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Who Uses this Facility and Why? Developing Survey Tools to Implement the Trail Modeling and Assessment Protocol

by

Jesse Cohn

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Executive Summary

Policymakers and transportation planners utilize quantitative methods for developing and prioritizing transportation investments. While travel forecasting and evaluation tools have been employed in the highway planning process for decades, these instruments have only recently begun to be developed for non-motorized transportation investments. As a result, road projects are typically described as needs, while projects addressing conditions for bicyclists and pedestrians are often considered "amenities" (RTC 2014, T-MAP Fact sheet). Individual agencies have developed programs to measure trail use along local greenway corridors, but there currently are no national methods for demand and impact estimation on trails and greenways. To address this gap, the Rails-to-Trails Conservancy has undertaken a $1.2 million, three-year project called Trail Modeling and Assessment Platform (T-MAP) to create "trail planning data collection instruments, methodologies, and analysis tools" (RTC 2014, T-MAP Fact sheet).

As part of T-MAP, the Rails-to-Trails Conservancy will lead the first nationwide survey of trail use. This paper contributes to the development of the T-MAP survey tools and methods, which will provide the empirical data necessary for calculating the health and transportation impacts of trail investments. Without this data, the impact analyses would rely on crude assumptions. The survey data allows Rails-to-Trails to learn more about trail use and usage, which will allow the organization to make a better case for trails. The T-MAP survey implementation will include two components: an intercept survey and an online survey. This project focuses on the development and refinement of the trail user survey and survey distribution protocol, which will outline strategies for effective survey administration, including survey timing, location, incentives, and surveyor training.

While nationally there have been broad efforts to summarize bicycling and walking activity, limited work has been done to address trip and user characteristics for activity along non-motorized trails. The information gap is not just that there is limited trail-specific information, but also that there has not yet been one survey (with a substantial sample size) that quantifies active transportation, evaluates it based on trip purpose, and determines the transportation and health impacts of using these modes. In addition to quantifying the trail use and user trends, some organizations provide guidance to local and state organizations seeking to collect and analyze their own data. T-MAP aims to build upon these existing tools to provide a more comprehensive and nuanced tool for quantifying trail benefits.

A systematic review of existing trail surveys provides insight into the content and distribution of initiatives similar to T-MAP. All studies evaluated in this review employed an intercept survey as at least part of their research methods. In many publications, this was the sole method for measuring the desired trip and user information. Lumsdom, Downward, and Cope (2004) employed several methods to gather their data. This use of complementary methods is similar to how T-MAP's intercept survey fits within its larger data collection scheme, which includes automated trail counters, manual counts and geographic information systems (GIS) analyses including routinely available data. Surveys and their questions varied in complexity purpose, and intercept survey questions addressed trip mode or activity, purpose, distance, and duration; trail use frequency; distance and mode of travel to the trail; trip replacement; and user activity level.

The data collected through this review informed the survey questions and distribution protocol employed in T-MAP.

The T-MAP survey includes both an intercept and online version. The intercept survey is short (5 minutes), while the online survey contains both a long (15-20 minutes) and short (5 minutes) version. The short version of the online survey was identical to the intercept survey, and in both surveys, questions were listed with multiple choice options wherever possible. Both surveys include five sections: current or most recent trip, trail use habits, health and physical activity, socio-demographics, and additional questions. The online version of the survey's health section includes questions from the Global Physical Activity Questionnaire (GPAQ), developed by the World Health Organization for physical activity surveillance. It collects information on physical activity in three settings – activity at work, travel to and from places, and recreational activities – as well as sedentary behavior (WHO 2015).

The intercept and online surveys were pilot tested on the American Tobacco Trail (ATT) in Durham, NC, in February and March 2015. Surveys were administered to users in three ways: through in-person participation, through receiving a trail card from a surveying volunteer, and through taking a card from a sign and plastic box posted at a trailhead. The pilot included eight three-hour survey shifts in two locations, and locations and time of surveys varied based on peak use along the facility. CamelBak water bottles were used as an incentive for in-person participation during all weekday shifts and half of the weekend shifts, and all online participants were given the opportunity to enter a raffle for a free bicycle jersey as an incentive for survey completion.

Implementing the survey distribution schedule yielded 277 survey responses, including 212 in-person surveys and 65 online surveys from both the trail card and trailhead. Response rates varied based on the survey type. Those approached on the trail were most likely to complete the survey in-person, with a 45 percent response rate. The response rate for trail cards was 26 percent, and the rate for cards taken from the trailhead was 17 percent. Incentives played a large role in determining participation; over 67 percent of trail users agreed to participate in the survey in person when the incentive was present, compared to just 41 percent when there was no onsite award for participation. These response rates were comparable with those reported in the studies evaluated for the literature review.

Of trail users who completed the online or intercept survey, 40 percent were walking, 26 percent were running, and 34 percent were bicycling. As expected, the average trip distance varied by mode. The average distance for bicyclists exceeded all other modes, and the average distance for runners exceeded that for walkers. Regardless of mode, trail users spent, on average, between one and two hours on the trail during their surveyed visit.

Trips originated in 27 different zip codes throughout the North Carolina Research Triangle region. Over half of trips (59 percent) started in zip code 27713, the same zip code as the survey location. Fifty-six percent of respondents reported that they used the same mode to access the trail as they did while on the trail. Access mode varied based on the distance traveled; those coming from farther distances were more likely to drive to the trail. This trail access distance impacted how often trail users reported using the facility. Users who live near the trail visit the

facility more frequently; those using the trail at least once a week have an average approach distance of 2.52 miles.

In addition to asking about the most recent trail trip, the online survey collected information about how the current trip compared to the typical trail trip. Eighty percent of online survey participants indicated that the mode used on their last trail trip was their typical mode on the trail. Analysis of the distances trail users traveled on their most recent visit and their "typical" trail trip show that there is not a significant difference at the 95 percent confidence interval. This finding demonstrates that the recent trail current trip distances are an accurate estimate of typical trail use.

Results from the health questions show that few people perform moderate or vigorous physical activity as part of paid or unpaid work, but those who do are active for several hours per day for an average of five or four days per week. Active travel is more common than physical activity for work; about two thirds of users walk for travel within a typical week and about one third of respondents bicycle for travel on a regular basis. The duration of these activities mirrors the durations of these modes on the trail – between .9 and 1.3 hours for walking and bicycling, respectively. Physical activity for leisure, such as sports or recreational activities, is the most common type of activity reported, with almost all users reporting either moderate or vigorous activity of this type in the typical week.

Implementation of this pilot study demonstrated that, on the whole, the survey content and distribution are successful tools for collecting the necessary data to implement T-MAP. The survey administration plan yielded sufficient responses both online and in-person, and included utilitarian and recreational users. While the pilot test was successful, it revealed several small changes that could be made to the survey content and structure to ease both surveyor and respondent use of the tool. Through tweaking the question order and phrasing, the revised survey – to be used for the national T-MAP implementation – will be a more effective instrument for collecting the data required to quantify health and transportation impacts of trail use.

1. Introduction

Decision-makers rely heavily on quantitative methods for planning and prioritizing transportation investments. These travel forecasting and evaluation tools have been used in the highway planning process for decades, but they have only recently begun to be developed for trail, bicycle, and pedestrian investments. As a result, large road projects are defined as needs, while projects to improve conditions for bicycling and walking, both on the road and on trails, are often considered "amenities" (RTC 2014, T-MAP Fact sheet).

Completing accurate cost-benefit and project prioritization analyses require comprehensive data, and this world of finite resources requires both data and analysis tools to ensure that investments are worthwhile. Project prioritization processes often compare an investment's benefits related to mobility, demand, connectivity, economic development, and safety to the local environmental and fiscal costs of the project (Shelton and Medina 2010). Each of these criterion are evaluated quantitatively, and projects can then be ranked based on compiled index of these measures (Kissel 2012). Currently, non-motorized project costs are well-documented, but accurate estimates of the impacts of this infrastructure are lacking. A better understanding of trail use – of both how and why people use these facilities – may justify expansion and support improved maintenance and operations; it can also allow agencies to sufficiently budget for snow removal during winter or to regulate any user conflicts that raise safety concerns on trails. And beyond supporting a data-driven planning process, comprehensive information about trail use can help trail managers obtain grants and identify successes or challenges to full trail utilization.

However, non-motorized transportation data is not readily available. The U.S. Department of Transportation's Bureau of Labor Statistics' *Bicycle and Pedestrian Data: Sources, Needs, & Gaps* (2000) evaluates the quality of existing data resources as either fair or poor, yet identifies the priority for better usage, trip, and user characteristics as high for use in conditions and trend analyses, network planning, crash analysis, and demand forecasting. In addition, agencies often lack the capacity to collect comprehensive data related to bicycling, walking, and trails.

Some individual agencies have developed count and survey programs to determine trail use along their local greenways, but no national trail tool for demand and impact estimation currently exists. To address this gap, the Rails-to-Trails Conservancy brought together an interdisciplinary team of researchers and practitioners to develop the Trail Modeling and Assessment Platform (T-MAP). T-MAP is a $1.2 million, three-year project to create the "next generation of trail planning data collection instruments, methodologies, and analysis tools," (RTC 2014, T-MAP Fact sheet). As part of T-MAP, the Rails-to-Trails Conservancy will lead the first nationwide survey of trail use. This paper contributes to the development of the T-MAP survey tools and methods. The project focuses on the development and refinement of the trail user survey and survey distribution protocol, which will outline strategies for effective survey administration, including survey timing, location, incentives, and surveyor training.

This paper is organized into several sections. Chapter 2 will provide background about T-MAP as well as about both national efforts to measure non-motorized activity and existing guides and resources for data collection for bicycling and walking. Chapter 3 is a systematic review of existing trail intercept surveys and studies. It outlines different approaches to both the content and distribution of these surveys. Chapter 4 provides a methodology, outlining both survey

development practice and the pilot study administration. Chapter 5 follows with a comprehensive analysis of the pilot study results, and Chapter 6 provides a discussion of both these findings and other observations made during pilot study administration. The paper closes with Chapter 7, both the paper's conclusion and a summary of next steps.

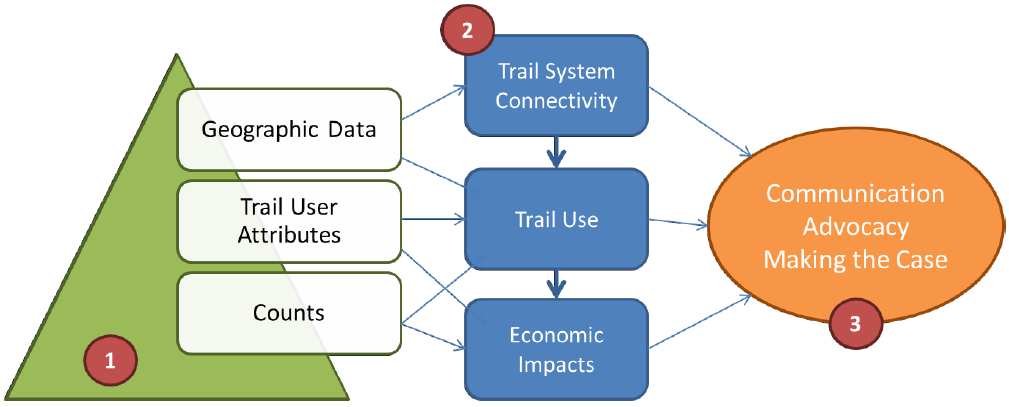
2. Background

This chapter provides information about T-MAP and its objectives and describes how this initiative aligns and builds on existing active transportation count programs, tools, and guides.

Trail Modeling and Assessment Platform

T-MAP is comprised of three broad phases: data collection, analytical models, and communication of outcomes (Figure 1). The goal of T-MAP is to create communication tools for understanding and explaining both existing trail use and benefits and the return on investment for constructing additional trail miles. The outcome of the project is not just research, but applied use of the developed tools. T-MAP will allow communities to convert model outputs into tables, graphs, and factsheets for use in trail building, planning, and policy work.

Figure 1: T-MAP Research Design

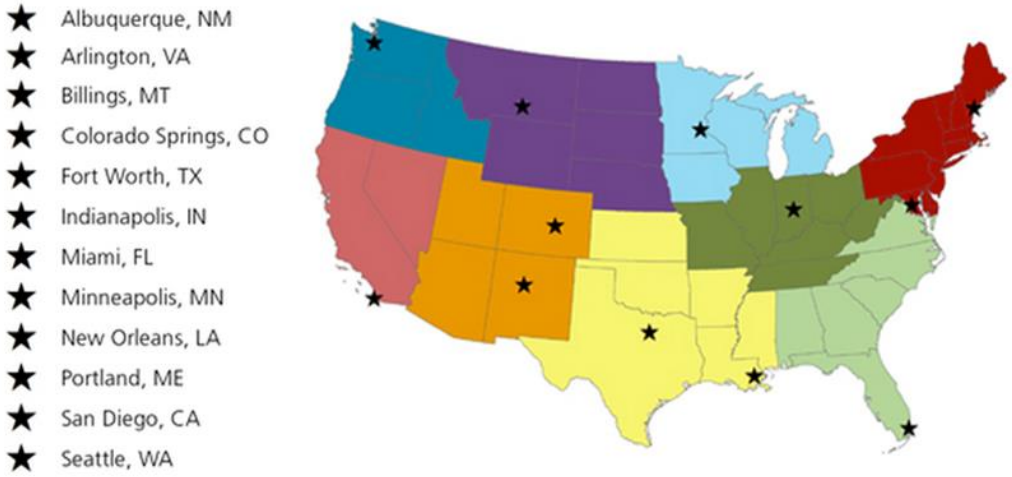


T-MAP aims to develop three core models for improving trail planning analysis:

- A GIS-based method for measuring trail system connectivity
- A trail use demand factoring and forecast model
- A set of impact assessment tools that translate trail use into dollars related to health and transportation impacts.

T-MAP data collection will inform model development, and this first phase is comprised of three initiatives: continuous automated bicycle and pedestrian counts on 46 trails in 12 urban areas, a trail user intercept survey implemented along those trails, and a spatial analysis of both the trail facility and its surrounding area (including population and nearby destinations). These cities provide a representative range of the nation's urban areas, comprising a mix of different size, climate, and demographic profiles (Figure 2).

Figure 2: T-MAP Data Collection Locations



T-MAP is managed by an advisory committee comprised of researchers and practitioners from transportation, health, and economics; the research team leads include Dr. Tracy Hadden Loh, the Rails-to-Trails Conservancy Director of Research; Dr. Greg Lindsey of the University of Minnesota; Dr. Mike Lowry of the University of Idaho; and Dr. Thomas Gotschi of the University of Zurich.

Survey Rationale and Objectives

The T-MAP survey will provide the empirical data necessary for calculating the health and transportation impacts of trail investments. Without this data, the analyses would rely on crude assumptions. The survey data allows Rails-to-Trails to learn more about trail use and users, which will allow the organization to make a better case for trails. Impact calculations will require three steps: quantification of trail use, quantification of impacts, and the monetization of impact. While the automated counters provide the data for quantifying trail use, the survey results will inform the quantification of impacts.

The T-MAP survey implementation will include two components: an intercept survey and an online survey. Both methods have strengths and weaknesses: the intercept survey, while it will provide a more accurate representation of trail users, must be short and will require significant volunteer hours. In contrast, the online survey will collect more comprehensive, detailed information and its distribution will require a limited effort, but there is a higher likelihood of a biased sample of respondents.

The use of two survey types is purposeful and significant, as mixed-mode surveys provide advantages over a single mode distribution (Lesser et al. 2011). Utilizing a mixed-mode survey can increase response rate, as Fowler (2009) noted, "One of the best ways to minimize survey non-response is to use more than one mode to collect data…Mixing modes can enable researchers to reach people who are inaccessible via a single mode" (61). Also, multi-mode surveys can reduce cost of using a single, more expensive mode like implementing intercept interviews (Lesser et al. 2011). The primary disadvantage of multi-mode surveys is the

comparability of data across different modes (Fowler 2009). Chapter 5: Results addresses the variability in responses between the two survey types.

National Efforts to Measure Non-motorized Activity

While nationally there have been broad efforts to summarize bicycling and walking activity, limited work has been done to address trip and user characteristics for activity along non-motorized trails. The information gap is not just that there is limited trail-specific information, but also that there has not yet been one survey (with a substantial sample size) that quantifies active transportation, evaluates it based on trip purpose, and determines the transportation and health impacts of using these modes.

- The National Household Travel Survey (NHTS), a periodic national survey, provides comprehensive data on travel and transportation patterns across the country. The most recent survey was completed in 2009, with previous surveys conducted in 2001, 1995, 1990, 1983, 1977, and 1969. Data is collected for all trips, modes, purposes, and lengths for households and individuals in those households over a 24-hour period (FHWA 2015). The NHTS records each trip link from one location to another as well as access links (such as biking to a bus station or walking from a parked car to one's final destination). However, respondents often underreport short trips, so non-motorized travel is likely to be greater than the metrics provided through this survey (Litman 2014).
- In 2008, the National Highway Traffic Safety Administration (NHTSA) and the Bureau of Transportation Statistics (BTS) published results from the *National Survey of Bicyclist and Pedestrian Attitudes and Behaviors*. Telephone interviews were conducted with a nationally representative sample of 9,616 respondents 16 or older in the U.S. in 2002. These results were then weighted to reflect the national population of 208 million non-institutionalized people 16 or older residing in the United States. The survey included information about bicyclists and pedestrians' frequency of activity, injury occurrences, and trip purposes, as well as demographic information an attitudinal data about personal safety (based on provided facilities, visibility, or area crime) and helmet legislation. While this provided a comprehensive descriptive analysis of cyclist and pedestrian behavior, it did not link these results to travel impacts, nor did it package the information in a way that communities can use to bolster investments in non-motorized transportation projects within their jurisdiction (NHTSA 2008).
- Initiated in 2003, the National Bicycle and Pedestrian Documentation Project (NBPD), co-sponsored by Alta Planning + Design and the Institute of Transportation Engineers Pedestrian and Bicycle Council is a nationwide effort to collect consistent bicycle and pedestrian data in order to estimate demand and activity. The NBPD website includes downloads such as data collection instructions, forms, and data entry sheets as well as training materials for both counts and surveys (NBPD 2014). While this provides a methodology for data collection, it does not address how counts may be transferred into local impacts.
- Transportation Research Board (TRB) Bicycle and Pedestrian Data Subcommittee, formalized in 2011, focuses on non-motorized travel data acquisition including volume counting, understanding traveler behavior, and capturing relevant supporting transportation data, and it addresses these activities' collection methods (TRB 2011).

In contrast to these efforts, T-MAP provides trail-specific tools for quantifying use and impacts.

Non-Motorized Transportation Data Analysis and Collection Guides

National organizations do not just seek to identify national trends in bicycling and walking, but also to provide guidance to local and state organizations seeking to collect and analyze their own data. Given that T-MAP involves both conducting data collection and developing tools for agencies to employ in these processes in the figure, it is important to review the existing national standards for non-motorized and trail data collection and analysis.

- In 2014, the National Cooperative Highway Research Program (NCHRP) published *Report 797: Guidebook on Pedestrian and Bicycle Volume Data Collection*. The guide is directed to transportation practitioners involved in collecting non-motorized count data. It describes methods and technologies for counting bicyclists and pedestrians and includes guidance on selecting the appropriate method based on agency resources and goals.
- The 2013 *Traffic Monitoring Guide* by Federal Highway Administration (FHWA) provides guidance on traffic monitoring for motorized and non-motorized modes. It reviews different technologies for bicycle and pedestrian count monitoring and includes strategies for implementing effective permanent and short-duration count programs. A prior version of this guide, the FHWA *Guidebook on Methods to Estimate Non-Motorized Travel* (1999), describes and compares the various methods and tools that can be used to forecast non-motorized travel demand or that otherwise support the prioritization and analyses of bicycle and pedestrian facilities. It includes methods aimed at demand estimation, relative demand potential, and supply quality analysis. The report identifies extensive data collection as a challenge to utilizing some of these methods, but it does not discuss methods for undergoing this data collection.
- Another study by FHWA (2005) analyzes 29 different data collection efforts related to bicycling and walking in an effort to help practitioners determine the most accurate and efficient way to measure bicycling and walking given a community's resources and goals. In addition to including a description of each case, the report includes information such as methods and optimum timing for pedestrian and bicycle data collection; emerging technologies that can be used to gather and analyze data; and benefits, limitations, and costs of different techniques. It segments data collection approaches into those that seek to quantify use, survey users (through intercepting non-motorized users and through sampling the general population), and documenting facility extent.
- The Rails-to-Trails Conservancy *Trail Survey Workbook: How to conduct a survey and win support for your trail* (2005) provides additional detail for this data collection method. It outlines the steps of successfully developing and implementing a survey: establishing the goals of the project, determining who to interview, choosing a data collection methodology, creating the questionnaire, collecting and analyzing the data, and producing a report. The survey methods summarized include drop box and mail-back forms, personal intercepts, direct mail and email, and posted website surveys.

One study implements the same survey content through multiple methodologies for the purpose of evaluating how survey distribution methods impact results (Schneider, Toole, & Flink 2006). Surveys are distributed through students, the local bicycle advisory committee, mailers, and an online link, and the researchers find that there are significant differences in the response to many questions depending on what method was used. These differences focus on the following types of questions: 1) household and individual characteristics, 2) bicycling behavior, 3) bicycling preferences, and 4) safety and security. While many practitioners had previously presumed that

surveys that are distributed using different methods will generate different results (because they reach different groups of people), Schneider et al. (2006) confirms this presumption with quantitative data.

3. Systematic Review

This systematic review aims to provide a detailed understanding of previous studies using trail intercept surveys. Rather than summarizing the research by individual article, the chapter is broken into sections based on different topics related to the survey, and provides information about survey content – such as trip purpose, frequency of use, and physical activity behavior – and survey distribution, covering survey platforms, user sampling, and the role of incentives and volunteer training.

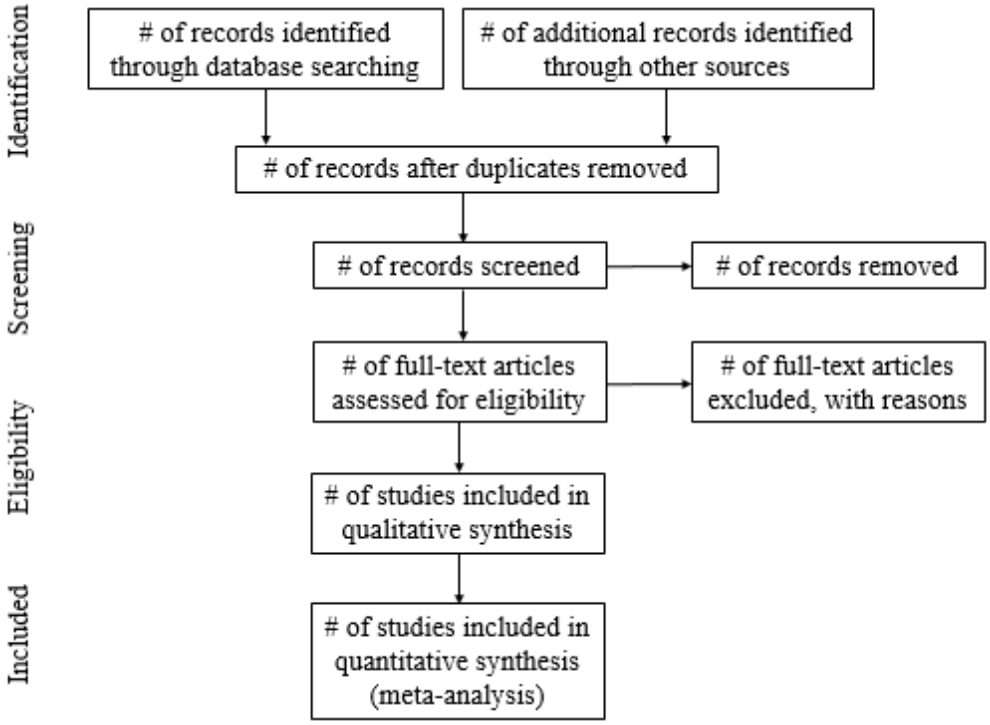
Methodology

This systematic review follows a transparent process and clear methodology in order to reduce the risk of bias and increase the accuracy of the review. The review includes both scholarly articles and grey literature (including documents produced by government, academic, or nonprofit organizations, but that have not gone through peer review). This section outlines how studies were selected as well as what specific content was review within each publication.

