies.* Second, we recommend implementing a new mapping platform, such as the one we demoed, in order to allow L/A Trails the most control over information about the trails. L/A Trails might also wish to explore the possibility of partnering with Maine Trail Finder, a resource that has many of the features our partner is looking for in a mapping platform and is overseen in Farmington, Maine.

Finally, we have recommendations for increasing future usage of trails. The usage data collected by the trail cameras, and the system L/A Trails chooses for future collection, can be

used when applying for funding opportunities for the trails. Knowing which trails are most popular and for what activity can be helpful in providing accurate information to donors. This information, as well as comparing amenities information for the various trails, can also be used when making decisions for future trail improvements. Improving the aspects of the trails that are most used, desired, and needed can increase engagement with the trails. Other ways to possibly increase future trail usage is to make the information more accessible through translating the information into other languages and increasing trail signage with information about the trails on the ground.

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# APPENDICES

**Appendix 1: List of Trail Owners**

Androscoggin Land Trust

City of Auburn

City of Lewiston

Lake Auburn Community Center

Lost Valley

Lake Auburn Watershed Protection Commission

Stanton Bird Club

**Appendix 2: User Survey Questions**

1. How many times a month do you visit L/A trails?

    a. 0-1

    b. 1-4

    c. 5-10

    d. More than 10

2. Why do you come to the trails?

    a. Recreation

    b. Exercise

    c. Transportation

    d. Dog Walking

    e. Other

3. What do you like most about the trails?

4. What could be done to improve the trails? Please specify which one.

5. Are there any barriers to entry for the trails?

    a. Cost

    b. Time

    c. Preferred activity not supported

    d. Distance to trail

e. Lack of social support

f. Physical inhibitors

g. Lack of knowledge

h. Lack of motivation

i. Safety Concerns

j. Other

6. Which trails do you visit?

   a. Barker Mill Trail

   b. Bonney-Moulton Park

   c. David Rancourt Preserve

   d. Elf Woods Trail

   e. Franklin Pasture Trail

   f. Garcelon Bog

   g. LA Riverwalk

   h. Lake Auburn Community Center Trails

   i. Lost Valley Running Trails

   j. McMahon Nature Trail

   k. Mount Apatite

   l. Parcel 4 Trail

   m. Pettengill Park

   n. Riverside Greenway Trail

   o. Salmon Point Trail

   p. Sherwood Conservation Trails

   q. Simard-Payne Park

   r. Whitman Spring Road Trail

   s. Thorncrag Nature Sanctuary

7. Do you have any additional comments regarding the public trails in the L/A area?

8. What is your age?

9. What is your gender?

10. What is your race?


**Appendix 3: Amenities Data Survey Questions**

1. What is the surface of the trail?

    a. Dirt

    b. Gravel

    c. Paved

    d. Grass

    e. Other

2. Is there parking?

    a. Yes

    b. No

    c. Paid

    d. Other

3. Are there bathrooms?

    a. Yes

    b. No

    c. Other

4. Is it pet-friendly?

    a. Yes

    b. No

    c. Other

5. Is biking allowed?

    a. Normal Biking

    b. Fat Biking

    c. None

    d. Other

6. What is the distance of the trail?

7. Is there trailhead/information signage?

    a. Yes

    b. No

    c. Other

8. Are there maps/brochures available?

    a. Yes

    b. No

    c. Other

9. Are there trash/recycling receptacles?

    a. Yes

    b. No

10. Is this trail accessible to those with limited mobility?

    a. Yes

    b. No

    c. Other

11. Is this trail ever closed?

    a. Yes

    b. No


**Appendix 4: List of Trails with Mapping Data**

Trails with GPS/GPX/Shapefile Data:

    Mount Apatite, Lake Auburn Community Center Trails, Auburn Riverwalk, Pettengill
    Park, Barker Mill, David Rancourt Preserve, Sherwood Conservation Trails, Whitman
    Spring Road, Lewiston Riverwalk, Franklin Pasture, McMahon Nature Trails, Garcelon
    Bog

Trails with a Source Map:

    Lost Valley, Lake Auburn Community Center Trails, Auburn Riverwalk, Mount Apatite,
    Lewiston Riverwalk, Franklin Pasture, McMahon Nature Trails

**Appendix 5: List of External Trail Site Inaccuracies (By Trail)**

Sherwood Conservation Trails:

- Maine Trail Finder lists parking as available in front of school

- Both Maine Trail Finder and ALT website list only mountain biking, not both kinds

- Trailfinder lists 2.4 miles of trails, ALT website lists 2.1 miles

Auburn Riverwalk :

- Auburn parks website lists bathrooms as available

- Biking is not listed on Maine Trail Finder site

Pettengill Park:

- Biking listed on Auburn Parks site

Mount Apatite:

- Bathrooms not listed online

- Pet friendly not listed

- Distance not listed on Auburn Parks site

- Trailheads not on map on Auburn Parks site

- Type of path not listed on Auburn Parks site

- Closing not listed on Maine Trail Forks

LACC Trails:

- Lists 4.8 miles on Maine Trail Finder

Thorncrag Nature Preserve:

- Lists no pets at all on Thorncrag website

- Distance not listed

- Trailheads not listed

- Listed as open only during daytime