Research Selection

The research selection loosely followed the process put forth in the PRISMA statement, which follows four main steps: identification, screening, eligibility, and inclusion (Moher et al. 2009). Figure 3 summarizes these phases.

Figure 3: Systematic Review Process



Source: Moher et al. 2009

Study Identification

To identify relevant studies for inclusion, the terms searched for included "trail" or "trails" and "intercept survey" or "intercept surveys". The search was conducted in three databases.[1] These include:

- *Google Scholar* – this database provides a simple approach to searching scholarly literature, and will likely include more grey literature than the other sources
- *PubMed* – this tool comprises biomedical literature from MEDLINE, life science journals, and online books. This database should return studies highlighting the impact of trails on health.
- *TRID* – hosted by the Transportation Research Board, this search engine compiles research from the Transportation Research Information Services and International Transport Research Documentation databases

These databased searches were conducted on December 5, 2014. The numbers of resulting records are included below (Table 1).

Table 1: Search Results

Search Terms	Database		
	PubMed	Google Scholar	TRID
"Trail" & "Intercept Survey"	7	272	2
"Trail & "Intercept Surveys"	1	238	0
"Trails" & "Intercept Survey"	4	266	4
"Trails" & "Intercept Surveys"	1	229	3

In addition to this database search, other key sources were identified as well. These were documents cited within the records collected in the database review. Several Google and Google Scholar searches were also completed to find published material that fit a specific need within this project.

Study Screening and Eligibility

Duplicate records collected from different sources were eliminated, and an initial screening removed records with irrelevant titles. Only titles that referenced trails or trail use, parks or park use, bicycle and pedestrian trips, or measurement of health impacts from physical activity were retained. Articles to which full-text versions were not available through the UNC library were eliminated (Table 2).

Table 2: Initial Screening

Total Records	1027
- Duplicates	479
- Excluded through Screening	423
- Full Text Not Available	15
Remaining Citations	110

[1] None of the three databases automatically include plural forms of provided terms in their search.

During the assessment for eligibility, content considerations were used to identify relevant research (Table 3). Records were screened for relevant methods (an intercept survey) and for content relevance based on their inclusion of a distribution scheme or of questions relating to trip characteristics and physical activity habits. Records with relevant research that was duplicative to other citations were removed as well. For example, when the search returned both a journal article and grey literature, the journal article was retained while the grey literature associated with that study was removed. These included newsletters or other articles summarizing academic literature or agency-produced reports.

Table 3: Eligibility Assessment

Eligible Citations	110
- Irrelevant Methods	15
- Irrelevant Content	54
- Repetitive Content	5
Included Records	36

Included Studies

The remaining 36 full-text documents were reviewed and divided into four types:

1) *Relevant Cases* – the bulk of literature summarized below, these documents are comprised of a specific trail intercept survey, including implementation, and results;
2) *Relevant Research* – these studies evaluate the reliability of specific trail intercept survey questions and distribution methods;
3) *Review Articles* – these studies are comprised of literature reviews of active transportation research and trail survey research; and
4) *Guidance Documents* – these sources provide sample methods and questions based on best practices in trail survey research.

Research Review

The identified literature was reviewed based on several characteristics that broadly fall within the study overview, its survey's contents, and the distribution protocol used to administer the survey. Table 4 shows the subcategories reviewed for each identified case. Not every publication included information related to all categories.

Table 4: Literature Review Categories

Overview	Survey Contents	Survey Distribution
Publication Type	Activity	Platform and Administration
Objectives	Intensity	Survey Location
Facility Type Studied	Trip Duration	Distribution Schedule
Location	Trip Distance	User Sampling
Survey Application	Trip Purpose	Incentives
Survey Length	Trip to the Trail	Training
	Use Frequency	
	Trip Replacement	
	Physical Activity Behavior	

Results

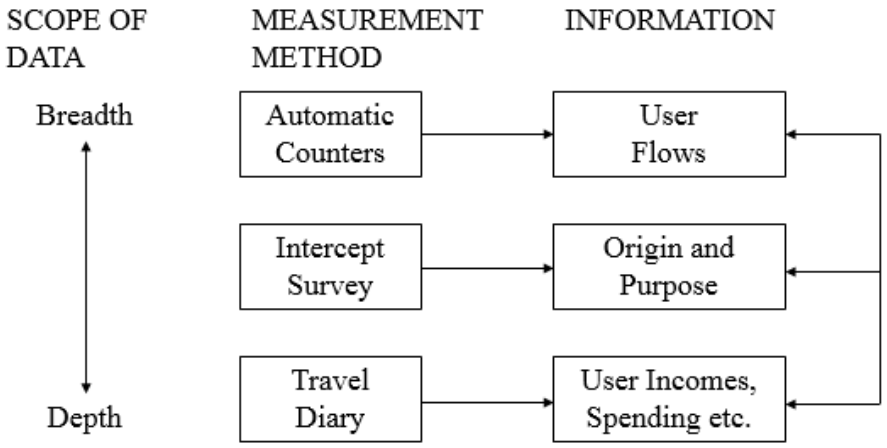
Relevant Cases Studies Overview

The systematic review process identified 25 relevant cases for T-MAP. The cases were published between 1995 and 2014, and 21 were conducted at sites within the United States (two were conducted in Australia [Veitch et al. 2014; Rose 2006], and one in the United Kingdom [Lumsdon, Downward and Cope 2004]). The surveys spanned urban, rural, and suburban settings, and included standalone trails and trail facilities within local, state, and national parks. Twenty-two cases focused on trails, while two addressed other bicycle facilities - either cycle tracks (Zhang et al. 2014) or on-road bicycle facilities (Piatkowski, Krizek, and Handy 2014).

The research was conducted for a variety of objectives: to evaluate how residential proximity influences trail use (Lu, Yu, and Lu 2014; Krizek, El-Geneidy, and Thompson 2007), to assess the impact of trail construction on active travel behavior and overall physical activity (Goulias and Burbidge 2009), and to better understand trail user characteristics, preferences, and satisfaction (Judge 2010; Hargis 2004; Wolter, Drew, and Stowers 2007). All cases evaluated employed an intercept survey as at least part of their research methods. In many publications, this was the sole method for measuring the desired trip and user information. However, some cases also used follow-up surveys either online or as a mail-back questionnaire (Gonzalez, Overdeep, and Church 2004; Haglund 2011; Rose 2006). Others employed GIS analyses of home addresses to link trail use to home proximity (Lu, Yu, & Lu 2014) or used automated counters (Rose 2006) and trail diaries (Lumsdon, Downward and Cope 2004; Goulias and Burbidge 2009) to supplement the survey information. Figure 4 shows how Lumsdom, Downward, and Cope (2004) employed several methods to gather their data. This use of complementary methods is similar to how T-MAP's intercept survey fits within its larger data collection scheme, which includes automated trail counters, manual counts and GIS analyses including routinely available data.

The identified case studies included a mix of peer-reviewed articles (12), graduate theses and dissertations (6), and reports published by public municipal or state agencies (6), and trail or parks organizations (1). Twelve publications included the intercept survey within the document, while the other half described individual questions and results without providing the actual survey instrument used on the trail. Only these complete surveys were accessed and evaluated in this study. Individual survey questions mentioned in other studies were evaluated as well.

Figure 4: Lumsdom, Downward, and Cope (2004) Research Design



Survey Application

Two types of intercept surveys were evaluated for this literature review: those completed entirely on the trail, and those which included both an on-site component and a mail-back or online follow-up questionnaire. Of those with a second set of questions (Haglund 2011; Rose 2006; Gonzalez, Overdeep, and Church 2004), only the questions asked during the intercept portion of the survey were evaluated.

Survey Length

Surveys varied significantly in length across the different studies evaluated. While response rates were reported for different studies, researchers did not indicate a clear relationship between the length of the survey and the trail user's decision to participate. Survey length was reported by number of pages, number of questions, and time to complete.

Surveys ranged from one to four pages. One-page surveys were common (Met Council 2008; Judge 2010; Nelson et al. 2002; Haglund 2011; Gonzalez, Overdeep, and Church 2004). However, those with two (Zhang et al. 2014), three (Bowker, Bergstrom, and Gill 2004A), and four pages (Krizek, El-Geneidy, and Thompson 2007) did not report divergent response rates (response rates are discussed in more detail in the Survey Distribution section below). The one survey completed using an iPad (Lu, Yu, and Lu 2014) did not indicate the length of the survey. Those studies that quantified survey length through reporting the time required to complete the survey, indicated that surveys typically took 5-10 minutes to complete (Veitch et al. 2014; Gordon, Zizzi, and Pauline 2004; Wolff 2011; Bowker, Bergstrom, and Gill 2004B).

Surveys asked between 5 and 50 questions. Shorter surveys were often those that contained a mail-back or online follow-up, such as Gonzalez, Overdeep, and Church (2004) and Rose (2006). Most surveys included 10-30 questions (Hargis 2004; Wolff 2011; Met Council 2008; Haglund 20011; Shafizadeh and Niemeier 1997; Colleen 2010; Nelson et al. 2002), typically broken into sections about a trail user's current trip, general trail use habits, and socio-demographic information. On other occasions, trail satisfaction and physical activity were also considered (Wolter, Drew, and Stowers 2007).

Survey Content

Intercept survey questions addressed trip mode or activity, purpose, distance, and duration; trail use frequency; distance and mode of travel to the trail; trip replacement; and user activity level. While some questions referred specifically to user's current trip, others focused on the user's typical trail use.

Activity

Questions about activity were very similar across all studies evaluated, and nearly all asked about the current trip, rather than general activity. The questions varied slightly in asking about either the user's "primary activity" (Hargis 2004), "mode of recreation" (Ridge to Ridge Trail System 2000), and "primary reason for being on the trail" (Nelson et al. 2002), but generally asked about activity in the same way with similar provided responses. Those responses typically included: walking, bicycling, jogging or running, or "other". Additional, less frequently used responses include using a wheelchair, walking a pet, scooters, handcycles, and rollerblading (Table 5).

Table 5: Trail Activity Options

	Bicycling	Walking	Running/Jogging	Inline Skating	Other	Walking w/ Pet	Stroller	Equestrian	Using Wheelchair	Using Walker	Handcycling	Scooter	ATV
Nelson et al. 2002	■	■	■	■	■	■			■	■			
Met Council 2008	■	■	■										
Hargis 2004	■	■	■										
Bowker, Bergstrom, and Gill 2004B	■	■	■	■	■	■	■	■					
Gonzalez, Overdeep, and Church 2004	■	■	■	■	■				■		■	■	
Price, Reed, and Muthukrishnan 2012	■	■	■	■	■								
Haglund 2011	■	■	■		■	■							
Wolter, Drew, and Stowers 2007	■	■	■	■	■								
Wolff 2011	■	■	■	■	■								
Price et al. 2013	■	■	■		■								
Lindsey 1999	■	■	■	■									
Ridge to Rivers Trail System 2000	■	■	■					■					■
Bowker, Bergstrom, and Gill 2004A	■	■	■		■			■					
Gordon, Zizzi, and Pauline 2004	■	■	■	■									

Troped et al. (2009) conducted a test-retest reliability assessment of an interviewer-administered trail survey by surveying the same trail users twice, one week apart. Overall, reliability of categorical items evaluated in their study ranged from "substantial" to "almost perfect" correlation coefficients between 0.65 and 0.96 and observed agreement between 64 percent and 98 percent. When they asked "What type of activity do you usually do when you are on this trail for recreational purposes?" respondents provided consistent answers for the test and re-test over 96 percent of the time.

Instead of directly asking a question about the user's activity, some surveys relied on the surveyor to observe and record the user attributes such as gender and mode (Haglund 2011; Bowker, Bergstrom, and Gill 2004B). For example, surveyors would record the user's mode and gender as part of a "pre-interview". This practice saved some time during survey administration and allowed surveyors to track response rates based on different user attributes.

Intensity

Few questions directly inquired about the user's activity intensity. Nearly all studies distinguish between someone walking and someone jogging or running, but otherwise the rigor of the activity is scarcely addressed. Veitch et al. (2014) does include such a question, asking: "In the past 3 months, which describes your usual activity levels during your visits to this park?" Responses include:

> "1) Mostly sitting;
> 2) Mostly light activities;
> 3) Mostly moderate activities; and
> 4) Mostly vigorous activities" (7).

Activity intensity may be derived through responses to other questions. By evaluating a user's mode, time, and distance of trail use, the researcher can calculate a speed of travel. Ainsworth et al. (2001) developed the "Compendium of Physical Activities" to enhance the comparability of results across studies using self-reported physical activity, and the tool is intended to assist in quantifying the energy costs among a wide variety of physical activities. The Compendium provides 821 codes that reflect 21 major activities under various levels of intensity, measured through both speed and activity type. For example, bicycling is divided into 14 distinct codes, based on speed (from "<10 miles per hour" to ">20 miles per hour") and type (mountain, road, or stationary bicycling) (Ainsworth et al. 2011, 1).

Trip Distance

Trip distance was often measured through a set of questions or prompts (Table 6). In some cases, these questions referred specifically to the distance of the trip link along the trail (Bowker, Bergstrom, and Gill 2004B), while others were inclusive of the entire user's trip (Rose 2006; Judge 2010; Gordon, Zizzi, and Pauline 2004). Based on the specific purpose of a survey, it is appropriate to use one of these types of questions or the other.

When Troped et al. studied the test-retest reliability of the question "About how far do you usually go when you use this trail for recreation?", the study found a .87 correlation coefficient.

Table 6: Trip Distance Questions/Prompts

Question	Source
Suburb/postcode of origin Suburb/postcode of destination	Rose 2006
What is the length of this trip? (blocks or miles) Where did you begin the trip? (address, intersection, landmark) Where is your destination (address, intersection, landmark)	Judge 2010
Circle the town closest to where you entered the trail today.* Circle the town closest to where you will exit the trail.* About how far will you go on the trail today (round-trip)?* (miles)	Bowker, Bergstrom, and Gill 2004B
How far do you usually perform this activity? (miles) How far did you go (round-trip)? (miles)	Gordon, Zizzi, and Pauline 2004

* Map and mileage chart provided to survey participants

Trip Duration

Many studies supplemented their trip distance questions with an inquiry about trip duration. In contrast to some of the questions listed in the above section, these questions explicitly reference time spent traveling on the trail, rather than the user's overall trip from home to his or her destination. Duration was regularly measured as a categorical variable, often measured in 30 minute or hourly increments (Lu, Yu, and Lu 2014; Veitch et al. 2014; Lumsdon, Downward and Cope 2004; Lindsey 1999). Other researchers allowed for open-ended responses to this question, allowing respondents to provide an exact number of minutes or hours of trail use for the current trip (Judge 2010; Nelson et al. 2002; Wolter, Drew, and Stowers 2007; Bowker, Bergstrom, and Gill 2004B). Overall, these questions were relatively consistent across different studies. However, Price et al. (2013), included a distinct question for the duration of typical recreational trips and for typical transportation trips on the trail. Troped et al. (2009) found substandard test-retest reliability (.64 correlation coefficient) for the question "How much time do you usually spend on this trail per visit when you use it for recreational purposes?" and five response options. None of the evaluated studies used GPS to quantify duration or distance; all values were self-reported estimates.

Trip Purpose

Researchers included survey questions about the purpose of a trail user's trip. These were phrased in multiple (though similar) ways, including:

- "What motivated you to use the trail?" (Hargis 2004);
- "What reason best describes your use of the trail today?" (Nelson et al. 2002); and
- "What is your purpose for using the greenway today?" (Wolff 2011).

Response options were provided, and again, followed a similar pattern across all studies. Typical responses are discussed below, as well as ways in which certain studies diverged from the common standard. Regularly used terms included recreation and exercise; transportation, commuting, or utilitarian; and running errands, shopping, or personal business. Less frequently used categories included nature (Bowker, Bergstrom, and Gill 2004B) and "meditation/reflection" (Hargis 2004).

Only one study, conducted by Price, Reed, and Muthukrishnan (2012), acknowledged that a trip might serve multiple purposes. However, it provided very broad options from which users could select: exercise, travel, both exercise and travel. Troped et al. (2009) found a 95 percent agreement when participants were asked about their "usual reason for using the trail" and provided with similar responses: "exercise or recreational activity, to travel somewhere, both recreation and transportation purposes" (777).

Recreation and Exercise

Some studies distinguished between exercise and recreational activities (Judge 2010; Nelson et al. 2002; Gonzalez, Overdeep, and Church 2004; Wolter, Drew, and Stowers 2007). Others were even more specific, noting a difference in use between "exercise" and "weight loss" (Hargis 2004) as well as exercise and "training for event" (Bowker, Bergstrom, and Gill 2004B). The Rails-to-Trails Conservancy (2005) explicitly separates recreation, health and exercise, and fitness training (marathon, triathlon) as three distinct categories of trip purpose. In other cases, exercise and recreation were presented as one activity type (Wolff 2011; Lu, Yu, and Lu 2014).

Transportation Trips

Transportation or utilitarian trip-types were described in two broad ways in the studies evaluated. Sometimes all trips for transportation fell under one broad category (Piatkowski, Krizek, and Handy 2014; Hargis 2004; Lumsdon, Downward and Cope 2004; Price et al. 2013; Wolter, Drew, and Stowers 2007). Other times, these trips were separated into several unique purposes, including shopping and commuting to school or work (Wolff 2011; Judge 2010; Gonzalez, Overdeep, and Church 2004). Nelson et al. (2002) simply distinguished commute trips from other transportation trips by creating two catchall categories: "transportation to work/school", "transportation other than to work/school" (Nelson et al. 2002).

Finally, some studies bundled commute trips to work or school (Krizek, El-Geneidy, and Thompson 2007; Lu, Yu, and Lu 2014; Wolff 2011; Nelson et al. 2002), while others categorized these trips as two distinct types (Judge 2010; Rose 2006).

Trip to the Trail

Several trail intercept surveys included questions about how far the user traveled to the trail, how long this trip took, and what mode the user employed for this trip link. The next section will address these three elements of the trail approach: distance, time, and mode.

Distance

Questions evaluating the distance to a trail were written in several ways – both as a continuous measure (Nelson et al. 2002) and as a categorical variable. Categorical variables chose different cutoffs based on the expected "reach" of the trail within the community, municipality, or region. For example, Lu, Yu, and Lu (2014) select category cutoffs of less than .5 miles, less than 4 miles, and greater than 4 miles. In contrast, the categories selected by Hargis (2004) and Lindsey (1999) are larger, referencing distances greater than 10 miles and 14 miles respectively.

Other surveys do not explicitly ask for the distance of the user's trip origin to the trail. Instead, the survey questions often ask about the user's home address (often not as a street address, but as

a nearby intersection) (Rose 2006; Met Council 2008; Lumsdon, Downward, and Cope 2004; Price, Reed, and Muthukrishnan 2012; Wolff 2011). Bowker, Bergstom, and Gill (2004B) ask specifically if the trail user lives adjacent to the trail. Others use a broader measure of home address – zip code (Judge 2010; Haglund 2011; Ridge to Rivers Trail System 2000). This can be helpful for trails or of regional significance, but will not be useful if the primary trail users are residents in the adjacent or surrounding community. Also, while these may provide an accurate shortest or most direct distance from a user's home or neighborhood to the trail, it makes a large assumption that user's trips originate from home. While this is likely often the case, it may not always be true, especially in the late afternoon or evening as people may be commuting home from work or school. Wolff (2011) addresses this issue by asking: "Where did you start your current greenway activity from today?" (70). Provided answers include 1) home, 2) work 3) retail stores, businesses or places like the library or church, 4) parking lot, and 5) other.

Troped et al. (2009) find a .93 correlation coefficient when evaluating the test-retest reliability of distance questions about the trip to the trail.

Time

Instead of asking about distance to the trail, some researchers ask about the time it takes a user to travel to the trail. While this question and its response can be valuable, this value is entirely tied to also asking about the mode used to travel to the trail. A 30-minute walk is a different distance than a 30-minute bike ride than a 30-minute drive, and the health and environmental implications of each modal trip are different as well. These questions are often asked with provided response categories, typically in 15 or 30-minute intervals (Wolter, Drew, and Stowers 2007; Price et al. 2013), and Troped et al. (2009) found 92 percent reliability when the same users were asked this question twice over a two-week period. Other questions ask about this topic while providing an open-ended response in minutes or hours (Wolff 2011; Bowker, Bergstrom, and Gill 2004A; Bowker, Bergstrom, and Gill 2004B).

Price et al. (2013) also explicitly asks the average time to travel from home to the trail as well as from work. Gordon, Zizzi, and Pauline (2004) and Lindsey et al. (2001) inquire about both the trip duration and physical distance user's travel to reach the trail.

Mode

In addition to asking how far trail users traveled to use the trail, several researchers asked what mode users employed on that first link of their trip. Questions were generally posed in two ways, inquiring either how the trail user traveled to the trail for this current trip, or how the user normally accessed the greenway. Troped et al. (2009) finds test-retest reliability research found 96.4 percent among individuals asked, "How do you usually get to this trail?" (777).

Table 7 provides a reference for which studies employed which type of questions. Each question provided a set of response options. Most included walking, jogging or running, cycling, inline skating, public transportation, private vehicle, or "other" category. It is important to acknowledge that these surveys distinguished between the intensities of on-foot modes of travel to the trail – several specifically call out walking as separate from jogging or running. Some studies included additional options as well, such as "dropped off" and "as a passenger" (Bowker,

Bergstrom, and Gill 2004A) and rollerblading or inline skating (Gonzalez, Overdeep, and Church 2004).

Table 7: Mode to Trail Question Types

Current Trip	Typical Trip
Bowker, Bergstrom, and Gill 2004B Gonzalez, Overdeep, and Church 2004 Lindsey 1999 Met Council 2008 Ridge to Rivers Trail System 2000 Veitch et al. 2014	Gordon, Zizzi, and Pauline 2004 Wolff 2011 Wolter, Drew, and Stowers 2007

Nelson et al. (2002) approached the question differently, instead inquiring if trail users were parked in any of the designated rail-trail parking lots during their trip. This indirectly tells the researcher whether or not the trail user drove to the facility.

Use Frequency

Many studies asked trail users about how frequently they use the facility. Frequency questions either reference a specific period in the past (the past seven days, the past 30 days, etc.), or referred to the participant's "typical" or "usual" behavior. Schaeffer and Presser (2003) suggests that reference period questions should provide the reference period at the beginning of the question, so that respondents do not construct their own prior to hearing the investigator's.
In the studies evaluated, responses were either tracked as part of a categorical variable or as a more precise value of the exact number of trail uses in the specified reference period. Table 8 summarizes the different reference periods used, as well as the type of variables and number of response options (when applicable).

Those surveys with categorical variables often used smaller reference times within their responses, such as "daily", "once a week", "3-5 times per week", etc. Some questions explicitly state, "including today's trip" or a variation on that phrase, to make clear that the user's reference period includes the survey trip and date (Met Council 2008; Bowker, Bergstrom, and Gill 2004A; Bowker, Bergstrom, and Gill 2004B). Some questions used were even more specific. For example, Wolff (2011) follows its use frequency question with additional questions about the mode and duration of other trips during the reference period (one week).

Table 8: Use Frequency Question Types

Source	Variable Type	# of options (if applicable)
Weekly		
Zhang et al. 2014	Categorical	4
Piatkowski, Krizek, and Handy 2014	Continuous	
Gordon, Zizzi, and Pauline 2004	Continuous	
Wolff 2011	Continuous	
Biweekly		

Hargis 2004	Categorical	5
Monthly		
Lu, Yu, and Lu 2014	Categorical	3
Hargis 2004	Categorical	5
Judge 2010	Categorical	5
Bowker, Bergstrom, and Gill 2004A	Categorical	8
Wolter, Drew, and Stowers 2007	Continuous	
Quarterly		
Veitch et al. 2014	Categorical	7
Met Council 2008*	Continuous	
Nelson et al. 2002*	Continuous	
Annually		
Krizek, El-Geneidy, and Thompson 2007	Continuous	
General Use		
Ridge to Rivers Trail System 2000	Categorical	5

* Four questions asked about each three-month season

Of particular note is the general use question posed by the Ridge to Rivers Trail System (2000). The organization surveyed users about their trail use frequency by asking, "How often do you recreate in the foothills?" with undefined responses including:

1. First visit,
2. Rarely,
3. Occasionally,
4. Frequently, and
5. Daily (8).

This lack of specific reference period or specific definitions for regularity of use makes the responses very subjective based on the trail users perception of the question.

Price et al. (2013) do not include the question text within their published study, but does include in their analysis a dummy variable for "regular trail use". This variable is defined within the text as more than 30 minutes of activity on the trail for at least three days each week, and it indicates that the researchers surveyed users not only about their frequency of use, but their duration of use for each trip as well.

Troped et al. (2009) indicates that the reliability of the use frequency question is also impacted by the length of the reference period. When analyzing the test-retest reliability of asking about the frequency of trail use over the past week, the researchers find a .62 correlation coefficient. In contrast, when the question is extended to refer to recreational activities on the trail over the last four weeks, the correlation coefficient increases to .95 (Troped et al. 2009). This should not be misunderstood to suggest that exceedingly longer reference periods will provide more reliable results. However, it does make a case that questions based on the last month will return more consistent results than those based on the last week.

Trip Replacement

This section includes background information about ways in which active transportation may

substitute for vehicle or transit trips, as well as different survey questions employed to quantify this substitution effect.

Background

Active transportation substitution for vehicular travel plays out in complex ways. Typical ‘‘four-step’’ travel demand modeling suggests that travelers decide to make a trip and select a destination prior to choosing a mode. But, individuals who walk or bicycle may reverse these steps. Their desire to use a non-motorized mode may lead them to make a trip in the first place, or they may consider a different set of destinations than if they were to drive—not only closer destinations but also those for which walking and bicycling are safer, more comfortable, and more attractive—all qualities that are not accounted for in traditional destination choice models (Piatkowski, Krizek, and Handy 2014). Piatkowski, Krizek, and Handy (2014) elaborate:

> “Mode choice may lead to differences in choosing a single destination, but also in forming ‘trip chains’ of stops at multiple destinations. Changes in mode, destination, and frequency may impact the type and frequency of activities one engages in, which in turn can lead to changes in VMT. An individual might cycle to the local market, then the pharmacy, and then coffee shop instead of driving to the large grocery store containing all those services in one destination. The same individual might then forego an auto trip to the gym, deciding he has gotten enough daily exercise through utilitarian cycling. In other words, mode substitution might go hand-in-hand with destination and even activity substitution” (2).

Choosing to substitute a specific trip may be one component in a behavior change process that leads to longer-term substitution behaviors. An individual might choose to live in a walk- or bike-friendly neighborhood, forego auto-ownership, and rely entirely on non-motorized modes. In this case, daily active transportation use that “does not qualify as trip-specific substitution could still be considered long-term, or lifestyle, substitution” (Piatkowski, Krizek, and Handy 2014).

Several travel modes could potentially substitute for driving, and the potential to substitute depends on the modes available to an individual for a particular trip. Available modes are a function of both individual characteristics (e.g., auto ownership, bicycling ability) and the trip characteristics (e.g., distance to destination, bicycle and pedestrian facilities along the route) (Piatkowski, Krizek, and Handy 2014).

Another consideration is the extent of substitution in terms for trip length and frequency. A commuter walking to work daily is likely to have a greater impact on a city’s transportation system than someone walking to the convenience store once per month. Both the frequency and the distance of the trip made can differ from the replaced trip. For example, a mile of bicycling may replace a much longer automobile trip, thereby increasing the substitution effect to greater than a 1:1 relationship. However, the inverse may occur as well; a single automobile trip could be replaced by more than one active transportation trip, leading to a substitution effect less than 1:1 (Piatkowski, Krizek, and Handy 2014).

Quantifying substitution can be determined in two ways. Many studies infer substitution from revealed behavior (“indirectly inferring’’ substitution), while some others directly ask respondents about substitution for a recent trip (i.e., ‘‘direct questioning’’) (Piatkowski, Krizek, and Handy 2014, 3). Direct questioning is most relevant for quantifying substitution in this project. This approach does not rely on assumed substitution rates, potentially providing a more accurate measure of substitution. Substitution behavior is identified for specific types of trips and modes, without relying on assumptions or mode choice models.

Review of Existing Questions

Few surveys explicitly asked about whether or not the user’s present trail trip replaced a different trip the user may have taken. Some researchers asked only one question to identify how the trail trip may replace an automobile trip or non-motorized trip on another trail or on-road facility, while others included a suite of questions to learn more about why the user specifically used the trail for this trip (Table 9).

Table 9: Trip Replacement Questions

Item	Question	Response Options	Source
1	What would you have done if you hadn’t walked (or cycled) for this trip?	a. Driven b. Used Transit c. Would not have made the trip at all d. Would have made the trip at a later time e. Would have combined the trip with other travel f. Other (open-ended response)	Piatkowski, Krizek, and Handy 2014
2	Did you take this trip prior to trail construction?	a. Yes b. No	Goulias and Burbidge 2009; Wolter, Drew, and Stowers 2007
3	If you were not biking for this trip, how would you be traveling?	a. Car b. Get a ride from friend/family c. Transit (bus or train) d. Walking e. I would not make this trip f. Other (open-ended response)	Judge 2010
4	Why are you using this route and not a different route to your destination?	a. Easy to get to b. Most direct route to my destination c. Less traffic d. Scenic qualities e. Flat ground f. Bike lanes g. Wider lanes h. Separated from traffic i. Connection to transit	Judge 2010

		j. Indicated on bike map or suggested to me	
5	What is the primary reason why you use the trail instead of other facilities?	Open-ended response	Gordon, Zizzi, and Pauline 2004

Physical Activity Behavior

This section includes background information about the role of trails for individual's physical activity behavior, as well as different survey questions employed to quantify the role of a specific trail in an individual's physical activity habits.

Background

Current physical activity recommendations have been established through the *2008 Physical Activity Guidelines for Americans*. These guidelines provide science-based recommendations to improve the health status of Americans over the age of 6 through physical activity. In order to attain health benefits from physical activity, the guidelines recommend adults achieve 150 minutes per week of moderate intensity physical activity such as walking briskly or biking; or 75 minutes of vigorous intensity physical activity such as jogging or sports. It is recommended that exercise sessions be broken up over the course of the week, where individuals would exercise 30 minutes to an hour, three to five days per week. Recommendations for weight loss state that individuals should attain twice the amount of physical activity recommended for health benefits. Individuals aiming to lose weight should therefore accumulate either 150 minutes per week of vigorous intensity physical activity or 300 minutes of moderate intensity physical activities (DHHS 2008).

Physical activity can be accumulated through numerous activities that are classified into four domains: leisure-time, occupational, domestic, and transportation. Leisure-time and transportation are of most interest in this project. Leisure-time physical activity is defined as activities performed at an individual's leisure such as: recreational activities, exercise, and sports participation. Transportation-related physical activity is defined as walking, jogging, or biking to-and-from work or school or while running errands (Lee 2009).

Research on the effectiveness of trails as a means to increase physical activity is challenging. Starnes et al. (2011) reviewed research on trails and physical activity from the public health, leisure sciences, urban planning, and transportation literatures. The evidence for the effects of trails on physical activity was mixed among eight intervention and correlational studies. They find the evidence for positive effects of trails on physical activity is limited, and that additional research is needed to evaluate the effects of trails on physical activity (Starnes et al. 2011). Evenson et al. (2005) conducted a phone survey in North Carolina prior to and after the construction of a trail, and found that 23 percent of trail users reported that they had increased their physical activity since they began using the trail.

Rationale for Asking about Non-Trail Physical Activity

Health benefits from physical activity are non-linear, therefore one needs to know how active people are outside of their trail use in order to calculate benefits they gain from trail use. To what

extent additional health benefits can be evaluated from trail use depends on four considerations: which users gain health benefits from their activities; the extent to which trail improvements increase activity; substitution between trail use and other forms of exercise; and the extent to which trail users take health effects into account when making their travel decisions (Borjesson and Eliasson 2007).

Review of Existing Questions on Physical Activity

Questions relating to the trail user's physical activity level are broken into two broad categories: the user's general level of physical activity (i.e. from activities other than trail use), and how that level is impacted by the trail. Oftentimes questions of both categories are included in the same survey to gauge both how physically active a person is now that the trail exists, and how the trail may have directly impacted this level of physical activity.

General Activity Level

Veitch et al. (2014) asks users to self-report their health condition, on a 5-option Likert scale from "poor" to "excellent". Some questions specifically ask about general activity allows the participant to indicate how many times per week, month, or year, they participate in whatever activity they are currently conducting on the trail (Haglund 2011).[2] Others ask directly about bicycling habits, both regularity of travel by bicycle (Shafizadeh and Niemeier 1997) and bicyclist skill level, including "beginner/novice", "intermediate/ recreational", and "advanced/serious" (Zhang et al. 2014, 52). Krizek, El-Geneidy, and Thompson (2007) ask about the user's "general activity level", but do not include their survey questions in the published study (614).

Trail Impacts on Activity

In their examination of test-retest reliability, Troped et al. (2009) asked, "Are you (walking, biking, etc.) more, less, or the same since you began using this trail?" and find 72 percent reliability in the responses provided (778). However, inquiring how a trail has impacted physical activity is not always asked in that manner. Alternative versions of the question are included in Table 10.

Table 10: Trail Impacts on Activity

Item	Question	Response Options	Source(s)
1	Did you take this trip prior to trail construction?[3]	a. Yes b. No	Goulias and Burbidge 2009; Wolter, Drew, and Stowers 2007
2	How often would you participate in this activity if the trail were not here?	a. I would participate the same amount. b. I would participate not as often. c. I would not participate at all.	Wolter, Drew, and Stowers 2007

[2] It should be noted that it is not clear if this question is specifying how often the activity is done on the trail, or in general.

[3] This question was also included in the Trip Replacement Question table, as it can refer to both trip replacement as well as physical activity habits.

3	How important is the trail to your outdoor recreation?	Likert scale from 1-5 (5 as most important)	Haglund 2011
4	Since using the trail, has the amount of exercise that you do	a. Increased b. Decreased c. Stayed the same d. I don't know	Gordon, Zizzi, and Pauline 2004
5	Since using the trail, approximately how much has your exercise increased?	a. 0-25% b. 26-50% c. 51-75% d. 76-100% e. Over 100%	Gordon, Zizzi, and Pauline 2004
6	Did you exercise regularly (three or more times per week for 20 minutes per session) before using this trail?	a. Yes b. No	Gordon, Zizzi, and Pauline 2004
7	Is there another trail you would consider as a substitute for this trail?	a. Yes b. No	Bowker, Bergstrom, and Gill 2004B

Lindsey (1999) evaluated the percent of a user's general physical activity that occurs because of the trail, the percent increase in activity because of the trail, and the "median time spent (weekly) because trail exists". Gordon, Zizzi, and Pauline (2004) also include a question and table where trail user's detail their physical activity apart from the trail in the last month, including frequency, duration, and type (Table 11).

Table 11: Gordon, Zizzi, and Pauline (2004) Survey Excerpt

28. Apart from your trail activities, in the month, have you participated in any of the following?

	Yes	No	Number of days per week	Minutes per session
Aerobic dance				
Bicycling				
Strength training				
Golf				
Jogging/running				
Walking				
Gardening				
Swimming/water exercises				
Organized team sports				
Housework				
Other				

Other Questions

While the above categories provide a comprehensive summary of the survey content employed for the surveys evaluated, some research included additional information relevant to this project. Specific notes from these studies are included below.

- Zhang et al. (2014) distributed separate surveys for bicyclists and pedestrians.
- Some researchers initially inquired if the trail user was from the surrounding neighborhood. Based on the user's response, he or she was given a "local" or "non-local" survey (Bowker, Bergstrom, and Gill 2004A; Bowker, Bergstrom, and Gill 2004B).
- Lindsey et al. (2001) explicitly asks if the trail entrance is also the trail exit.
- Several authors included demographic questions in their surveys, asking a mix of questions about age, gender, ethnicity, income, education, and employment. Some questions were included as multiple choice categorical variables, while others allowed respondents to provide a more precise response (Met Council 2008; (Price, Reed, and Muthukrishnan 2012; Nelson et al. 2002; Wolter, Drew, and Stowers 2007; Haglund 2011; Gordon, Zizzi, and Pauline 2004; Bowker, Bergstrom, and Gill 2004A; Bowker, Bergstrom, and Gill 2004B).
- Piatkowski, Krizek, and Handy (2014) included additional questions about transportation access. For example, their survey inquired if the trail user had access to a vehicle and possession of a bus pass.
- Finally, in addition to asking about frequency of use Wolff (2011), asked users to recall the first time they used the trail. Responses ranged from "today" to more than three years ago (70).

Survey Distribution

This section reviews the practices employed by different agencies and researchers to distribute their intercept survey. It outlines the platform employed, the selected survey locations, the distribution schedule and details, how survey participants were selected and incentivized to participate, training procedures for survey administrators, and the overall response rate of the surveys given different alternative distribution schemes.

Platform and Administration

Only one intercept survey utilized digital platform; Lu, Yu, and Lu (2014) used an iPad to administer their intercept survey. The rest of the survey responses were recorded manually on paper. In several instances, the interviewer read questions to the trail user and then recorder the user's response (Wolff 2011; Met Council 2008; Judge 2010; Wolter, Drew, and Stowers 2007; Gordon, Zizzi, and Pauline 2004; Bowker, Bergstrom, and Gill 2004A; Bowker, Bergstrom, and Gill 2004B). In some cases, the possible responses were read to the user. However, Wolter, Drew, and Stowers (2007) instructed surveyors to not read response choices to the participant. Instead, they inferred the appropriate answer from the user's open-ended response. Users giving multiple responses were prompted for the response that was "most often the case" (Wolter, Drew, and Stowers 2007). Similarly, in several cases, surveyors recorded the trail user's gender and mode without formally asking the trail user to report this information.

In several other studies, the user completes the survey independently (Piatkowski, Krizek, and Handy 2014; Krizek, El-Geneidy, and Thompson 2007; Shafizadeh and Niemeier 1997; Goulias and Burbidge 2009; Price, Reed, and Muthukrishnan 2012; Ridge to Rivers Trail System 2000).

Survey Location

Several authors clearly outline where along a given trail or trails their surveys were administered. While some focused their research on one survey location (Goulias and Burbidge 2009; Judge 2010), others chose multiple locations on one corridor based on the length of the trail (Lu, Yu, and Lu 2014; Krizek, El-Geneidy, and Thompson 2007; Shafizadeh and Niemeier 1997; Lumsdon, Downward and Cope 2004; Nelson et al. 2002; Haglund 2011; Bowker, Bergstrom, and Gill 2004B; Piatkowski, Krizek, and Handy 2014). Bowker, Bergstrom, and Gill (2004B) specify that they selected survey locations representative of different trail environments and possible uses and users.

Piatkowski, Krizek, and Handy (2014) designated potential survey locations as "ideal," "suitable," and "unsuitable" (5). Ideal survey locations included high levels of active transportation travel and natural slowing or stopping points so that surveyors could easily approach travelers. This focus on easily approaching trail users was pervasive throughout several studies. Shafizadeh and Niemeier (1997) positioned surveyors at intersections. Many researchers sited their survey locations based on access points to the trail in order to increase the likelihood that trail users would stop and participate in the survey (Hargis 2004; Price, Reed, and Muthukrishnan 2012; Nelson et al. 2002; Wolter, Drew, and Stowers 2007; Gordon, Zizzi, and Pauline 2004; Ridge to Rivers Trail System 2000; Bowker, Bergstrom, and Gill 2004A; Lindsey et al. 2001).

Positioning surveyors at access points allows them to reach those completing high intensity activities. At access points, the trail users will have slowed or stopped, and often will be either at the start or end of their trip. In some cases, this was explicitly part of the surveyors' instructions: "Interviewers were instructed to stay within the parking areas and approach only trail users entering and exiting the parking areas" (Wolter, Drew, and Stowers 2007, 3).

Rose (2006) took an alternative approach, stationing surveyors near automated trail counters in order to verify results. Finally, in some studies, the researcher was evaluating multiple trails, and therefore identified multiple survey locations (Zhang et al. 2014; Wolff 2011; Met Council 2008; Gobster 1995).

Distribution Schedule

The schedule researchers employ for surveying trail users significantly impacts the number and type of users evaluated. Among the reviewed sources, trail surveys were distributed at varying times of day, shift lengths, and days of the week.

Scheduling Methods

The methods used to determine the distribution schedule varied across studies. Oftentimes, both weekend and weekday times were selected (Met Council 2008; Lu, Yu, and Lu 2014; Shafizadeh and Niemeier 1997; Price, Reed, and Muthukrishnan 2012; Price et al. 2013), but the strategies for selecting which weekday and weekend time slots differed across the research evaluated. Different scheduling strategies are included below in Table 12.

Table 12: Scheduling Methods

Item	Scheduling Method	Source
1	Trail shift times chosen based on previous year's trail use data. Microsoft Excel's random number generator was used to select shifts form the potential weekday and weekend shifts available for a calendar month. Seven weekly shifts (5 weekday and 2 weekend) were selected for each week. Each time was paired with a randomly selected location.	Wolter, Drew, and Stowers 2007
2	Sample days were randomly selected to include equal number of weekend and weekdays distributed evenly.	Haglund 2011
3	Interviews were conducted two times per day using a randomized schedule that included predetermined blocks of time (7-10:00 AM, 11- 2:00 PM, 3-6:00 PM, and 6-9:00 PM) and five different trail access points to ensure that samples fairly represented time of day, location on trail, and time of week (i.e., weekend vs. weekday).	Gordon, Zizzi, and Pauline 2004
4	The days of the week and the time of day were randomly selected. For the days of the week, three days were randomly selected (without replacement) between Monday and Friday and two sampling times were selected between Saturday and Sunday. Each day was divided into three time slots: 7:00 am-11:00 am, 11:00 am-3:00 pm, and, 3:00 pm –7:00 pm. The time slot for each day was randomly selected. The location of the sample varied as well. For each path, some locations were identified as likely access points to the path. Then, for each path, the location was randomly selected to place the interviewer to conduct the survey.	Gonzalez, Overdeep, and Church 2004
5	Sampling time allocated should be proportional to expected trail use.	Bowker, Bergstrom, and Gill 2004B

As cited, in some cases, some trails with multiple survey stations were sampled over several weekend days. Confining sampling to a small number of observation periods per trail limited the generalizability of study results in one way but enhanced it in another:

> "A design that sampled users over a long period of time including weekdays and different seasons would be more desirable if one were studying only a few trails, and might result in a slightly different pattern of findings (e.g. more local use, a greater diversity of user types, possibly more older users) than the design used in this study. Given the study objectives and time and funding constraints, an 'extensive' sampling of many trails for a short period was chosen over an 'intensive' sampling of only a few trails" (Gobster 1995, 403).

Distribution Time Period

The time period for each survey differed across studies, both in the length of shifts selected for surveying and in the overall survey period. Little consistency exists among the length of shifts selected for surveying, and varied from 30-minute segments (Lu, Yu, and Lu 2014) to 6-hour

stints (Met Council 2008). However, it is worth noting that in several cases, these shifts were conducted back-to-back by different groups of volunteers (Met Council 2008; Price, Reed, and Muthukrishnan 2012; Price et al. 2013; Gonzalez, Overdeep, and Church 2004).

Researchers outlined the specific hours surveyed. Some schedules encompassed all daylight hours (Wolter, Drew, and Stowers 2007; Wolff 2011; Met Council 2008; Ridge to Rivers Trail System 2000; Nelson et al. 2002), while others focused principally on peak usage times. Peak trail use varies based on the type of trail, and day of the week. Some surveys were distributed during typical weekday commute peaks in the morning and late afternoon (Shafizadeh and Niemeier 1997; Zhang et al. 2014; Judge 2010), while others focused on weekday recreational use, capturing "lunch time usage" (Bowker, Bergstrom, and Gill 2004B). If researchers highlighted a weekend peak (rather than surveying the entire day), they focused their surveying efforts on midday, or 10:00AM-4:00PM (Shafizadeh and Niemeier 1997).

Sometimes researchers surveyed throughout all seven days of the week (Lu, Yu, and Lu 2014; Nelson et al. 2002), while others selectively sampled a mix of weekday and weekend times (Table 13).

Table 13: Days of the Week Surveyed

Source	Day						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Wolff 2011					■	■	
Goulias and Burbidge 2009			■			■	
Lumsdon, Downward and Cope 2004		■				■	■
Price, Reed, and Muthukrishnan 2012		■		■		■	■
Price et al. 2013		■	■	■		■	■
Zhang et al. 2014		■	■				
Bowker, Bergstrom, and Gill 2004B	■	■	■	■		■	

The overall review period varied as well. The River to Ridges Trail System survey (2000) was conducted in just one day, while others were completed over six months (Nelson et al. 2002) or throughout an entire year (Hargis 2004; Bowker, Bergstrom, and Gill 2004B; Price, Reed, and Muthukrishnan 2012). While these represent extremes, the most common distribution schemes were comprised of four-to-six weeks of scheduled surveying (Piatkowski, Krizek, and Handy 2014; Judge 2010; Haglund 2011; Gonzalez, Overdeep, and Church 2004).

User Sampling

Many studies outlined the methods used for selecting the trail users sampled for the intercept survey. While some indicated simply that trail respondents were "randomly selected" (Met Council 2008, 7), others were more specific in their prescription for which trail users would participate in the survey (Table 14). Within this framework, each group of people traveling together was counted as one trail user (Wolter, Drew, and Stowers 2007).

Table 14: User Sampling

Every User	Price, Reed, and Muthukrishnan 2012
Every 2nd User	Lumsdon, Downward and Cope 2004 Haglund 2011
Every 3rd User	Piatkowski, Krizek, and Handy 2014 Shafizadeh and Niemeier 1997 Wolter, Drew, and Stowers 2007
Every 4th User	Rose 2006

When selecting trail users at a given interval, some researchers specified that users were not counted while survey administrators were conducting the survey with a given trail user. Counting resumed once the survey was completed (Piatkowski, Krizek, and Handy 2014). Instead of focusing specifically on an interval of number of trail users, Nelson et al. (2002) instructed volunteers to approach trail users at 10 minute intervals in an effort to gain a random, representative sample.

Lindsey (1999) did not randomize or systematize the selection process, and acknowledged that "users who were beginning or ending their use of the trail, and those participating in slower moving activities like walking, were easier to stop and were more likely to be included in the sample" (150). Gobster (1995) varied its sampling plan based how busy the trail was. In cases of low trail use, survey assistants asked at least one member of every group who went by to complete a survey. On high-use trails, assistants attempted as much as possible to select users randomly at an interval in concert with the intensity of trail use.

Some studies specifically indicated an age cut-off for participants; some required those interviewed be at least 12 years old (Met Council 2008) or greater than 18 years old (Hargis 2004; Wolff 2011; Price et al. 2013; Judge 2010; Gordon, Zizzi, and Pauline 2004).

Incentives

Some researchers provide incentives to encourage trail users to participate in their intercept survey or to complete the mail-back or follow-up portion of their study. These incentives fell into two broad categories: small on-site products or an entry into a raffle for a larger prize. Small on-site gifts included refreshments, such as nutrition bars and water (Gobster 1995; Piatkowski, Krizek, and Handy 2014), as well as maps and information about area trail opportunities (Gobster 1995). Larger incentives included a chance to win a free pair of running shoes (Wolff 2011) and a $100 gift card (Haglund 2011). While incentives were used in multiple cases, the majority of studies examined did not provide incentives to increase participation.

Response Rates

Given the different administration methods based on platform, time, sampling, and incentives, the evaluated studies provided a range of response rates. Response rates were not reported throughout all research, and the specific rates provided did not consistently evaluate the same types of responses. Response rates provided fell into a two primary categories: number of

intercept surveys completed as a ratio of number of trail users approached, number of follow-up surveys returned to the researcher as a ratio of number of initial surveys completed.

For those tracking the number of responses compared to the number of people approached, the responses ranged between from 40 to nearly 100 percent. At one extreme, Gordon, Zizzi, and Pauline (2004) recorded that 98 percent of approached users agreed to participate in the survey. Veitch et al. (2014) also found a high rate, with 75 percent of approached trail users completing the intercept survey. Wolff (2011) reported that 45 percent of trail users completed the distributed survey either in person or online. One study suggested that the reason for its relatively low response rate (42 percent) was the result of poor survey siting (Piatowski, Krizek, and Handy 2014).

Survey follow-up online and mail-back survey response rates varied between 30 and 75 percent (Haglund 2011; Gonzalez, Overdeep, and Church 2004; Bowker, Bergstrom, and Gill 2004A; Shafizadeh and Niemeier 1997). These results are less relevant to T-MAP, as the online survey for this project is not a second phase of surveying – it is the only survey phase. The rates here may vary from the results in our survey in either direction: participants already have invested time in the process and therefore may feel obligated to complete the remaining portion, or given their prior involvement, they may feel it is excessive to commit additional time to this project.

Training

In order to acquire accurate and consistent responses, interviewers and volunteers must administer the survey in a neutral way. Several researchers and agencies trained their interviewers prior to allowing them to conduct the intercept survey on the trail. Some researchers solely acknowledge that it occurred (Wolff 2011; Bowker, Bergstrom, and Gill 2004A; Bowker, Bergstrom, and Gill 2004B; Price, Reed, and Muthukrishan 2012), while others clearly specify the type and purpose of the training.

Gordon, Zizzi, and Pauline (2004) provided extensive training for volunteers. Graduate students were trained to interview participants using skills training developed from other physical-activity interview driven questionnaires. During training, interviewers reviewed and discussed the questionnaire, rehearsed several practice interviews, and received grades on proficiency. Important features of the training sessions included clear explanations of the frame of reference for each question, how to control the pace and structure of the interview, and how and when to use prompts and other questions. To assure consistency, the same interviewers participated in the survey's pilot study prior to the study's initiation (Gordon, Zizzi, and Pauline 2004).

The Rails-to-Trails Conservancy (2005) suggests that if the survey is going to be conducted like an interview, additional training should to be conducted on how to elicit responses so as not to bias the results. Interviewers were trained in appropriate sampling procedures, instructed to take special care not to select users preferentially from one gender, age group, or user type (Gobster 1995). Others were given instructions on how to identify themselves, explain their purpose, and describe the two-phase approach to the survey when they approached users of the path (Gonzalez, Overdeep, and Church 2004).

In addition to training, some researchers provided additional safeguards against poorly administered surveys. Wolder, Drew, and Stowers (2007) provide specific scripts to interviewers to ensure consistency across all volunteers, and Hargis (2004) regularly monitored interviewers during data collection to ensure adherence to the protocol.

Other Distribution Details

While the above categories provide a comprehensive summary of the distribution methods employed for the surveys evaluated, some research included additional information relevant to this project. Specific notes from these studies are included below.

- Several researchers were systematic in their site setup and how they gained the attention of passersby. Wolff (2011) posted signs visible to users in both directions approximately 0.25 miles and 25 meters away from the interview location on the trail, and Rose (2006) gave approaching cyclists a verbal warning that they were nearing a survey point. In addition, efforts were made to match the number of field staff to the anticipated workload at each site (Rose 2006).
- Similar to the format that will be used in the T-MAP survey, Wolff (2011) invited trail users that could not stop for the intercept survey to participate in the online survey and gave them a card with a link to the survey website (Wolff 2011).
- Wolter, Drew, and Stowers (2007) developed a short "Refusal to Participate" form, including date, time, and location as well as the trail user's gender, activity, and type of refusal.
- Judge (2010) and Whiting et al. (2012) distributed surveys in both Spanish and English.

Discussion

This systematic review provided a comprehensive summary of survey content, question phrasing, and distribution for the included studies. Many surveys conducted in person were short and included concise multiple choice questions with three to five possible responses. In many cases, quantitative information (e.g. frequency of use) was also recorded within this multiple choice framework, though some variables such as distance and duration of the trail trip or trail access trip were asked as open-ended questions and recorded as continuous variables. Surveys were split between asking about the user's current trip and their "typical" trail use. Based on the researcher's goals, surveys varied based on the individual questions asked and the complexity of possible responses permitted.

Survey distribution varied significantly amongst the studies evaluated, though each researcher generally aims to collect data representative of overall trail use and selected survey times, locations, and strategies to match the needs of their specific facility. In some instances, trail users completed paper surveys on their own, while other surveys were conducted more as structured interviews in which the researcher read questions aloud and recorded the respondent's answer. While some surveys included a second online component, only one survey evaluated recorded intercept responses digitally (with an iPad).

4. Methodology

This section describes the methodology developed for the trail user intercept and online surveys to be used in the T-MAP project as well as the pilot study distribution. As stated prior, the survey will provide the observed data required for quantifying the health and transportation impacts of trail investments. Without this data, these analyses would rely on simplified assumptions. The

survey data collected through this tool will allow Rails-to-Trails to learn more about trail use and usage.

Survey Development

Both an intercept and online survey were developed. The intercept survey is short (5 minutes), while the online survey contains both a long (15-20 minutes) and short (5 minutes) version. These lengths were selected to ensure that sufficient information was collected without being prohibitively long. Collection of comprehensive information is important, but not at the expense of lower participation.

The short version of the online survey is identical to the intercept survey. Both surveys are comprised of five sections: current or most recent trip, trail use habits, health and physical activity, socio-demographics, and additional questions. More detailed survey content can be found in Table 15. Whenever possible, questions are listed with multiple choice options to ensure consistency across responses. Complete versions of the intercept and online surveys can be found in Appendix A and B, respectively.

Table 15: Survey Content by Type

Intercept Survey	Online Survey
Current Trip	Most Recent Trip
Trail activity	Trail activity
Purpose	Purpose
Distance	Distance
Duration	Duration
Trip origin and destination	Trip origin and destination
Trail access mode and time	Trail access mode and time
	Trail access point
	Loop trip
Trail Use Habits	
Frequency in summer	Frequency in summer
Frequency in winter	Frequency in winter
	Typical trail mode
	Typical trail distance
	Typical trail intensity
Health and Physical Activity	
General health status	General health status
Single item physical activity	Global Physical Activity Questionnaire
	Weight
	Height
Trail User Socio-Demographics	
Age	Age
Gender	Gender
	Education

	Income
	Race/Ethnicity
Additional Questions	
Substitution of other travel mode	Substitution of other travel mode
Substitution of other exercise	Substitution of other exercise
Bicycling preference	Bicycling preference
	Ownership: bike, car, dog
	Number of children

Global Physical Activity Questionnaire (GPAQ)

The online version of the survey includes questions from the Global Physical Activity Questionnaire (GPAQ). The GPAQ was developed by the World Health Organization (WHO) for physical activity surveillance. It collects information on physical activity in three settings – activity at work, travel to and from places, and recreational activities – as well as sedentary behavior (WHO 2015). Questions ask

1) if the trail user takes part in this activity,
2) the number of days per week they participate in the activity, and
3) the time per day that they participate in the activity.

Questions specify whether the trail user participated in vigorous- or moderate-intensity activities, where "vigorous-intensity activities" are those that require hard physical effort and cause large increases in breathing or heart rate, and "moderate-intensity activities" are those that require moderate physical effort and cause small increases in breathing or heart rate (WHO 2015, 1). This survey employs an adapted version of the GPAQ that asks for bicycling and walking separately. This adaptation was developed as part of the Physical Activity through Sustainable Transport Approaches (PASTA) project, an initiative funded by the European Union to identify how promoting "active mobility" can lead to a more active and healthy population (PASTA 2015).

Platform

The survey was developed and administered using Qualtrics online and mobile applications. The survey tool allows the researcher to include complex skip and display logic, as well as the ability to carry forward all, selected, or unselected responses from previous questions. Several questions were given content validation restrictions to ensure that responses were within reason. For example, inputs as hours were restricted to less than 24 and inputs as minutes must be less than 60. In addition, the survey included a mix of required questions and "encouraged" questions. The encouraged questions provide a reminder that the user had not answered a question, but did not force them to provide a response.

The aforementioned two surveys were developed in Qualtrics: the intercept survey and the online survey. The online survey was then copied into two versions to create the trail card and the trailhead surveys.

Pilot Study

The pilot study evaluated the survey content and draft distribution strategy on the American Tobacco Trail (ATT) in February and March 2015. The pilot study tested the intercept survey

implementation using two volunteers, as well as the role of the trail cards and posting survey links at a trailhead. This section will provide some background about the trail and the distribution protocol implemented during the pilot.

American Tobacco Trail

The American Tobacco Trail is a 22-mile shared use path that runs on a former railroad corridor south from Durham, NC. The trail is part of the East Coast Greenway network. In 1989, the non-profit Triangle Rails to Trails Conservancy promoted development of the corridor into a rail-trail. The corridor was purchased by the North Carolina Department of Transportation in 1995 and subsequently leased to Durham, Chatham, and Wake Counties to be developed and operated as a public recreational trail. Various sections opened between 2000 and 2014 to complete and connect the current 22-mile path (ITRE 2014).

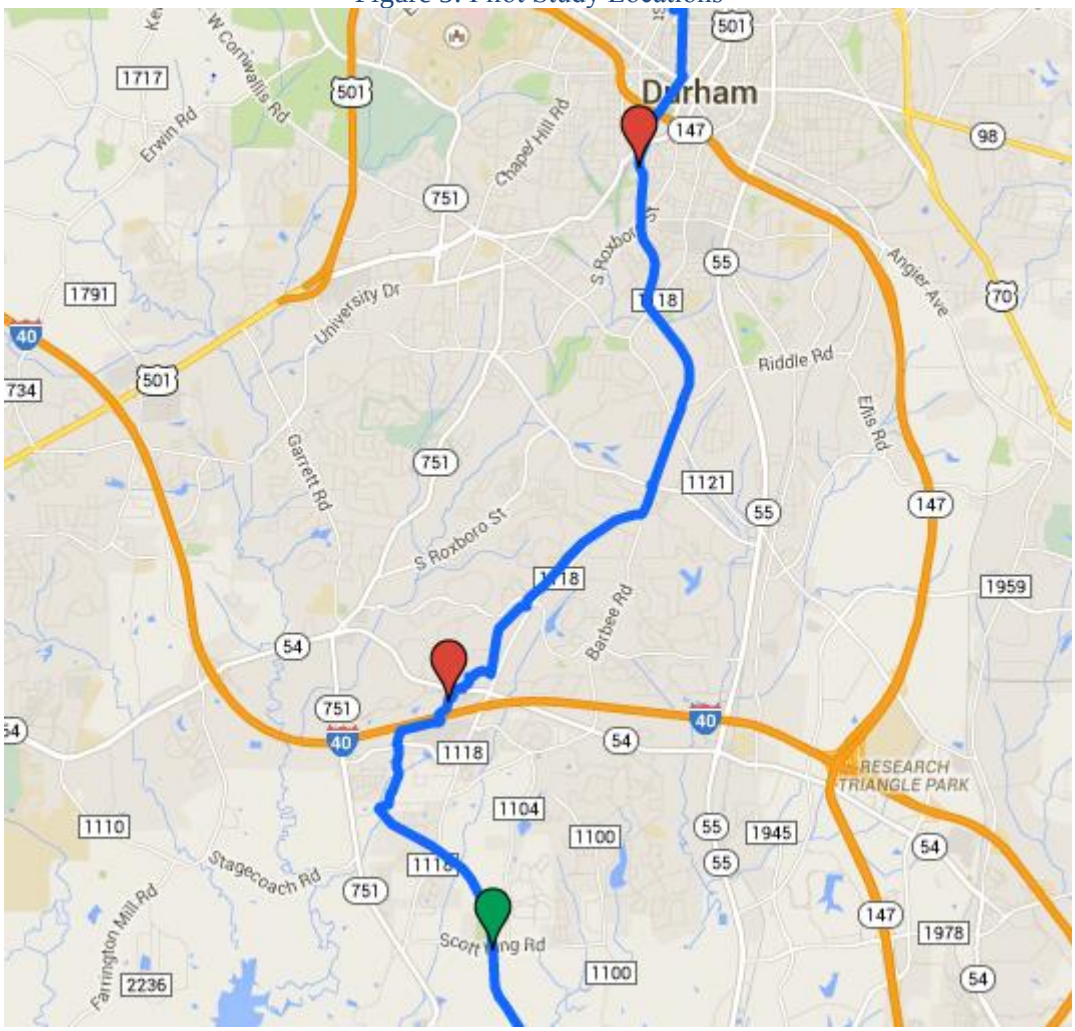
The ATT is paved except for about seven miles of compacted screenings extending north from the New Hill-Olive Chapel Road trailhead. Land use and demographic characteristics differ between the Northern and Southern segments of the trail. There are 45 known access points to the trail: 21 in the northern portion and 25 access points in the southern portion. In 2014, an estimated 508,000 trips occurred on the trail, leading to $6.1 million in direct expenditures on groceries, retail and restaurants related to AAT trips (ITRE 2014).

A December 2014 study conducted by the Institute for Transportation Research and Education (ITRE) at North Carolina State University evaluated behavioral changes that resulted from the construction of a critical link of the ATT, a bridge over Interstate 40. ITRE conducted surveys and counts on the two trail segments before and after construction of the bicycle and pedestrian bridge. The before and after data – collected in 2013 and 2014, respectively – were compared to determine the changes that occurred in use of the ATT and accompanying social, public health, transportation, and economic effects. Key findings from the report demonstrate a one year increase in trail trips of 233 percent, and an increase in trip distance (27 percent) and trip duration (7 percent). Direct trail expenditures rose over 150 percent, and ITRE modeled an economic impact of "43 jobs, $1.3 million in employee compensation, and $4.9 million in total business gross revenues" (ITRE 2014, iii).

Distribution Protocol

Overall, surveys were administered to users in three ways: through in-person participation, through receiving a survey card from a surveying volunteer, and through taking a card from a sign and plastic box posted at a trailhead near Herndon Park, where the trail crosses Scott King Road. Figure 5 shows the different survey locations (red markers indicate survey locations, while the green marker identifies the trailhead card box). The two cards contain different links but the same survey content, allowing the results to be analyzed together or separately, as needed. As stated, the online survey includes both a long and short version. Participants were first asked to take the long version (about 20 minutes). If they refused, they were then asked to take the short version (5 minutes).

Figure 5: Pilot Study Locations



The in-person surveys were administered in February and March 2015, over eight three-hour shifts. Twelve hours of surveying occurred during weekends, while the other 12 hours occurred on weekdays. Weekend and midday weekday surveys were conducted on a segment of trail between Highgate Drive and I-40 (about seven miles from downtown Durham), and weekday peak hour surveys were administered between West Enterprise Street and US Route 15-501 (about one mile from downtown Durham). CamelBak water bottles were used as an incentive for in-person participation during all weekday shifts and half of the weekend shifts. The shift schedule, location, and bottle distribution are included in Table 16.

Table 16: Distribution Schedule

Weekday				Weekend			
Date	Time	Location	Bottles	Date	Time	Location	Bottles
3/4/2015	7-10AM	West Enterprise		2/8/2015	10AM-1PM	Highgate	
3/4/2015	10AM-1PM	Highgate		2/14/2015	10AM-1PM	Highgate	
2/12/2015	1-4PM	Highgate		2/7/2015	1-4PM	Highgate	
2/13/2015	4-7PM	West Enterprise		2/22/2015	1-4PM	Highgate	

One sign was posted about 100 feet in both directions from the survey point to alert trail users coming from either side about the survey. The side facing the oncoming trail user stated “Trail Survey Ahead”, while the back stated “Thank You! Happy Trails!” When CamelBak water bottles were distributed to participating trail users, an additional sign was placed in both directions, about 25 feet from the survey point. This sign read “Free CamelBack Water Bottle!” with an image of the bottle to be distributed.

Two volunteers participated in the survey administration. The primary volunteer approached trail users about participating in the survey. When not surveying other users, the surveyor approached every individual user, except 1) only one out of groups up to four and 2) only two out of groups larger than four. Only trail users over 18 were approached to complete the survey.

Trail users were given the option to complete the survey in person or online. If the trail user chose to take the survey online, they received a business-card sized piece of paper with brief instructions, a link to the online survey, the Rails-to-Trails Conservancy logo, and an image of the prize available as an incentive for participation (a bicycle jersey) (Figure 6). Every trail user approached by the primary volunteer was tracked on the iPad; including their gender and activity, as well as their interest in participating in person, online, or not at all.

Figure 6: Survey Card

The other volunteer counted the number of trail users, and identified their gender and activity on the trail (walking, running, bicycling, or other) (see Appendix C for Tracking Users Form). In addition, he approached trail users when the primary volunteer was surveying. He gave trail users the option to wait and participate in person once the current survey was completed, or to take the slip of paper with information about the online survey. The secondary volunteer did not track number of refusals. However, the number of cards distributed by both volunteers was counted at the end (as the difference between the starting and remaining number of cards).

5. Results

This section reviews the trail use patterns, response rates, and survey results collected during the pilot study. Implementing the survey distribution schedule yielded 277 survey responses, including 212 in-person surveys and 65 online surveys from both the trail card and trailhead (Table 17). The rest of this chapter is divided into six sections: trail use, response rates, platform, trip attributes, trail user habits, and user attributes.

Table 17: Total Responses

Type	Responses	%
Intercept	212	77%
Online	65	23%
Trail Card	48	17%
Trailhead	17	6%
Total	**277**	**100%**

Trail Use

Trail use is evaluated based on automated trail use counter outputs, manual counts, and variations in weather. When possible, results are disaggregated by mode, gender, and day.

Automated Counter

There is one automated trail use counter installed on the American Tobacco Trail, located on the same trail segment where the bulk of surveys were conducted for this pilot study. The trail counter records the user's mode as either pedestrian (including both those walking and running) or bicyclist, and it also tracks the direction of the trail user's movement (north-bound or south-bound). The counter was installed in September 2014, and the first package of data from this counter was released in early April 2015 including count data from September 18, 2014 to April 5, 2015. As this count is automated, it provides a screen line summary of trail use. This is not to be confused with individual trail users; trail users may be recorded multiple times, one for each time they pass the automated counter.

For the purpose of this study, we delineate the study period as one week prior to the first survey shift to one week after the last survey shift (January 31 – March 11, 2015). The counter recorded 13,536 trail "uses" during the study period. Figure 7 and Figure 8 summarize average daily trail use by mode and day type during the study period and the total data collection period. During the study period, 69 percent of trail users were pedestrian uses, while 31 percent were bicyclist uses (Table 18). During the specific time periods surveyed in this pilot, the mode splits were similar (67 percent pedestrian use and 33 percent bicyclist use). However, these values are not consistent over the entire data collection period. This demonstrates that the study period is not representative of longer-term trail use.

Table 18: Mode Ratios by Data Analysis Period

	Total Data		Study Period		Survey Shifts	
Pedestrian	53,370	62%	9,319	69%	961	67%
Bicyclist	32,273	38%	4,217	31%	471	33%

For both periods, use is significantly higher on the weekends than during the week. On the weekend, pedestrians see both morning and afternoon peaks in activity, while bicyclist trail use has one afternoon peak. Weekday pedestrian and bicyclist peak in the afternoons, with an average of 20 uses per hour.

Figure 7: Average Daily Bicyclists by Day Type and Collection Period

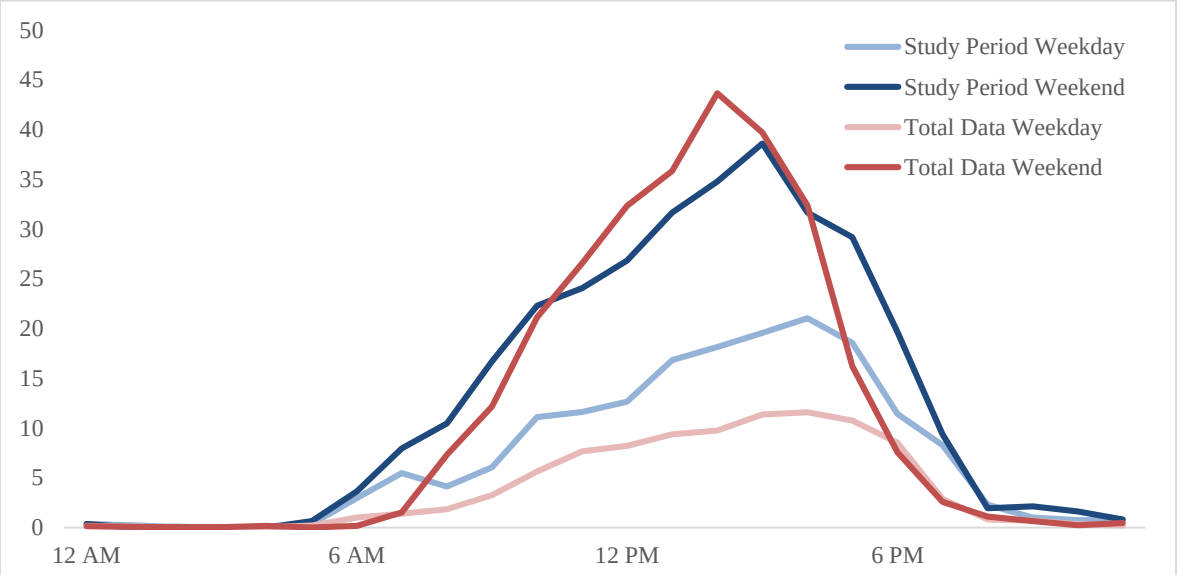
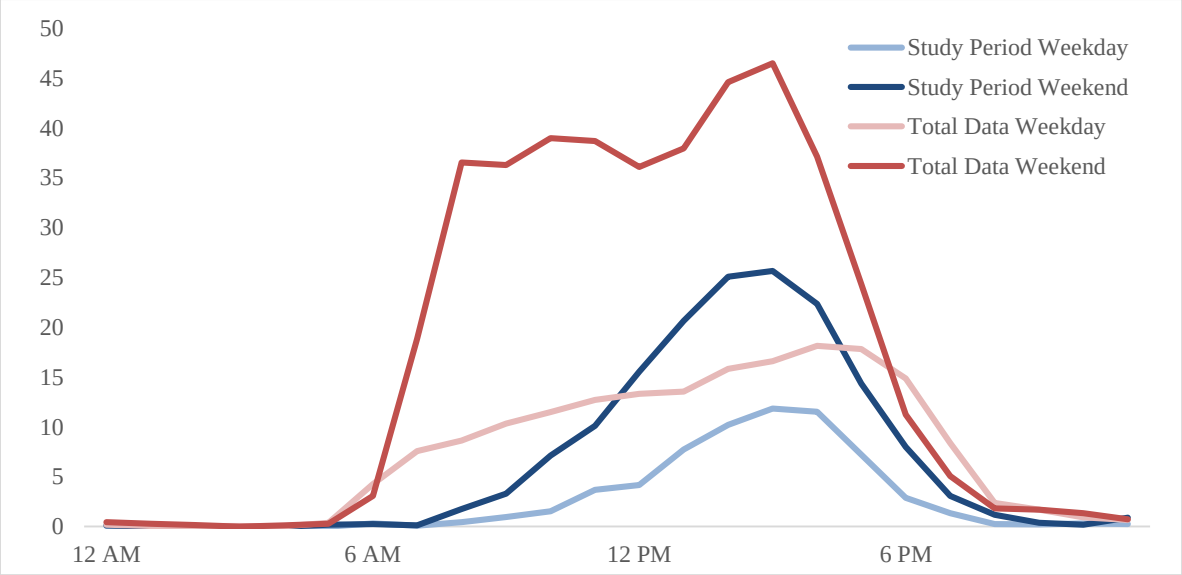


Figure 8: Average Daily Pedestrians by Day Type and Collection Period



Manual Counting

In addition to reviewing the automated count data, the pilot study tracked the number of people using the trail during the different survey shifts. It should be noted that this was not a pure screen line count; trail users that passed more than once (often on an out-and-back trail trip) were only counted once during the manual count. Limited information was collected about each trail user, including his or her mode and gender. Table 19 provides a summary of trail use during the survey.

Table 19: Counted Trail Uses

Mode	Male	Female	Unknown	Total	% of Users
Walk	162	202	1	365	39%
Run	131	116	0	247	26%
Bike	250	69	0	319	34%
Other	3	5	0	8	1%
Total	546	392	1	939	100%
% of Users	58%	42%	0%	100%	

The automated counter recorded significantly more trail uses than the manual count, but the manually collected values align with those recorded by the automated counter. Sixty-five percent of manually counted trail users were pedestrians (either runners or walkers), while 34 percent of trail users were bicyclists. This alignment, despite different overall counts and counting methods (screen line versus individual trail users), suggests that the ratio of users conducting out-and-back trips are the same for both bicyclists and pedestrian modes.

User Sampling

The primary surveyor used the iPad to input whether approached trail users chose to participate in person, online, or not at all. During the pilot study implementation, the primary surveyor approached 376 trail users for participation in the survey, including 212 men and 164 women (56 percent and 44 percent respectively). This ratio is comparable to the overall trail use by gender, noted in Table 19, where men comprised 58 percent of trail users and women comprised 42 percent.

A parallel analysis was conducted for mode. Of those approached to participate in the survey, 37 percent were walking, 30 percent were running, and 33 percent were bicycling. This suggests oversampling of runners, as they only comprised 26 percent of trail users. It is important to note that while group size was not recorded, this may have impacted the sampling by mode. As stated prior, group size influenced who was approached to participate in the survey. While all individual users may participate, only one person in groups of four or fewer trail users and only two people in larger groups were approached for participation.

It should be noted that the surveyors did not track how many trail users were approached by the second surveyor. Users approached by the second surveyor were only tracked if they chose to participate in the in-person survey (more detail provided in the Chapter 6: Discussion).

Weather Impacts

The weather varied greatly over the several sessions, impacting the number of trail users and therefore the number of responses (Table 20). Coincidentally, the weather was consistently colder during weekday surveys than during the weekends. This perhaps produced a less representative sample of typical weekday trail use. It is important to note that while the weather impacted the number of responses, it did not significantly impact the response rate. In some instances, the lower traffic produced a higher number of responses because the surveyors were able to approach all trail users as there were rarely multiple people passing at one time.

Table 20: Users and Responses by Date

Date	Temperature (℉)	Weather	Users (Manual)	Intercept
2/7/2015	64	Sunny	196	56
2/8/2015	56	Sunny	298	44
2/12/2015	45	Overcast, windy	41	19
2/13/2015	32	Sunny	26	7
2/14/2015	46	Sunny	143	38
2/22/2015	55	Overcast	163	21
3/4/2015	48	Overcast	22	10
3/4/2015	57	Sunny	50	17

Response Rates

As this survey implementation is a pilot study for the national T-MAP survey, it is important to identify strategies that increase response rates. This survey will be conducted on a larger scale, and will require a minimum of a few thousand responses. This scale requires efficient practices to minimize the time and labor of participating surveyors.

By Survey Type

Response rates varied based on the survey type. Those approached on the trail were most likely to complete the survey in-person, with a 45 percent response rate. The response rate for trail cards was 26 percent, and the rate for cards taken from the trailhead was 17 percent, respectively (Table 21). Despite the lower response rate, there is still value to posting cards at the trailhead. This distribution method required a limited effort, reached a potentially large number of people, and still yielded a reasonable response. It should be noted that the trailhead card box was empty for some part of the survey period. When it was checked two weeks after the initial installation, 49 of 50 cards had been taken. Refilling this box sooner may have encouraged more people to take the cards and complete the survey online.

Table 21: Response Rate by Type

Type	Distributed/ Approached	Responses	Rate
Intercept	470	212	45%
Trail Card	195	48	26%
Trailhead	100	17	17%

However, it is important to note some redundancies in this table. Those who completed the survey from the trail card were initially approached to complete the intercept survey. The approached number for the intercept survey is the sum of those contacted on the trail that either took the survey in person, accepted the trail card, or refused to participate. Of those approached on the trail, 260 people completed the survey either online or in person, a response rate of 55 percent.

Online Survey Completion

While 65 individuals provided some responses for the online survey, not all participants completed it. The online survey contained two options: a short and long version. The initial survey question asked if the respondent would be willing to participate in the long (15-20 minute) survey. Should the participant respond no, he or she was then asked to participate in the shorter (5 minute) version of the survey. Only one person (1.5 percent of respondents) opted to take the short version of the survey, and this person completed all of the required questions. Of those who chose to participate in the longer version, 92 percent completed the survey. Of the five respondents that dropped out during the survey, there was not one consistent time mark at which people chose not to complete the questions:

- Two respondents dropped out immediately after agreeing to complete the long survey, and they did not answer any questions. The survey link for these respondents was open for only 15 seconds.
- One respondent exited the survey after the trail access questions, and had the survey link open for four minutes.
- One respondent dropped out at the beginning of the GPAQ after answering survey questions for nearly seven minutes.
- One respondent closed the survey in the middle of GPAQ, on the page with questions about bicycling for travel. This respondent had the survey link open for 32 minutes, but spent only about 3 minutes on all the previous survey pages.

By Time of Day and Week

Response rates were disaggregated by day type and time of day (Table 22). The difference between intercept participation on weekends and weekdays is not significant at the 95 percent confidence interval. Different survey shifts yielded different response rates, with the highest rates during midday shifts. This is perhaps a result of commuters using the trail during morning and afternoon peaks do not have the time flexibility to stop and complete the survey. However, the low sample size of weekday surveys may impact the significance of these results.

Table 22: Responses by Day and Time

Day	Intercept		Accept Card		Refuse		Total
Weekend	159	56%	78	27%	47	17%	284
Weekday	53	58%	23	25%	16	17%	92
Shift	**Intercept**		**Accept Card**		**Refuse**		**Total**
7-10AM	10	48%	8	38%	3	14%	21
10AM-1PM	101	52%	60	31%	32	17%	193
1-4PM	94	65%	28	19%	22	15%	144
4-6PM	7	44%	3	19%	6	38%	16

There was no discernable pattern based on weather – neither temperature nor type of weather (overcast, sunny, etc.) significantly impacted the response rate.

By Observed User Characteristics

Response rates varied among the different modes. Walkers were the most likely to participate in the survey in person (70 percent), followed by runners (54 percent) and bicyclists (45 percent)

(Table 23). The ratio of accepting the trail card to those refusing to participate at all varied among all groups. If trail users could not participate in person, walkers were most likely to take a trail card. Runners and bicyclists accepted cards with more frequency than they refused participation, but these rates are lower than that for walkers.

Table 23: Response Rates by Mode

Mode	Intercept		Accept Card		Refuse		Total
Walk	95	69%	31	22%	12	9%	138
Run	49	44%	37	33%	26	23%	112
Bike	67	54%	33	26%	25	20%	125
Other	1	100%	0	0%	0	0%	1
Total	**212**	**56%**	**101**	**27%**	**63**	**17%**	**376**

We evaluated response rates based on individual user attributes. There is no significant difference in response rates based on gender (Table 24). Similar to the analysis above, the ratio between those accepting a trail card and declining to participate is constant across both genders (about 1.6).

Table 24: Response Rate by Gender

Gender	Intercept		Accept Card		Refuse		Total
Male	118	56%	56	26%	28	18%	212
Female	94	57%	45	27%	25	15%	164

By Incentives

Incentives were provided for participation in the survey. All online survey participants were given the opportunity to enter a raffle for a free bike jersey. Of the 64 people who completed online surveys, 43 (67 percent) entered the raffle for the jersey. This indicates that while over 32 percent of people were willing to participate in the survey without compensation, the incentive may have been influential in leading people to the website. The ratio of people entering the raffle was nearly identical for participants picking up the trailhead card and those receiving a card from a surveyor on the trail (64 percent and 63 percent, respectively).

In-person incentives (CamelBak water bottles) were not provided throughout all survey shifts. During the entire survey period, 376 trail users were approached to participate in the survey; 58 percent were approached during shifts where incentives were provided, and 42 percent were approached when there was no incentive. The difference in response rates among the two groups is dramatic. Over 67 percent of trail users agreed to participate in the survey in person when the incentive was present, compared to just 41 percent when there was no onsite award for participation (Table 25). The ratio of accepting the trail card to those refusing to participate at all remained relatively constant among both groups (at 1.84 and 1.45 respectively), though when the incentive was present, people were slightly more likely to take the trail card. This suggests that while the onsite incentive encouraged people to participate in person, it did not affect how many people agreed to participate online. This is logical, given that there was no change to the incentive for online participation between the two groups.

Table 25: Responses by Incentive

Incentive	Intercept		Accepted Card		Refused		Total
Yes	147	67%	46	21%	25	11%	218
No	65	41%	55	35%	38	24%	158

The response rate was then further disaggregated by mode, to evaluate if the role of the incentive impacted participation by different modes users in different ways (Table 26). The impact of the water bottles was most dramatic for bicyclists. While 68 percent were willing to answer in person when there was an incentive present, only 28 percent completed the survey in person when the CamelBak water bottles were not distributed. This 40 percent difference is much higher than the 23 percent differences recorded for walking and running.

Table 26: Reponses by Incentive and Mode

Incentive	Intercept		Accept Card		Refuse		Total
Walk							
Yes	56	80%	13	19%	1	1%	70
No	39	57%	18	26%	11	16%	68
Run							
Yes	36	53%	21	31%	11	16%	68
No	13	30%	16	36%	15	34%	44
Bike							
Yes	54	68%	12	15%	13	16%	79
No	13	28%	21	46%	12	26%	46
Other							
Yes	1	100%	0	0%	0	0%	1
No	0	0%	0	0%	0	0%	0

Evaluating the role of the incentive on response rates by gender demonstrates that there are no significant differences (evaluated at the 95 percent confidence interval) between the way in which men and women respond to the incentive (
Table 27).

Table 27: Responses by Incentive and Gender

Incentive	Intercept		Accept Card		Refuse		Total
Male							
Yes	81	66%	26	21%	16	13%	213
No	37	42%	30	34%	22	25%	89
Female							
Yes	66	70%	20	21%	9	9%	95
No	28	41%	25	36%	16	23%	69

Platform

The survey platforms – online and intercept – impacted the respondent experiences and responses provided for these different survey types. As expected, the shorter intercept survey took less time to complete than the online version. The in-person survey took an average of 2 minutes and 22 seconds to complete on the iPad (the longest intercept survey took 6:37 to complete). The one respondent completing the short survey finished answering all the provided questions in 5 minutes and 15 seconds. Of the long online surveys in which respondents answered all the required questions, the average completion time was 11:23 minutes. The longest response time for the long online survey was 41:57 minutes, though we can assume that the respondent did not spend all of this time completing the survey. The respondent spent 31 minutes on an early page of the survey (asking three questions about trail access), yet the average page completion time for this respondent was 17 seconds for all other pages of the survey.

The modal breakdown of responses varied by survey type as well (Table 28). Here, the number of trail users counted is compared to those completing the survey in person and online. Walkers are under-sampled online and over-sampled in person, but these differences balance out when comparing the total responses to the counted trail users. Genders were similarly represented across both platforms.

Table 28: Response Representativeness by Survey Type

	Counted		Intercept		Trail Card		Total Responses	
Mode								
Walk	365	39%	95	45%	14	23%	**109**	**40%**
Run	247	26%	49	23%	20	33%	**69**	**25%**
Bike	319	34%	67	32%	26	43%	**93**	**34%**
Other	8	1%	1	0%	0	0%	**1**	**0%**
Gender								
Male	546	58%	118	56%	34	58%	**152**	**56%**
Female	392	42%	94	44%	25	42%	**119**	**44%**

While we cannot compare the trip distances and durations for all those who accepted the trail cards, we can use the online survey responses to compare these user's trips to those users that completed the intercept survey (Table 29). Walkers and runners who completed the survey online traveled farther than those who participated in person. Runners and bicyclists who completed the survey online traveled for a longer duration than those who participated in person.

In instances where the change in distance and change in time did not shift together, this indicates that the intensity of the activity varied between the two groups. For example, walkers completing the survey online traveled longer distances than in person participants, but they were walking for about the same time. This means that walkers completing the survey online were walking faster than those who stopped to participate in person. The inverse is true of bicyclists. Faster traveling bicyclists were more likely to stop than those traveling slower. None of the observed differences between those completing the survey in person or online were significant at the 90 percent confidence interval. While this may indicate that individuals completing the trail survey online

and in-person have similar trail use habits, the lack of significance between these values may also be the result of a small sample size (the pilot study yielded 65 responses from trail cards).

Table 29: Distance and Duration by Survey Type

Average Distance					
Mode	Intercept	Trail Card	% Difference	T	P(T)
Walk	2.7	4.3	59%	1.58	.12
Run	7.3	8.8	21%	1.06	.30
Bike	18.5	16.6	-10%	0.67	.51
Other	2.0	0.0	-100%	-	-
Average Duration					
Mode	Intercept	Trail Card	% Difference	T	P(T)
Walk	1.1	1.3	18%	0.69	.49
Run	1.2	1.5	25%	1.16	.25
Bike	1.5	1.9	27%	1.38	.18
Other	1	0	-100%	-	-

Users self-reported health condition did differ between those answering the online and in-person surveys. There was a statistically significant difference (at the 95 percent confidence interval) between those reporting their health as “Excellent” and “Good”. In the online survey, more people report having “Excellent” health while fewer people report having “Good” health. This difference could be caused by several factors. First, individuals may feel more comfortable honestly reporting their health online when they do not need to speak directly to the interviewer. Alternatively, the types of people choosing to complete the survey online may actually have better health than those stopping to complete the survey in person. It is not conclusive which of these rationales is the true cause of the difference. In addition, this observed difference may also just be the result of a limited sample size. Collecting additional online survey responses may yield a different outcome.

Table 30: User Attributes and Response

	Intercept	Trail Card	% Difference	Z	P(Z)
Average Age	43	45	5%	1.08	.18
Health					
Excellent	30%	47%	60%	2.50	**.01**
Very Good	42%	40%	-5%	0.23	.81
Good	25%	13%	-49%	2.01	**.04**
Fair	3%	0%	-100%	1.34	.18
Poor	0%	0%	-100%	0.54	.59

Trip Attributes

This section evaluates characteristics of trail trips based on mode, distance, and duration; trail access, and trip replacement.

Mode, Distance, and Duration

Of trail users who completed the online or intercept survey, 40 percent were walking, 26 percent were running, and 34 percent were bicycling (Table 31). As expected, the average trip distance varied by mode. The average distance for bicyclists exceeded all other modes, and the average distance for runners exceeded that for walkers. As the average durations shifted less dramatically than the differences, one can infer there are different average speeds for each mode.

Table 31: Average Trip Attributes

Mode	Trips	%	Average Distance (mi)	Average Duration (hr)	Average Speed (mph)
Walk	112	40%	2.8	1.1	2.6
Run	71	26%	7.8	1.3	6.1
Bike	93	34%	18.1	1.6	11
Other	1	0%	2.0	1.0	2.0
Overall	**277**	**100%**	**9.3**	**1.4**	**7.0**

Trail Access

Trips originated in 27 different zip codes throughout the Research Triangle region (Figure 9). Seventy-eight percent of tips originated in zip codes with their centroid in Durham County. Chatham, Orange, and Wake Counties are the origin of 4, 7, and 11 percent of trips, respectively. Over half of trips (59 percent) started in zip code 27713, the same zip code as the survey location.

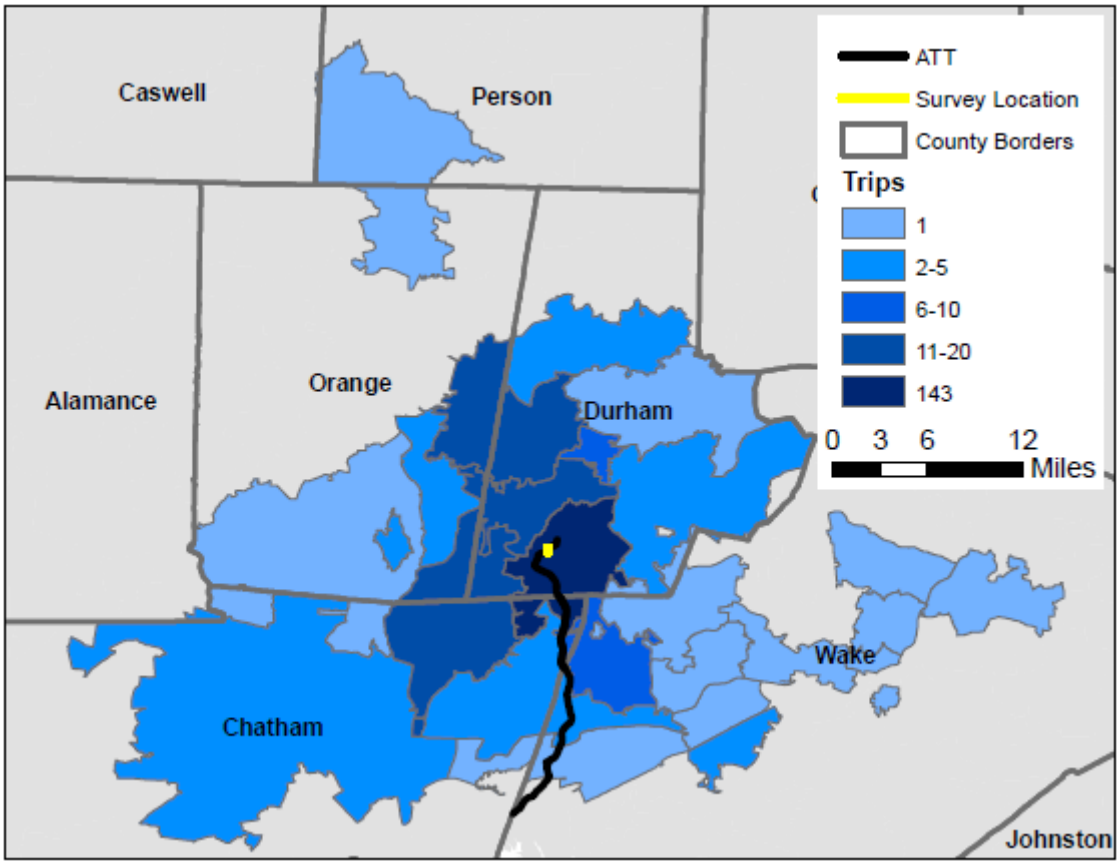
The trip-weighted average distance from the centroid of zip codes with trips to any point on the ATT was 3.4 miles. The trip-weighted average distance from the centroid of zip codes with trips to the survey location was 4.3 miles. The survey did not ask where users accessed the trail, so these are crude, straight-line measurements about the distance traveled to the trail and survey location.

Trail users were asked what mode they used to reach the trail. Fifty-six percent of respondents reported that they used the same mode to access the trail as they did while on the trail. Access mode varied based on the distance traveled. The trip-weighted average access distance for walking trips was 1.21 miles (Table 32). As mode speeds increased, the average access distance increased. The trip-weighted average access distance was 5.90 miles for those driving to the trail.

Table 32: Access Distance by Mode

Access Mode	%	Average Access Distance (mi)	Same Mode
Walk	21%	1.21	48%
Run	13%	1.31	53%
Bike	25%	2.08	73%
Other	0%	1.06	0%
Drive	41%	5.90	N/A

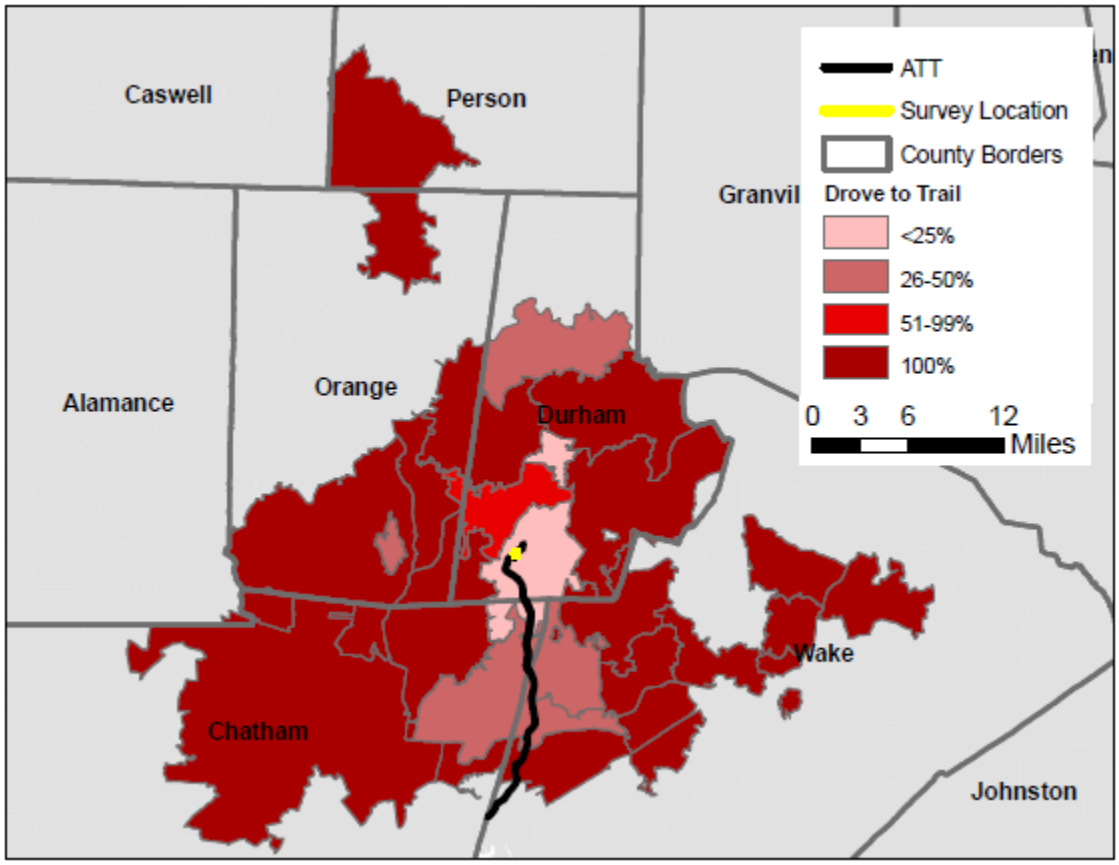
Figure 9: Trip Origins by Zip Code



Forty-one percent of trail users reported driving to the trail, and then walking, running, or bicycling from a trailhead or nearby parking lot. As expected, trips that originated farther from the trail included a higher portion of users driving to the trail (Figure 10, next page).

Those completing the online survey were asked whether they entered and exited the trail at the same access point. Eighty-three percent of respondents got on and off the trail at the same location, while 17 percent left the trail at a different point from where they first entered. Unsurprisingly, almost all trail users who drove to the trail (96 percent) entered and exited at the same location. Bicyclists comprised almost all of the trails users that did not enter and exit at the same access point. In fact, 35 percent of cyclists reported getting onto and off of the trail at different locations. Ninety-six percent of participants reported going "out-and-back" on the trail, while 4 percent used the trail as part of a loop ride that include on-street and off-street facilities.

Figure 10: Percent of Trail Trips Accessed by Car



Trail access distance impacted how often trail users reported using the facility. Table 33 shows the average distance traveled to the trail by frequency of trail use (in summer months). As expected, those who live near the trail use the facility more frequently. Aggregating some of categories, reveals that those using the trail at least once a week have an average approach distance of 2.52 miles. Trail use frequency is discussed in the Trail User Habits section below.

Table 33: Access Distance based on Summer Frequency

Frequency	Average Distance (mi)
Never	7.45
Less than once a month	9.93
Once a month	5.21
2-3 times a month	7.95
Once a week	3.93
2-3 times per week	2.77
More than 3 times per week	1.66

Trip Replacement

Users indicating that their trip destination was different from their trip origin were asked a question about trip replacement. The question inquired: "If for some reason you would not have

been able to take this trip by [reported mode], would you have used another mode of transportation?" Forty-three percent of trail users indicated that they would not have taken their current trip had they been unable to use their current mode of transportation, and 48 percent responded that they would have driven to their destination (Table 34).

Table 34: Trip Replacement

Mode	Count	%	Avg Distance
Car	22	48%	5.8
Transit	1	2%	1.5
Other	2	4%	2.1
Would not have taken this trip	20	43%	4.5

Seventy-eight percent of trips were a loop (where the origin and destination were the same location). Most of the trips (67 percent) that were not a loop ended at destination type "other", such as the gym or the mall. These trips are more elastic than a work or school trip, likely explaining the high number of people reporting they would not have taken the trip with a different mode. Had a higher sample of work or school commute trips been included in the sample, these proportions may provide different findings.

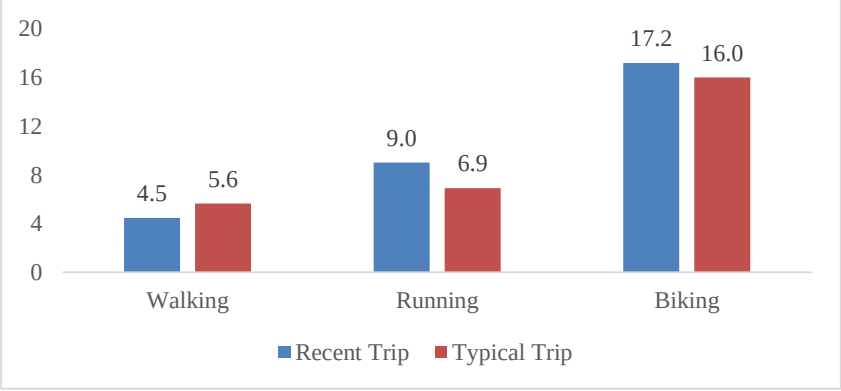
Trail User Habits

This section reviews data collected related to questions about respondents' general trail use habits. These questions focused in two areas: the typical trip users take on the trail, and their frequency of use.

Typical Trip

In addition to asking about the most recent trail trip, the long version of the online survey inquired about how the current trip compared to the typical trail trip. Understanding the differences between the observed behavior and typical behavior can assist in developing accurate impact tools. Eighty percent of online survey participants indicated that the mode used on their last trail trip was their typical mode on the trail. Figure 11 demonstrates the difference between trip distances for the most recent trip and the user's typical trail trip. None of these differences are significant at the 95 percent confidence interval, suggesting that the recent trail current trip distances are an accurate estimate of typical trail use.

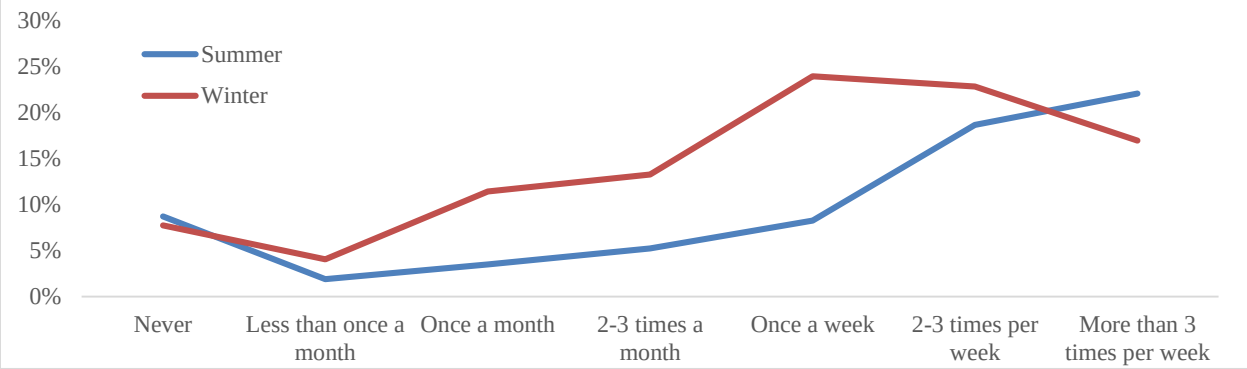
Figure 11: Distance: Recent Trip v. Typical Trip



Frequency

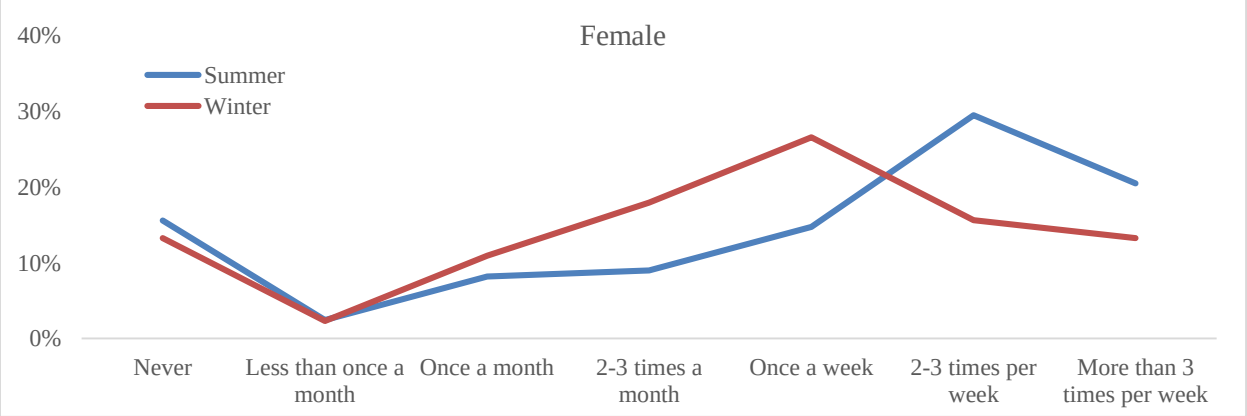
Trail users were asked to report the frequency with which they use the trail in the winter (December, January, and February) and the summer (June, July, and August). There are more high frequency users in the summer than in the winter, as shown by how the winter line is consistently to the left of the summer line (Figure 12). Forty nine percent of trail users reported using the trail the same amount in the winter and the summer, while 44 percent of users use the trail more in the summer than in the winter, and 6 percent use the trail more often in the winter.

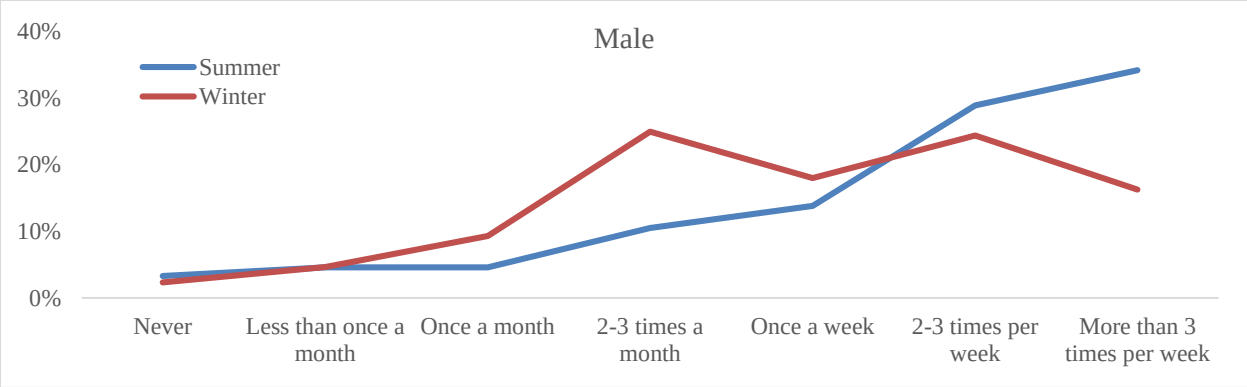
Figure 12: Percent of Trips by Frequency and Season



Frequency of trips was then disaggregated by gender (Figure 13). About thirty percent of women report using the trail about once a week in the winter and two-to-three times per week in the summer. The trend for women's trail use presents significant peaks in this level of frequency. In contrast, the proportion of men using the trail increased with frequency of use, especially in the winter.

Figure 13: Seasonal Frequency of Trips by Gender





User Attributes

This section provides a description of the trail user variables included in the survey, and it focuses primarily on socio-demographic attributes and health metrics.

Socio-Demographic Attributes

Nearly 80 percent of trail trips began in Durham County, almost all of which began at the trail user's home. Surveyed trail users were much more affluent than the average Durham County resident (Table 35). Higher proportions of trail users earned advanced degrees than the percentage of Durham County residents with this credential. Similarly, income for trail users was significantly higher than that of the typical resident in the county. Racial breakdown of the trail users also varied dramatically from the surrounding area. About half of Durham County residents are non-Hispanic white citizens, while 90 percent of trail users completing the online survey reported their race as white.

It is important to note that the goal of the survey and its sampling plan is to accurately capture attributes of trail users – not of the general population. While this may provide insight into how the typical trail user differs from the typical Durham resident, this may not be entirely useful for considering how well the survey and its distribution captured trail use.

Table 35: Trail User Characteristics

Metric	#	%	Durham County
Education			T25
High School Diploma	0	0%	18%
Some College	2	3%	24%
2-year College Degree	2	3%	N/A
4-year College Degree	20	33%	25%
Masters Degree	21	35%	12%
Professional Degree (JD, MD)	5	8%	4%
Doctoral Degree	10	17%	5%
Income			T56
less than $10,000	1	2%	8%
up to $30,000	5	8%	22%

up to $60,000	11	18%	27%
up to $100,000	7	11%	21%
over $100,000	25	42%	22%
Prefer not to answer	11	18%	N/A
Race			T13/T14
White (not Hispanic or Latino)	54	90%	50%
Black or African American	0	0%	37%
Hispanic or Latino	3	5%	13%
Asian	2	4%	4%
Other	1	2%	8%

Source: ACS 2008-2013

Of those completing the online survey, 87 percent own personal vehicles, 71 percent own bicycles, and 30 percent own dogs. Of those who reported owning cars, 49 percent drove to access the trail. Eighteen percent of trail users reported having children. These different metrics may influence how these individuals use the trail. For example, of those who owned bicycles, 53 percent were bicycling on the trail during their most recent trail trip.

Health

There were several different health-related questions in the survey: those that asked about the trail user's height and weight, a self-report health assessment, questions about their physical activity habits, and the GPAQ.

The average height of survey respondents was average height of 64 and 69 inches for women, respectively, and the average weight reported was 132 lbs. for women and 168 lbs. for men (Table 36). The standard deviation for height was between two and three inches, and was about 15 lbs. for weight. The average calculated Body Mass Index (BMI) is 24 (24.8 for men, and 22.7 for women).

Table 36: Trail User Health Metrics

	Male		Female	
Metric	Mean	SD	Mean	SD
Age	49	15	40	14
Height (in)	69	2	64	3
Weight (lbs)	168	21	132	17
BMI	25	2	23	3

Trail users were also asked to report how they viewed their health. Responses were generally very positive, with 72 percent reporting that their health was either "Excellent" or "Very Good" (Table 37). Runners reported the most positive health assessments, with 90 percent placing themselves in one of the top two categories.

Table 37: Percent Trips by Self-Reported Health Status and Mode

Health	Walk	Run	Bike	**Total**
Excellent	27%	36%	40%	**34%**
Very Good	40%	54%	33%	**41%**
Good	27%	10%	24%	**22%**
Fair	3%	0%	3%	**2%**
Poor	1%	0%	0%	**0%**

Those completing the survey, both online and in person, were asked how likely they were to engage in physical activity if they had been unable to come out to the trail. Sixty-six percent of users reported that they were either likely or very likely to do some other physical activity if trail use was no longer an option (Table 38).

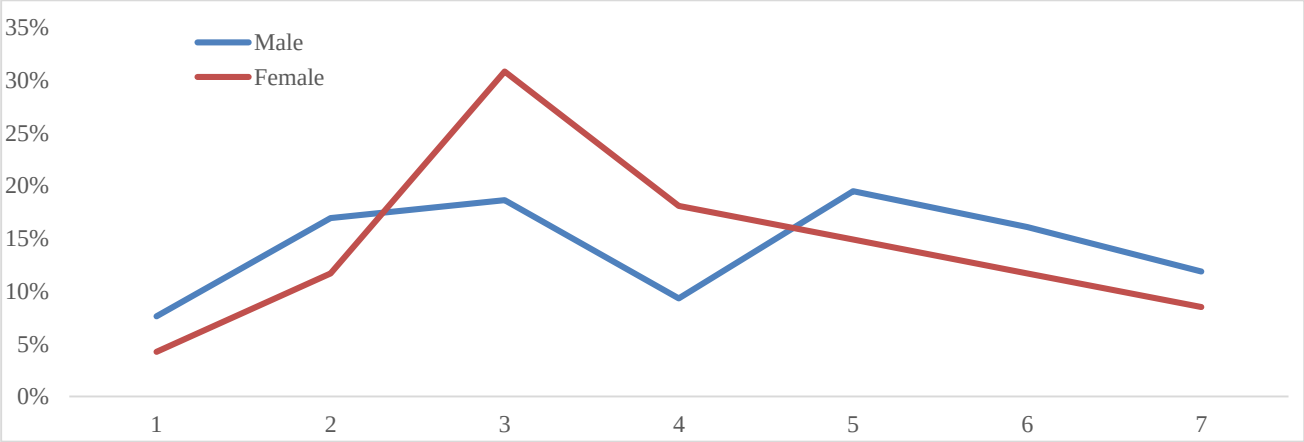
Table 38: Likelihood of Other Physical Activity

Likelihood	%
Very Likely	28%
Likely	38%
Undecided	9%
Unlikely	14%
Very Unlikely	11%

Online survey respondents were asked if alternative physical activity would be of comparable duration or intensity to using the trail. Sixty-four percent reported that their alternative physical activity would have lasted the same period of time; 28 percent would have exercised for a shorter period of time, and 8 percent would have exercised longer. Sixty-six percent of surveyed trail users reported that had the trail not been an option for physical activity, they would have exercised with the same level of intensity. About half of the remaining respondents said their activity would be less rigorous (18 percent) and half reported that it would be more rigorous (12 percent).

Respondents reported an average of four days of vigorous activity each week (standard deviation of about two days). Women's physical activity presented a peak at three days per week, while men's responses were pretty even for all options (one to seven days of physical activity) (Figure 14).

Figure 14: Days of Physical Activity by Gender



GPAQ Results

The online version of the survey includes questions from the GPAQ, developed by the WHO for physical activity surveillance. It collects information on physical activity in three settings – activity at work, travel to and from places, and recreational activities. This survey asked respondents about vigorous and moderate activity at work, walking and bicycling for travel, and vigorous and moderate physical activity.

Table 39: GPAQ Results

Activity	Intensity	%	Average Days	Average Duration (hr)
Work	Vigorous	5%	5	7.5
	Moderate	16%	4	3.0
Travel	Walk	67%	4	0.9
	Bike	34%	4	1.3
Leisure	Vigorous	78%	4	1.7
	Moderate	78%	3	1.2
Sit		100%	N/A	7.7

Table 39 summarizes the extent to which the surveyed population participated in these different physical activities. Few people perform moderate or vigorous physical activity as part of their paid or unpaid work, but those who do are active for several hours per day for an average of five for four days per week (by vigorous and moderate intensity, respectively). Active travel was more common than physical activity related to work; about two thirds of users walk for travel within a typical week and about one third of respondents bicycle for travel on a regular basis. The duration of these activities mirrored the durations of these modes on the trail – between .9 and 1.3 hours for walking and bicycling, respectively. Physical activity for leisure, such as sports or recreational activities, is the most common type of activity reported, with almost all users reporting either moderate or vigorous activity of this type in the typical week. Trail users report exercise for leisure on an average of four days per week for over one hour.

In addition to evaluating the absolute outputs from the GPAQ, we identify the extent to which trail users meet the recommendations for weekly physical activity. The WHO recommends that adults (age 18-64) complete "at least 150 minutes of moderate-intensity aerobic activity throughout the week or do at least 75 minutes of vigorous-intensity physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity activity" (WHO 2011). In addition, it should be noted that the WHO recommends that aerobic activity should be performed in sessions of at least 10 minutes in duration (WHO 2011). The questions included in this pilot test include the phrase "for 10 minutes continuously" in reference to each activity type to ensure users consider this in their response.

Table 40 provides a simplified analysis of the WHO recommendations; it identifies what percentage of respondents, by gender and activity type, complete 150 minutes of physical activity weekly, regardless of intensity. Consideration of intensity would yield higher percentages as less time of vigorous activity is required to meet the recommended activity level. Despite this undercounting, activity rates are high among the respondents in this survey pilot. Ninety-two percent of respondents met the WHO recommended 150 minutes per week of physical activity. Men were more likely to meet this standard than women were, but both genders had the vast majority meeting this standard. Given that the percentages for women in individual activities is significantly lower than those for men, while the overall percentage of those meeting the WHO recommendations is comparable across genders, women who met the standard did so through several short, different active events throughout the week. In contrast, men were more likely to meet the standard through one activity.

Table 40: Respondents Meeting 150-minute WHO Activity Recommendations

	Male	Female	Total
Work	18%	12%	15%
Vigorous	6%	0%	3%
Moderate	18%	12%	15%
Travel	53%	20%	38%
Walk	29%	16%	23%
Bicycle	32%	0%	18%
Leisure	88%	84%	85%
Vigorous	65%	56%	60%
Moderate	35%	32%	33%
All Activity	**97%**	**88%**	**92%**

Similar to the metrics described in the initial GPAQ results table, work did not comprise a significant portion of physical activity for men or women. In contrast, the other two activity types – travel and leisure – contributed significantly to individuals overall physical activity profile. This is significant, because the trail is one facility these respondents use to meet this weekly activity recommendation. When considering whether one type of activity alone met the standard, we found that travel comprised at least 150 minutes of physical activity for many more men than women (53 percent to 20 percent).

Active travel comprises 26 percent of total physical activity for those meeting the WHO recommendations. Active travel makes up a larger portion (40 percent) of total physical activity in those not meeting the WHO standard. Those meeting the WHO recommended level of physical activity walk or bike for travel an average of 282 minutes per week (4.7 hours weekly, or about 40 minutes daily). Those not meeting the 150 minute threshold walk or bicycle for active travel just 24 minutes a week.

6. Discussion

Implementation of this pilot study demonstrated that, on the whole, the survey content and distribution are successful tools for collecting the necessary data to implement T-MAP. The survey administration plan yielded sufficient responses both online and in-person, and it included a mix of utilitarian and recreational users. The automated and manual counts conducted concurrent with the surveys revealed that the sampling plan is generally representative of the gender and modes of trail users on this facility. While not all results matched expectations, responses were not wildly surprising, suggesting that the included questions effectively conveyed the desired inquiry.

While the pilot test was successful, it revealed several small changes that could be made to the survey content and structure to ease both surveyor and respondent use of the tool. Through tweaking the question order and phrasing, the revised survey – to be used for the national T-MAP implementation – will be a more effective instrument for collecting the data required to quantify health and transportation impacts of trail use. This section provides a discussion of observations made about the intercept and online surveys during the pilot study, reflecting on the content, structure, and distribution of the survey. It also explains the limitations of this pilot study and opportunities for improvement during the national implementation of this survey instrument.

Response Rates

Forty-five percent of approached trail users participated in the trail survey in-person. When summing the responses from trail cards distributed on this trail with intercept responses, we find an overall 55 percent response rate among all users approached for participation. These values are comparable to rates summarized in the literature review, where response ranged from 40 to 100 percent for in-person surveys. Few studies evaluated in the review offered trail users the options for either onsite or online participation. The number of trail users completing the survey in-person in the T-MAP distribution plan is likely lower than it would have been had trail users solely been offered an in-person option.

During the pilot study, the two surveyors tracked overall trail use as well as the response rate among those asked to participate in person or online by the primary surveyor. The iPad allowed this surveyor to input whether approached trail users would participate in person, online, or not at all. However, when the secondary volunteer approached users, the likelihood of these users taking a card or refusing to participate at all was not recorded. The surveyors could track the number of cards distributed by subtracting the remaining cards at the end of a shift from the original set, but an accurate number of the total “approaches” and “refusals” could not be determined given the methods used in the pilot.

Length

All intercept survey respondents completed the entire survey; there were no drop-outs partway through the set of questions. In addition, oftentimes trail users would inquire how long the survey was before agreeing to participate. Stating that the survey would take about five minutes rarely deterred anyone from choosing to participate. These observations imply that the intercept survey is not too long, as its current length does not turn away potential participants.

Some participants did drop out while completing the long version of the online survey (eight percent). This is relatively low, indicating that the survey is not too long. However, two respondents closed out of the link immediately upon agreeing to participate in the long version; this questions whether the short option should be immediately available. While this strategy may prevent individuals from dropping out, it may also result in fewer people completing the long version of the survey. An alternative approach to this challenge could be shifting important questions to earlier in the survey. By making this change, even if individuals do not complete the entire survey, the researchers will have collected the most fundamental user attributes necessary to complete the planned impact analyses.

Incentives

Incentives significantly impacted response rates during the pilot study; 67 percent of approached trail users participated in person when an incentive was present, in contrast to just 41 percent when the CamelBak water bottles were not distributed. These impacts were seen across both genders and modes (though most pronounced for bicyclists). In addition to the quantitative results regarding incentives and response rates, it is worth noting how people reacted to the presence of the incentive on the trail. Some trail users asked if they would receive a water bottle for online participation. Others responded that they had seen other trail users with the bottles, and therefore wanted to participate. While the survey cards advertised the free jersey incentive, this reward did not appear to appeal to all trail users. Cyclists riding in athletic gear were drawn by the incentive, while other trail users perhaps did not expect to yield the same utility from this reward.

All online survey participants were given the opportunity to enter a raffle for a free bike jersey. Of those that completed the survey, 67 percent entered the raffle for jersey, demonstrating that 33 percent of people were willing to participate in the survey without compensation. While the incentive may not be necessary to induce survey responses, it is still influential. Given that the online incentive is one prize based on a raffle, it is still a worthwhile investment. The cost per individual respondent will likely be very low in the national implementation (assuming a high number of online responses).

Content

The survey content in the intercept and online survey was successful at gathering the information required for impact calculations. However, individual question changes could be made to improve the administration of the survey. This section describes specific content improvements that can be made to the survey based on the pilot study implementation. Revised intercept and online surveys can be found in Appendix D and E, respectively.

Response Options

It is fundamental that questions are structured in a way that users can provide an accurate response. When multiple choice options are used, these different alternatives must be comprehensive list of possible options or include an "other" category. For the most part, the surveys contained multiple choice options that sufficiently met the respondents' needs during the survey. However, there were a few specific questions where additional flexibility would improve response accuracy. For example, during the pilot study, the trip replacement question included options for driving, taking transit, walking, running, or biking had the current trail trip been taken by an alternative mode. While surveying during the morning and afternoon peaks near downtown Durham, several trail users reported that they would have carpooled with a spouse or family member to and from work had they chosen not to bicycle. This option – carpooling – is different from driving a personal vehicle; it implies that limited or no additional vehicles miles would have been traversed had the trail user utilized this commute option. This response option is included in the revised version of the survey.

A similar example was found with the frequency question, which inquires how often the trail user visits the trail during the winter and summer seasons. Trail users that have either never used the trail before this visit or have not lived in the area for a full year struggled to answer this question. Perhaps including a question that asks if this is the user's first visit to the trail, and then only asking the frequency question if the response is "no", would allow for the results to show clearer pattern of trail use. During the pilot study, individuals who were first-time users or had not spent a given season in the region were marked as "never" using the trail during those time periods.

The intercept survey asked trail users about the distance and duration of their current trail trip. However, several recreational trail users did not have an answer for this inquiry. At the start of their trail trip, they had not yet determined how far or how long they planned to walk, run, or bike on the facility. In addition, others were confident about the time or distance on the trail, but had not yet determined the alternative factor. For example, a runner may plan to complete five miles on a given run, but is unsure if this will take 45 or 55 minutes. Alternatively, a family walking with young children and a dog may plan to spend about an hour on the trail, but the distance they may travel could vary greatly. In the current version of the survey, both distance and duration questions require responses. When trail users provided a range of possible times or distances, the mean of those estimates was recorded. In the survey revision, it should be decided whether more, but potentially inaccurate, data is preferable to a smaller dataset of more accurate metrics.

Question Objectives

Construct validity considers whether a test measures the intended construct. It is important to evaluate whether the questions included in these surveys accurate address the concept of interest. For example, several questions seek to evaluate the trail users' health. The self-reported health question, "In general, what would you say your health is?" provides five optional responses: excellent, very good, good, fair, and poor. The question is very subjective, and it is unclear what the researcher gains from asking it. Some trail users interpreted this question to refer to cardiovascular health, while others answered in reference to the medication they were taking or how physically fit they felt compared to either a baseline or peak fitness state. The question, used

in comparison with more objective measures of health may provide insight to the differences between perception and actual health conditions. However, given the multiple interpretations, not every survey participant is using the same construct of "health" in answering this question.

Similarly, discussions of physical activity and activity intensity should be clearly defined for survey respondents. In the online survey, there is sufficient clarifying information for activity-related questions to specify what activity is considered rigorous- and moderate-intensity, and the activity types are clearly defined with examples. However, the onsite survey respondents are not given as much information. The question inquiring about weekly activity states:

> "In a typical week, on how many days do you do a total of 30 min or more of physical activity, which is enough to raise your breathing rate? This may include sports, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job."

While the question does provide an explanation for respondents, most trail users did not wait for the surveyor to complete explaining the question prior to providing a response. These values may be overestimates of activity and many not truly evaluate the desired construct.

In addition to providing information related to the survey questions, several trail users also provided comments about the ATT during the survey. This feedback is valuable, but there is not yet a method for collecting it in this specific survey. While T-MAP is intended to develop nationally applicable tools, this hyperlocal trail feedback should not be discounted. Perhaps trail surveyors could bring printed feedback forms to the trail. This would not take time away from conducting additional surveys, and would not require the surveyor to input long text responses into the iPad.

Structure

The structure of the survey is fundamental to easing administration and ensuring sufficient responses. Each survey is divided into several sections – recent or current trail trip, trail use habits, health-related questions, user characteristics, and additional inquiries. This is a logical flow for the survey; the first inquiry is about a specific trail experience, and this is then generalized to typical trail use and overall characteristics of the trail use. This portion of the discussion describes the benefits and drawbacks of the structure used for the surveys. It first highlight improvements necessary across both versions, then outlines specific changes for the intercept survey.

The current trip replacement question, asking what mode (if any) trail users would have used today if they could not have used their current mode, is currently at the end of the survey. It follows trip frequency and health related questions, though would make more sense after the questions asking about the attributes of the user's current trail trip. Similarly, the question asking about substitution of other physical activity is currently placed in the "Additional Questions" section. Moving these two questions earlier in the survey, following the trip purpose question, will ease the flow of survey administration.

Several questions in the pilot survey included piped text responses from previous answers. This was valuable during the survey, and allowed the survey to flow more like a conversation than a

structured interview. While this is currently employed on a handful of questions, the revised survey should include additional piped responses. For example, if a respondent plans to bike 25 miles on this trail trip, the duration question can ask "How long will it take you to bike 25 miles today?" The reference helps remind the trail user of how to calculate their time, and indicates the surveyor's engagement with participant. This inclusion could also rephrase questions about trip distance to ask, "How long will it take you to walk from home to work today?"

Intercept Survey

The intercept survey should be designed to be completed quickly and efficiently. Each section of the survey used in the pilot included an introductory sentence, informing the participant that the next few questions will refer to their current trip, overall trail habits, etc. While this may be a useful component of the online version, it is superfluous for the onsite survys. The ordering of the sections is logical, and the questions from one section transition to the next without requiring this additional qualifying statement.

The survey is administered in an interview format. The surveyor reads a question to the trail user, and based on the trail user's response, the surveyor inputs an answer (either multiple choice or open-ended). For most questions included in the survey, the multiple choices responses are not recited to the trail user. However, in order for this method to be effective the questions must be clearly phrased to elicit the right type of response. For example, the question about the start of the trip asks "Where did you start your trip today, including getting to the trail?" The response options: home, work, school, and other, are all logical answers if the trail user discerns that the question is about location type rather than an address.

A later question in the survey asks specifically about a starting intersection or zip code for the trip origin. This could be rephrased into two questions: 1) did your trip start at home today? and 2) if not, then where did it start? In addition, sometimes there was confusion about the start of the trip, even though the question explicitly states "including getting to the trail". If trail users drove or used a different mode to reach the trail than the mode they employed while on the trail, they were often confused about where to claim their trip began.

Similarly, the bicycle preference question currently requires the surveyor provide each of the four answer options (Figure 15). Instead, this question can be rephrased as a set of short yes-or-no questions. The skip logic for the questions could be based on whether or not the person is currently riding a bike. For example, if they are riding a bike, they are not going to be in the "No way no how" cohort.

Figure 15: Bicycle Preference Question

> Finally, we would like to ask you how you feel about bicycling in traffic. Which of these do you most identify with?
> - You are not interested in riding a bicycle, regardless of bicycle accommodations. (No Way No How)
> - You are uncomfortable riding with fast, high volume traffic (Interested but Concerned)
> - You are willing to ride a bicycle as long as there are minimal accommodations for bicycles (e.g. wide enough streets or bike lanes in critical sections) (Enthused and Confident)
> - You are willing to ride your bike pretty much under any traffic conditions (Strong and Fearless)

Instead, the question can be rewritten in the following segments. If the person is not bicycling, start with question 1. If they are bicycling, skip to question 2.

1. Do you own or ride a bicycle?
    - If no: next question
    - If yes, skip to question 3
2. Are you interested in owning or riding a bicycle?
    - If no: "No way no how"
    - If yes: Next question
3. Do you ride on the roads?
    - If no: "Interested but concerned"
    - If yes: Next question
4. Do you feel comfortable riding in high traffic?
    - If no: Enthused and confident
    - If yes: Strong and fearless

It is unclear if these questions would save or add time to the survey - those not interested in cycling would likely complete the survey more quickly; those that are "interested and concerned" may complete the survey in a similar timeframe; and those that are more comfortable or assertive cyclists would take longer to complete the survey. These last two groups comprise about 10 percent of the population (Geller 2006) though likely a larger portion of trail users.

While the iPad platform streamlines data collection, there are some challenges with using this format. During the pilot, the survey sometimes unfolded more like a conversation than a list of questions. For example, a question about the trip destination may elicit additional information about the frequency within which the trail user bicycles on the trail to work. While this information is valuable and recorded in the survey, it cannot be recorded in real-time when given out of sequence. Each page on the iPad currently shows two or three questions, and the surveyor advances through the several pages while administering the survey. A paper survey would allow the surveyor to fill in information as it is received, yet this digital format requires very specific order of information. Showing more questions per page may address some of this issue, but may complicate survey administration.

Distribution

The pilot test provided valuable information about the benefits and drawbacks of the original distribution strategy, particularly timing, location, and strategies for approaching users.

Schedule and Implementation

During the pilot test, weekend and weekday surveying was evenly split, and while weekday surveying occurred all day (7AM-7PM), weekend surveying was confined to peak hours (11AM-4PM). This schedule was developed based on assumptions about trail use rather than observed count data, as the automated count information was not yet available. As a result, the pilot distribution schedule may not have accurately captures the trends of trail use. The T-MAP Distribution Protocol (Appendix G), provides clear guidance about how to use previously collected count data to inform survey locations and times.

Project timing and weather posed challenges to implementing the distribution schedule. Given the project timeline, the pilot study was expected to occur during February 2015. While the winter in the region is typically moderate, several planned survey shifts needed to be cancelled due to freezing temperatures or inclement weather. Those survey shifts that were completed as originally scheduled were under a range of weather conditions (as discussed above). Also, most time shifts were only surveyed once or twice during the course of the pilot study. This small sample size makes it is difficult to discern how well these shifts accurately capture trail use during those periods of the day.

Weather also likely impacted the types of users surveyed. More committed athletes may have been more likely to use the trail during colder weather. In addition, it is assumed utilitarian trail users may be more likely to travel on the trail during typical commute hours. However, the temperatures during these periods may have been prohibitively cold during the selected survey days. While midday shifts often reach temperatures between 50 and 65 degrees, the morning and afternoon peaks surveyed were both below 50 degrees. Some of these issues will not be challenges faced in the national T-MAP survey implementation, as the summer temperatures will be more conducive to trail use by all user types. However, locations with very high temperatures should consider how extreme heat may impact trail use.

Location

The two survey locations provided insight into effective siting for the trail survey. In both cases, the surveyors were located near an intersection. The Highgate location, used primarily for weekend surveying, was not only near an intersection, but near common trail access point. Individuals just beginning or ending their trail trip were often willing to stop and participate in the survey just before starting or ending their trail activity. The West Enterprise location, while near an intersection, was not a common stopping point for trail users. Individuals commuting to work or training on this section of the trail were often hesitant to stop. This effect was likely exacerbated by the fact a higher proportion of surveyed users were conducting utilitarian trips on this trail segment. Those making these trips may have commitments at home or work that prohibit them from participating in the survey.

Approach

Who surveyors choose to approach and how they do so may impact the number and type of responses collected. For example, trail users that were running or cycling at a fast pace were often not willing to stop for the survey. In addition, there was not always enough time to both ask if they would participate in person, and then if they would to participate online. In later trail shifts, the surveyors focused more on giving these trail users cards to the online survey than asking them to participate in-person. The training for surveyors of the T-MAP survey should include information about how to boost response rates through similar tactics. In addition, while the sampling plan requires asking only one or two members of a group to participate in the survey in person, cards should be distributed to all group members not willing to stop. It is expected that the response rate among these users will be low, and distributing more cards allows for more overall responses.

In addition, there were often groups traveling together. In some instances, multiple people within the group were interested in participating in the survey and were permitted to, given the sampling plan. However, these surveys could not be completed simultaneously; instead they needed to be completed one at a time. It should be investigated if there are alternative ways of presenting the survey within the Qualtrics application so that multiple surveys may be completed concurrently. This would save time for both the trail users and the volunteer administering the questions. In addition, the sampling plan influences the number of individuals approached during the survey shifts. However, group size was not previously included in the pilot survey. Updating the intercept pre-interview to include questions related to group size, perhaps including information about number of adults, children, and dogs, would provide valuable insight into how people use the facility. The Tracking Users Form has been updated as well to reflect this additional information (Appendix F).

Limitations

While many of the above comments can be addressed and improved between the pilot study and the larger implementation of the T-MAP survey, some limitations are unavoidable. For example, it should be noted that even though the content of the intercept and short version of the online survey is identical, there may be some differences in responses unrelated to the different types of people who may choose to respond on one platform or another. These variations may be based on the platform itself. The intercept survey is conducted like an interview, and respondents are not provided the possible responses unless they require clarification about the question. In contrast, the online survey provides all the possible responses to the participant.

One primary challenge throughout the survey distribution was the balance between encouraging in-person and online participation. While the online survey has substantially more information, the response rate for trail users potentially using this survey type is low. Going forward, those administering the national survey implementation should consider how to optimize the sampling plan. This may include strongly encouraging participation in the online survey (to the right mix of users) and employing the interview only to augment that online information.

7. Conclusion

As part of T-MAP, the Rails-to-Trails Conservancy is leading the first nationwide survey of trail use. This paper described the development of the T-MAP survey tools and methods, which will

provide the empirical data necessary for calculating the health and transportation impacts of trail investments. Without this data, the impact analyses would rely on crude assumptions. The survey data, collected both onsite and online, allows Rails-to-Trails to learn more about trail use and usage, which will allow the organization to make a better case for trails.

The T-MAP pilot surveys were on the American Tobacco Trail (ATT) in Durham, NC, in February and March 2015, yielding nearly 300 survey responses, including over 200 in-person surveys and 65 online surveys from both the trail card and trailhead. Response rates varied based on the survey type, mode, and the presence of incentives, and the rates were generally comparable with those reported in the studies evaluated for the literature review. Implementation of this pilot study demonstrated that, on the whole, the survey content and distribution are successful tools for collecting the necessary data to implement T-MAP. While the pilot implementation was successful, it revealed several small changes that could be made to the survey content and structure to ease both surveyor and respondent use of the tool. Through tweaking the question order and phrasing, the revised survey – to be used for the national T-MAP implementation – will be a more effective instrument for collecting the data required to calculate trail impacts.

The national implementation of T-MAP's survey instruments will take place in summer 2015. The intercept and online surveys will collect thousands of responses, aggregated from the 12 metropolitan areas with currently installed automated trail counters. From data collected, the T-MAP Advisory Board will develop impact tools for quantifying the health and transportation benefits of trail investments, both based on emissions and health metrics, but also in monetary amounts. Upon the completion of T-MAP, these tools will be available to nonprofit organizations and local and state agencies to estimate the impact of trail investments in their local communities.

Appendix

A. Pilot Intercept Survey

Gender
- ❍ Male
- ❍ Female

Mode
- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Other

If Other Is Not Selected, Then Skip To End of Block

Please specify your trail activity
- ❍ Rollerblading, inline skating
- ❍ Horse riding
- ❍ Skate boarding
- ❍ Other _____

Hello, we are working for the Rails-to-Trails Conservancy and today we are conducting a survey of trail users. Would you be willing to participate in this survey? It will take about 5 minutes.

IF NO: Would you be willing to take this survey later online?
- ❍ Yes, will participate in person
- ❍ Yes, prefer to participate online
- ❍ No, prefer not to participate at all

If Yes, will participate in person Is Not Selected, Then Skip To End of Survey

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To start, I will ask you some questions about your current trip on the trail today.

Where did you start your trip today, including getting to the trail?
- ❍ Home
- ❍ Work
- ❍ School
- ❍ Other

Could you specify a nearby street intersection and/or the zip code of your starting location?

Street 1:
Street 2:
Zip Code:
Prefer not to provide/ do not know:

Is this also where your trip will end?

- ❍ Yes
- ❍ No

Answer If Is this also where your trip will end? No Is Selected

Where will you end your trip today, after leaving the trail?

- ❍ Home
- ❍ Work
- ❍ School
- ❍ Other

Answer If Is this also where your trip will end? No Is Selected And Could you specify a nearby street intersection and/or the zip code of your starting location? Prefer not to provide location Is Empty

Please specify a nearby street intersection:

Street 1:
Street 2:
Zip Code:
Prefer not to provide/ do not know:

What mode of transportation did you use to get to the trail today?

- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Driving
- ❍ Public transportation
- ❍ Other

How much time did it take you to reach the trail from ${q://QID18/ChoiceGroup/SelectedChoices}?

Minutes:

How far are you ${q://QID3/ChoiceGroup/SelectedChoices} during this trip (in miles), including accessing the trail?

Miles:

How much time will you be ${q://QID3/ChoiceGroup/SelectedChoices} during this trip (in minutes), including accessing the trail?

Hours:
Minutes:

What is the purpose of your trip?

- ❍ Recreational (leisurely walk, walking the dog, exercise, fitness, for health, etc.)
- ❍ Utilitarian (commute, running errands, transit access, going to the gym, etc.)
- ❍ Other

The following questions refer to how you use this trail in general.

During the summer season (June, July, and August), how often do you use this trail?
- ❍ Never
- ❍ Less than once a month
- ❍ Once a month
- ❍ 2-3 times a month
- ❍ Once a week
- ❍ 2-3 times per week
- ❍ More than 3 times per week

During the winter season (December, January, and February), how often do you use this trail?
- ❍ Never
- ❍ Less than once a month
- ❍ Once a month
- ❍ 2-3 times a month
- ❍ Once a week
- ❍ 2-3 times per week
- ❍ More than 3 times per week

If for some reason you would not have been able to come out to the trail, how likely would you have been to engage in some other form of exercise or physical activity instead?
- ❍ Very Unlikely
- ❍ Unlikely
- ❍ Undecided
- ❍ Likely
- ❍ Very Likely

Answer If What is the purpose of your trip? Utilitarian (commute, running errands, transit access, going to the gym, etc.) Is Selected

If for some reason you would not have been able to take this trip by ${q://QID3/ChoiceGroup/SelectedChoices}, would you have used another mode of transportation?
- ❍ No, I would not have taken this trip
- ❍ Car
- ❍ Transit
- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Other

Finally, we would like to ask you how you feel about bicycling in traffic. Which of these do you most identify with?
- ❍ You are not interested in riding a bicycle, regardless of bicycle accommodations. ("No Way

No How")
- ❍ You are uncomfortable riding with fast, high volume traffic (Interested but Concerned)
- ❍ You are willing to ride a bicycle as long as there are minimal accommodations for bicycles (e.g. wide enough streets or bike lanes in critical sections) (Enthused and Confident)
- ❍ You are willing to ride your bike pretty much under any traffic conditions (Strong and Fearless)

We would like to ask you some questions about you. In particular we are interested in your health.

In general what would you say your health is?
- ❍ Excellent
- ❍ Very Good
- ❍ Good
- ❍ Fair
- ❍ Poor

In a typical week, on how many days do you do a total of 30 min or more of physical activity, which is enough to raise your breathing rate? This may include sports, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job.
- ❍ None
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7

What is your age?

B. Pilot Online Survey

Thank you for your interest in **Rails-to-Trails Conservancy's trail user survey**! We would like to ask you to fill out this survey within a reasonably short period after your most recent trail visit, so you can provide us with some details regarding your last trip.

The survey will take approximately 20 minutes of your time. Those who complete the survey will be entered into a raffle to win a custom, limited-edition Club Ride jersey in the men's or women's style and size of their choice! Would you like to participate in this survey today?

- ❍ Yes
- ❍ No

If Yes Is Selected, Then Skip To End of Block

We also have a short survey, which will take about 5 minutes. Would you be willing to complete that survey today?

- ❍ Yes
- ❍ No

If No Is Selected, Then Skip To End of Survey

The following questions refer to **your most recent trail visit**.

Where did you start your most recent trail trip, including getting to the trail?

- ❍ Home
- ❍ Work
- ❍ School
- ❍ Other

Could you specify a nearby street intersection and/or the zip code of your starting location? Hint: If you don't know or prefer not to answer, skip this question

Street 1:
Street 2:
Zip Code:

Is that also where your trip ended?

- ❍ Yes
- ❍ No

Answer If Is that also the final destination of your trip? No Is Selected

Where did you end your trip, after leaving the trail?

- ❍ Home
- ❍ Work
- ❍ School
- ❍ Other

Carry Forward Unselected Choices from Where did you start your most recent trail trip?

Answer If Is that also where your trip ended? No Is Selected

Could you specify a nearby street intersection and/or the zip code of your destination? Hint: If you don't know or prefer not to answer, skip this question

Street 1:
Street 2:
Zip Code:

How much time did it take you to reach the trail from ${q://QID25/ChoiceGroup/SelectedChoices}?

Hours
Minutes

What mode of transportation did you use to get to the trail on your most recent trail visit?

- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Driving
- ❍ Public transportation
- ❍ Other

The following questions refer to the **part of your trip that you actually spent on the trail.**

What activity were you engaging in during your most recent trail visit?

- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Other

Answer If What travel mode were you engaging when last visiting this trail? Other Is Selected

Please specify your trail activity:

- ❍ Roller blading, inline skating
- ❍ Horse riding
- ❍ Skate boarding
- ❍ Other _____

What was the purpose of your trip? (Check all that apply)

- ❑ Recreation (leisurely walk, walking the dog, exercise, fitness, for health, etc.)
- ❑ Transportation (commute, running errands, transit access, going to the gym, visit a friend, etc.)
- ❑ Other

Answer If In what activity were you engaging during your most recent trail visit? other Is Not Selected

How far were you ${q://QID3/ChoiceGroup/SelectedChoices} on the trail during your most

recent trail visit? (miles)
Miles:

Answer If What activity were you engaging in during your most recent trail visit? other Is Selected

What distance did you cover on the trail during your most recent trail visit? (miles)
Miles:

Answer If What activity were you engaging in during your most recent trail visit? other Is Not Selected

How much time did you spend ${q://QID3/ChoiceGroup/SelectedChoices} during your most recent trail visit? (excluding stops and breaks)
Hours:
Minutes:

Answer If What activity were you engaging in during your most recent trail visit? other Is Selected

How much time would did you spend on the trail during your most recent trail visit? (excluding stops and breaks)
Hours:
Minutes:

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey! We would like... Yes Is Selected And Is that also where your trip ended? Yes Is Selected

Did you get on and off of the trail at the same access point?
- ❍ Yes
- ❍ No

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey! We would like... Yes Is Selected And Is that also where your trip ended? Yes Is Selected

Was your trail trip a...
- ❍ Out-and-back (you turned around on the trail and came back the same way)
- ❍ Loop

Now we would like to ask you some questions about **how you use this and other trails in general.**

During the summer season (June, July, August), how often would you say do you use this trail?
- ❍ Never
- ❍ Less than once a month
- ❍ Once a month
- ❍ 2-3 times a month
- ❍ Once per week
- ❍ 2-3 times per week
- ❍ More than 3 times per week

During the winter season (December, January, February), how often would you say do you use this trail?

- ❍ Never
- ❍ Less than once a week
- ❍ Once a month
- ❍ 2-3 times a month
- ❍ Once per week
- ❍ 2-3 times per week
- ❍ More than 3 times per week

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Is ${q://QID3/ChoiceGroup/SelectedChoices} your usual activity on this trail, or do you typically do another activity?

- ❍ Yes, this is my usual activity
- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Other

Carry Forward Unselected Choices from What activity were you engaging in during your most recent trail trip?

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

In general, what would you say is the primary purpose for which you use this trail?

- ❑ Recreation (leisurely walk, walking the dog, exercise, fitness, for health, etc.)
- ❑ Transportation (commute, running errands, transit access, going to the gym, visit a friend, etc.)
- ❑ Other

Carry Forward All Choices from What was the purpose of your trip?

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Do you usually cover about the same distance on the trail as on your most recent trip?

- ❍ Yes, about the same.
- ❍ Usually more.
- ❍ Usually less.

If Yes, about the same. Is Selected, Then Skip To End of Block

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

How far do you travel on a typical trail trip? (miles)

In general what would you say your health is?
- ❍ Excellent
- ❍ Very Good
- ❍ Good
- ❍ Fair
- ❍ Poor

Answer If We also have a short survey, which will take about 5 minutes. Would you be willing to complete th... Yes Is Selected

In a typical week, on how many days do you do a total of 30 min or more of physical activity, which is enough to raise your breathing rate? This may include sports, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job.
- ❍ None
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

The following questions are about how much **physical activity you do in a typical week**. Please answer these questions even if you do not consider yourself to be a physically active person. In answering the following questions

- 'vigorous-intensity activities' are activities that require hard physical effort and **cause large increases in breathing or heart rate**,

- 'moderate-intensity activities' are activities that require moderate physical effort and **cause small increases in breathing or heart rate**.

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

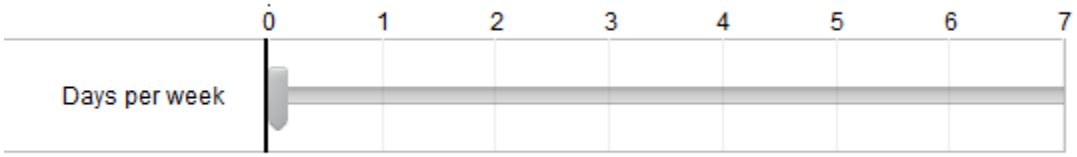
Think first about the time you spend doing **work**. Think of work as the things that you have to do such as paid or unpaid work, study/training, and household chores or gardening.

Does your work involve **vigorous-intensity activity** that causes large increases in breathing or heart rate for at least 10 minutes continuously? (for example carrying or lifting heavy loads, digging or construction work)
- ❍ Yes
- ❍ No

Answer If Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, and household chores or gardening. Does you... Yes Is Selected

In a typical week, on how many days do you do **vigorous-intensity** activities as part of your work?

Hint: Move the slider.



_____ Days per week

Answer If Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, and household chores or gardening. Does you... Yes Is Selected

Typically, how much time do you spend doing **vigorous-intensity** activities at work on such a day?

Hours:

Minutes:

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Does your work involve **moderate-intensity activity** that causes small increases in breathing or heart rate for at least 10 minutes continuously? (for example brisk walking, carrying light loads, waiting tables or cleaning floors)

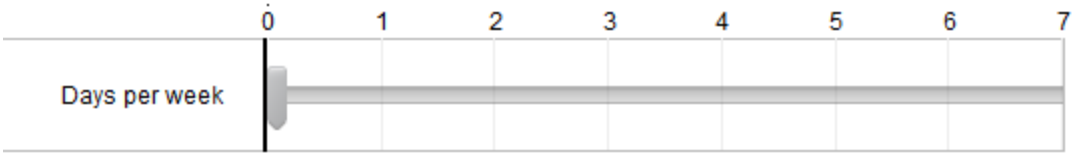
❍ Yes

❍ No

Answer If Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate for at least 10 minutes continuously? (for example brisk walking, carrying light loads, wai... Yes Is Selected

In a typical week, on how many days do you do **moderate-intensity** activities as part of your work?

Hint: Move the slider.



_____ Days per week

Answer If Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate for at least 10 minutes continuously? (for example brisk walking, carrying light loads, wai... Yes Is Selected

Typically, how much time do you spend doing **moderate-intensity** activities at work on such a day?

Hours:

Minutes:

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

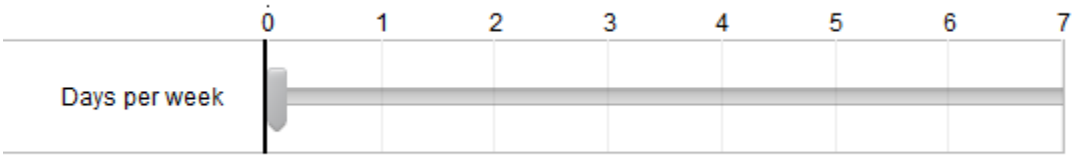
Walking and bicycling

The next questions exclude the physical activities at work that you have already mentioned. Now think about the usual way you **travel to and from places**. Do not include walking for leisure, bike tours, or cycling for sports.

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

In a typical week, on how many days do you walk for **at least 10 minutes continuously** to get to and from places?

Hint: Move the slider.



_____ Days per week

Answer If In a typical week, on how many days do you bike for at least 10 minutes continuously to get to and from places? Days per week Is Greater Than 0

Typically, how much time do you spend **walking** on such a day?

Hours

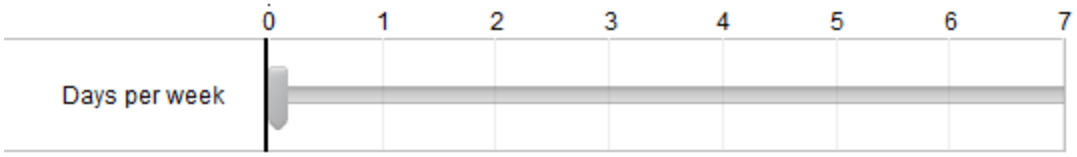
Minutes

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask

you to fi... Yes Is Selected

In a typical week, on how many days do you bike for **at least 10 minutes continuously** to get to and from places?

Hint: Move the slider.



_____ Days per week

Answer If In a typical week, on how many days do you bike for at least 10 minutes continuously to get to and from places? Days per week Is Greater Than 0

Typically, how much time do you spend **biking** on such a day?

Hours

Minutes

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Leisure time activities

The next questions exclude the work and transport activities that you have already mentioned. Now think about **sports, fitness and recreational activities (leisure),** including going for a walk or on a bike tour.

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

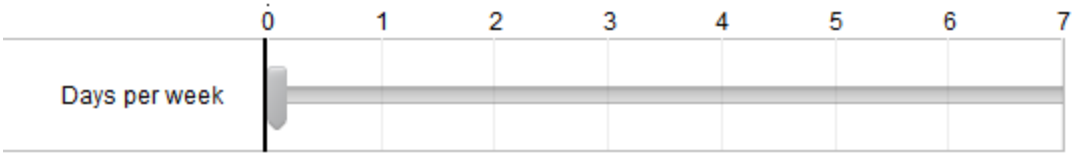
Do you do any **vigorous-intensity** sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate for at least 10 minutes continuously? (for example running, football, quick pedal cycling or fitness training)

- ❍ Yes
- ❍ No

Answer If Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate for at least 10 minutes continuously? (for example brisk... Yes Is Selected

In a typical week, on how many days do you do **vigorous-intensity** sports, fitness or recreational (leisure) activities?

Hint: Move the slider.



_____ Days per week

Answer If Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate for at least 10 minutes continuously? (for example brisk... Yes Is Selected

Typically, how much time do you spend doing **vigorous-intensity** sports, fitness or recreational activities on such a day?

Hours

Minutes

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Do you do any **moderate-intensity** sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate for at least 10 minutes continuously? (for example brisk walking, hiking, casual cycling or swimming, gymnastics)

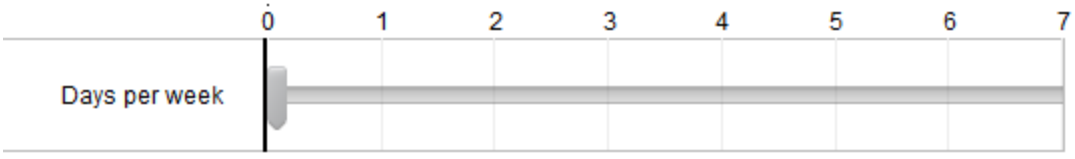
❍ Yes

❍ No

Answer If Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate for at least 10 minutes continuously? (for example brisk... Yes Is Selected

In a typical week, on how many days do you do **moderate-intensity** sports, fitness or recreational (leisure) activities?

Hint: Move the slider.



_____ Days per week

Answer If Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate for at least 10 minutes continuously? (for example brisk... Yes Is Selected

Typically, how much time do you spend doing **moderate-intensity** sports, fitness or recreational activities on such a day?

Hours:

Minutes:

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

The following question is about **sitting or reclining** at work, at home, getting to and from places, or during leisure-time. (for example time spent sitting at a desk, eating, traveling in car, bus, train, reading, watching television, using the computer) Times pent sleeping should not be included.

How much time do you usually spend sitting or reclining on a typical day?

Hours:

Minutes:

If for some reason you would not have been able to come out to the trail, how likely would you have been to engage in some other form of exercise or physical activity instead?

- ❍ Very Unlikely
- ❍ Unlikely
- ❍ Undecided
- ❍ Likely
- ❍ Very Likely

If Very Unlikely Is Selected, Then Skip To If for some reason you would not have...If Unlikely Is Selected, Then Skip To If for some reason you would not have...

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Would that exercise or physical activity be of similar duration to your activity on the trail?

- ❍ Yes, about the same.
- ❍ No, it would be longer.
- ❍ No, it would be shorter.

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey! We would like... Yes Is Selected

Would that exercise or physical activity be of similar intensity to your activity on the trail?

- ❍ Yes, about the same.
- ❍ No, it would be more rigorous.
- ❍ No, it would be less rigorous.

Answer If What was the purpose of your trip? (Check all that apply) Transportation (commute, running errands, transit access, going to the gym, visit a friend, etc.) Is Selected

If for some reason you would not have been able to take this trip by ${q://QID3/ChoiceGroup/SelectedChoices}, would you have used another mode of transportation?

- ❍ No, I would not have taken this trip.
- ❍ Car
- ❍ Transit

- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Other

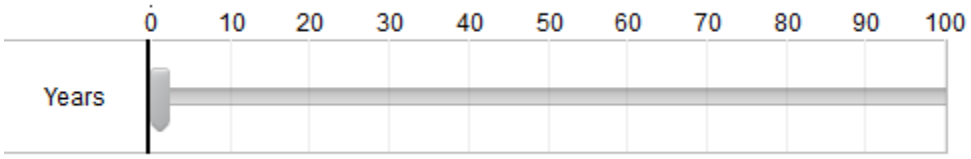
Carry Forward Unselected Choices from What activity were you engaging in during your most recent trail trip?

We would like to ask you how you feel about bicycling. Which of these do you most identify with?

- ❍ You are not interested in riding a bicycle, regardless of bicycle accommodations.
- ❍ You are currently not riding a bike mainly because you are uncomfortable riding with fast, high volume traffic.
- ❍ You are willing to ride a bicycle as long as there are minimal accommodations for bicycles (e.g. wide enough streets or bike lanes in critical sections)
- ❍ You are willing to ride your bike pretty much under any conditions.

Finally, we would like some questions about you.

What is your age? Hint: move slider!



_____ Years

What is your gender?

- ❍ Female
- ❍ Male

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

What is your weight?

Lbs:

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

What is your height?

Feet:

Inches:

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

How many children are there in your household?

	Number of children
Age 2 and under Age 3 to 6 Age 7 to 16	

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Do you own any of the following? (check all that apply)

- ❑ Car
- ❑ Bike
- ❑ Dog

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

What is the highest level of education you have completed?

- ❍ Less than High School
- ❍ High School / GED
- ❍ Some College
- ❍ 2-year College Degree
- ❍ 4-year College Degree
- ❍ Masters Degree
- ❍ Doctoral Degree
- ❍ Professional Degree (JD, MD)

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

What is your approximate annual household income

- ❍ less than $10,000
- ❍ up to $30,000
- ❍ up to $60,000
- ❍ up to $100,000
- ❍ over $100,000
- ❍ Prefer not to answer

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

What is your race/ethnicity?

- ❑ White (not Hispanic or Latino)
- ❑ Hispanic or Latino
- ❑ Black or African American
- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Native Hawaiian or Other Pacific Islander
- ❑ Other _____

Thank you for participating in our survey! If you would like to be entered into the raffle to win a custom, limited-edition Club Ride jersey, please enter your email address here. Your **email address** will be used only to contact you if you win so that you can choose your jersey style and size, and provide a shipping address for your prize.

E-mail:

C. Pilot Tracking Users Form

Trail: Time:
Date: Weather:

	Male	Female	Unknown
Walk			
Run			
Bike			
Other			

D. Revised Intercept Survey

Respondent Gender
- ❍ Male
- ❍ Female

Respondent Mode
- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Other

Please specify your trail activity
- ❍ Rollerblading, inline skating
- ❍ Horse riding
- ❍ Skate boarding
- ❍ Other _____

Group Characteristics

Male:
Female:
Children:
Dogs:

Hello, we are working for the Rails-to-Trails Conservancy and today we are conducting a survey of trail users. Would you be willing to participate in this survey? It will take about 5 minutes.IF NO: Would you be willing to take this survey later online?
- ❍ Yes, will participate in person
- ❍ Yes, prefer to participate online
- ❍ No, prefer not to participate at all

If Yes Is Not Selected, Then Skip To End of Survey

Did you start your trip at home today?
- ❍ Yes
- ❍ No

Where did you start your trip?
- ❍ Work
- ❍ School
- ❍ Other

Please specify a nearby street intersection and the zip code of your starting location.

Street 1:
Street 2:
Zip Code:
Prefer not to provide/ do not know:

Is this also where your trip will end?

- ❍ Yes
- ❍ No

Answer If Is this also where your trip will end? No Is Selected

Where will you end your trip today, after leaving the trail?

- ❍ Home
- ❍ Work
- ❍ School
- ❍ Other

Answer If Is this also where your trip will end? No Is Selected And Could you specify a nearby street intersection and/or the zip code of your starting location? Prefer not to provide location Is Empty

Please specify a nearby street intersection:

Street 1:
Street 2:
Zip Code:
Prefer not to provide/ do not know:

How did you get to the trail today?

- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Driving
- ❍ Public transportation
- ❍ Other

How much time did it take you to reach the trail from ${q://QID18/ChoiceGroup/SelectedChoices}?

Minutes:

How far are you ${q://QID3/ChoiceGroup/SelectedChoices} during this trip (in miles), including accessing the trail?

Miles:

How much time will you be ${q://QID3/ChoiceGroup/SelectedChoices} during this trip (in minutes), including accessing the trail?

Hours

Minutes

What is the purpose of your trip?

- ❍ Recreational (leisurely walk, walking the dog, exercise, fitness, for health, etc.)
- ❍ Utilitarian (commute, running errands, transit access, going to the gym, etc.)
- ❍ Other

If for some reason you would not have been able to come out to the trail, how likely would you have been to engage in some other form of exercise or physical activity instead?

- ❍ Very Unlikely
- ❍ Unlikely
- ❍ Undecided
- ❍ Likely
- ❍ Very Likely

Answer If What is the purpose of your trip? Utilitarian (commute, running errands, transit access, going to the gym, etc.) Is Selected

If for some reason you would not have been able to take this trip by ${q://QID3/ChoiceGroup/SelectedChoices}, would you have used another mode of transportation?

- ❍ No, I would not have taken this trip
- ❍ Car
- ❍ Dropped off by family or friend
- ❍ Transit
- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Other

During the summer (June, July, and August), how often do you use this trail?

- ❍ Never
- ❍ Less than once a month
- ❍ Once a month
- ❍ 2-3 times a month
- ❍ Once a week
- ❍ 2-3 times per week
- ❍ More than 3 times per week

During the winter (December, January, February), how often do you use this trail?

- ❍ Never
- ❍ Less than once a month
- ❍ Once a month
- ❍ 2-3 times a month
- ❍ Once a week
- ❍ 2-3 times per week
- ❍ More than 3 times per week

Answer If Respondent Mode Biking Is Not Selected

Do you own or ride a bicycle?

- ❍ Yes
- ❍ No

Answer If Do you own or ride a bicycle? No Is Selected

Are you interested in owning or riding a bicycle?

- ❍ Yes
- ❍ No

If No Is Selected, Then Skip To End of Block

Do you ride regularly on the roads?

- ❍ Yes
- ❍ No

If No Is Selected, Then Skip To End of Block

Do you feel comfortable riding in high traffic conditions?

- ❍ Yes
- ❍ No

In general what would you say your health is? (state possible responses)

- ❍ Excellent
- ❍ Very Good
- ❍ Good
- ❍ Fair
- ❍ Poor

E. Revised Online Survey

Thank you for your interest in **Rails-to-Trails Conservancy's trail user survey!** We would like to ask you to fill out this survey within a reasonably short period after your most recent trail visit, so you can provide us with some details regarding your last trip

The survey will take approximately 15 minutes of your time. Those who complete the survey will be entered into a raffle to win a custom, limited-edition Club Ride jersey in the men's or women's style and size of their choice

Would you like to participate in this survey today?

- ❍ Yes
- ❍ No

If Yes Is Selected, Then Skip To End of Block

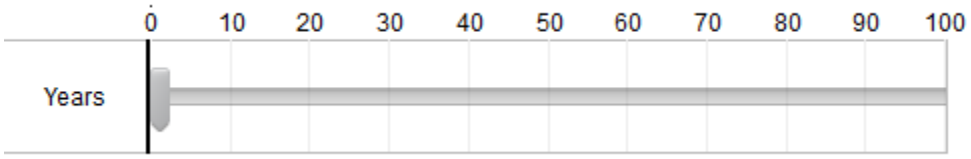
We also have a short survey, which will take about 5 minutes. Would you be willing to complete that survey today?

- ❍ Yes
- ❍ No

If No Is Selected, Then Skip To End of Survey

First we want to ask a few questions about you.

How old are you? Hint: move slider!



_____ Years

What is your gender?

- ❍ Female
- ❍ Male

The following questions refer to **your most recent trail visit.**

Where did you start your most recent trail trip, including getting to the trail?

- ❍ Home
- ❍ Work
- ❍ School
- ❍ Other

Could you specify a nearby street intersection and/or the zip code of your starting location? Hint: If you don't know or prefer not to answer, skip this question.

Street 1:
Street 2:
Zip Code:

Is that also where your trip ended?

- ❍ Yes
- ❍ No

Answer If Is that also the final destination of your trip? No Is Selected

Where did you end your trip, after leaving the trail?

- ❍ Home
- ❍ Work
- ❍ School
- ❍ Other

Carry Forward Unselected Choices from Where did you start your most recent trail trip?

Answer If Is that also where your trip ended? No Is Selected

Could you specify a nearby street intersection and/or the zip code of your destination? Hint: If you don't know or prefer not to answer, skip this question.

Street 1:
Street 2:
Zip Code:

How did you get to the trail on your most recent trail visit?

- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Driving
- ❍ Public transportation
- ❍ Other

How much time did it take you to reach the trail from
${q://QID25/ChoiceGroup/SelectedChoices}?

Hours

Minutes

The following questions refer to the **part of your trip that you actually spent on the trail**.

What activity were you engaging in during your most recent trail visit?

- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Other

Answer If What travel mode were you engaging when last visiting this trail? Other Is Selected

Please specify your trail activity:

- ❍ Roller blading, inline skating
- ❍ Horse riding
- ❍ Skate boarding
- ❍ Other _____

Were you traveling with a group? How many people (including yourself) were in your group?

Total group members:

Answer If In what activity were you engaging during your most recent trail visit? other Is Not Selected

How far were you ${q://QID3/ChoiceGroup/SelectedChoices} on the trail during your most recent trail visit? (miles)

Miles

Answer If What activity were you engaging in during your most recent trail visit? other Is Selected

What distance did you cover on the trail during your most recent trail visit? (miles)

Miles

Answer If What activity were you engaging in during your most recent trail visit? other Is Not Selected

How much time did you spend ${q://QID3/ChoiceGroup/SelectedChoices} during your most recent trail visit? (excluding stops and breaks)

Hours

Minutes

Answer If What activity were you engaging in during your most recent trail visit? other Is Selected

How much time would did you spend on the trail during your most recent trail visit? (excluding stops and breaks)

Hours

Minutes

What was the purpose of your trip? (Check all that apply)

- ❑ Recreation (leisurely walk, walking the dog, exercise, fitness, for health, etc.)
- ❑ Transportation (commute, running errands, transit access, going to the gym, visit a friend, etc.)
- ❑ Other

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey! We would like... Yes Is Selected And Is that also where your trip ended? Yes Is Selected

Did you get on and off of the trail at the same access point?

- ❍ Yes
- ❍ No

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey! We would like... Yes Is Selected And Is that also where your trip ended? Yes Is Selected

Was your trail trip a...

- ❍ Out-and-back (you turned around on the trail and came back the same way)
- ❍ Loop

If for some reason you would not have been able to come out to the trail, how likely would you have been to engage in some other form of exercise or physical activity instead?

- ❍ Very Unlikely
- ❍ Unlikely
- ❍ Undecided
- ❍ Likely
- ❍ Very Likely

If Very Unlikely Is Selected, Then Skip To If for some reason you would not have...If Unlikely Is Selected, Then Skip To If for some reason you would not have...

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey! We would like... Yes Is Selected

Would that exercise or physical activity be of similar intensity to your activity on the trail?

- ❍ Yes, about the same.
- ❍ No, it would be more rigorous.
- ❍ No, it would be less rigorous.

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Would that exercise or physical activity be of similar duration to your activity on the trail?

- ❍ Yes, about the same.
- ❍ No, it would be longer.
- ❍ No, it would be shorter.

Answer If What was the purpose of your trip? (Check all that apply) Transportation (commute, running errands, transit access, going to the gym, visit a friend, etc.) Is Selected

If for some reason you would not have been able to take this trip by ${q://QID3/ChoiceGroup/SelectedChoices}, would you have used another mode of transportation?

- ❍ No, I would not have taken this trip.
- ❍ Car
- ❍ Carpooled
- ❍ Transit
- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Other

Carry Forward Unselected Choices from What activity were you engaging in during your most recent trail trip?

Now we would like to ask you some questions about **how you use this and other trails in general.**

During the summer (June, July, August), how often would you say do you use this trail?

- ❍ Never
- ❍ Less than once a month
- ❍ Once a month
- ❍ 2-3 times a month
- ❍ Once per week
- ❍ 2-3 times per week
- ❍ More than 3 times per week

During the winter (December, January, February), how often would you say do you use this trail?

- ❍ Never
- ❍ Less than once a week
- ❍ Once a month
- ❍ 2-3 times a month
- ❍ Once per week
- ❍ 2-3 times per week
- ❍ More than 3 times per week

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Is ${q://QID3/ChoiceGroup/SelectedChoices} your usual activity on this trail, or do you typically do another activity?

- ❍ Yes, this is my usual activity
- ❍ Walking
- ❍ Running
- ❍ Biking
- ❍ Other

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

In general, what would you say is the primary purpose for which you use this trail?

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Do you usually cover about the same distance on the trail as on your most recent trip?

- ❍ Yes, about the same.
- ❍ Usually more.
- ❍ Usually less.

If Yes, about the same. Is Selected, Then Skip To End of Block

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

How far do you travel on a typical trail trip? (miles)

Miles

We would like to ask you how you feel about bicycling. Which of these do you most identify with?

- ❍ You are not interested in riding a bicycle, regardless of bicycle accommodations.
- ❍ You are currently not riding a bike mainly because you are uncomfortable riding with fast, high volume traffic.
- ❍ You are willing to ride a bicycle as long as there are minimal accommodations for bicycles (e.g. wide enough streets or bike lanes in critical sections)
- ❍ You are willing to ride your bike pretty much under any conditions.

In general what would you say your health is?

- ❍ Excellent
- ❍ Very Good
- ❍ Good
- ❍ Fair
- ❍ Poor

Answer If We also have a short survey, which will take about 5 minutes. Would you be willing to complete th... Yes Is Selected

In a typical week, on how many days do you do a total of 30 min or more of physical activity, which is enough to raise your breathing rate? This may include sports, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job.

- ❍ None
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

The following questions are about how much **physical activity you do in a typical week**. Please answer these questions even if you do not consider yourself to be a physically active person. In answering the following questions:

- 'vigorous-intensity activities' are activities that require hard physical effort and **cause large increases in breathing or heart rate**

- 'moderate-intensity activities' are activities that require moderate physical effort and **cause small increases in breathing or heart rate**

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

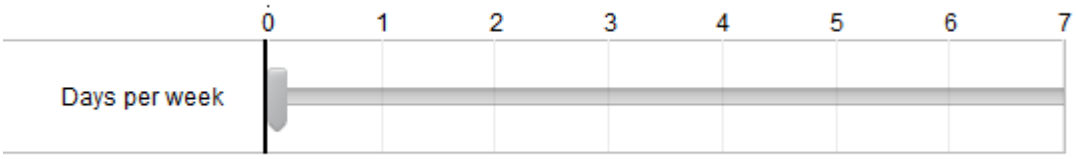
Think first about the time you spend doing **work**. Think of work as the things that you have to do such as paid or unpaid work, study/training, and household chores or gardening. Does your work involve **vigorous-intensity activity** that causes large increases in breathing or heart rate for at least 10 minutes continuously? (for example carrying or lifting heavy loads, digging or construction work)

- ❍ Yes
- ❍ No

Answer If Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, and household chores or gardening. Does you... Yes Is Selected

In a typical week, on how many days do you do **vigorous-intensity** activities as part of your work?

Hint: Move the slider



_____ Days per week

Answer If Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, and household chores or gardening. Does you... Yes Is Selected

Typically, how much time do you spend doing **vigorous-intensity** activities at work on such a day?

Hours
Minutes

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

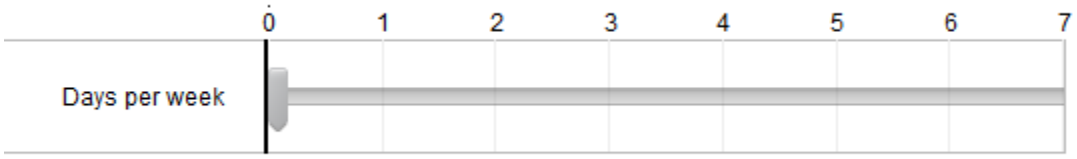
Does your work involve **moderate-intensity activity** that causes small increases in breathing or heart rate for at least 10 minutes continuously? (for example brisk walking, carrying light loads, waiting tables or cleaning floors)

- ❍ Yes
- ❍ No

Answer If Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate for at least 10 minutes continuously? (for example brisk walking, carrying light loads, wai... Yes Is Selected

In a typical week, on how many days do you do **moderate-intensity** activities as part of your work?

Hint: Move the slider



_____ Days per week

Answer If Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate for at least 10 minutes continuously? (for example brisk walking, carrying light loads, wai... Yes Is Selected

Typically, how much time do you spend doing **moderate-intensity** activities at work on such a day?

Hours
Minutes

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

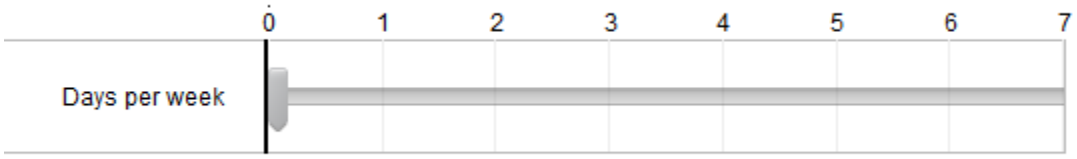
Walking and bicycling

The next questions exclude the physical activities at work that you have already mentioned. Now think about the usual way you **travel to and from places**. Do not include walking for leisure, bike tours, or cycling for sports

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

In a typical week, on how many days do you walk for **at least 10 minutes continuously** to get to and from places?

Hint: Move the slider.



_____ Days per week

Answer If In a typical week, on how many days do you bike for at least 10 minutes continuously to get to and from places? Days per week Is Greater Than 0

Typically, how much time do you spend **walking** on such a day?

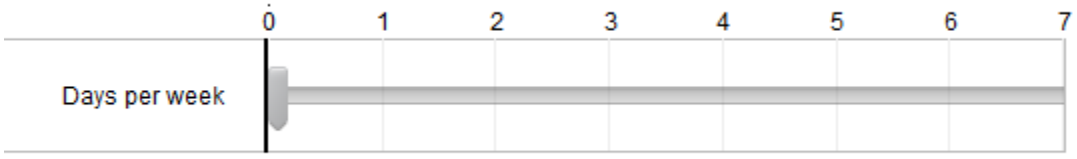
Hours

Minutes

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

In a typical week, on how many days do you bike for **at least 10 minutes continuously** to get to and from places?

Hint: Move the slider.



_____ Days per week

Answer If In a typical week, on how many days do you bike for at least 10 minutes continuously to get to and from places? Days per week Is Greater Than 0

Typically, how much time do you spend **biking** on such a day?

Hours

Minutes

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Leisure time activities

The next questions exclude the work and transport activities that you have already mentioned. Now think about **sports, fitness and recreational activities (leisure)**, including going for a walk or on a bike tour.

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

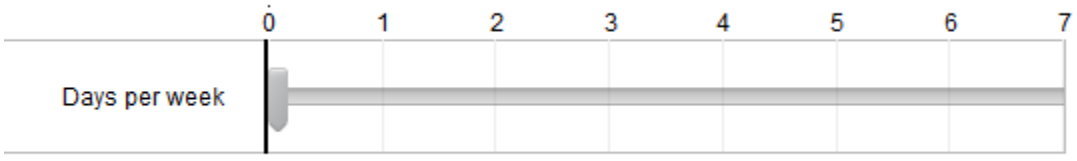
Do you do any **vigorous-intensity** sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate for at least 10 minutes continuously? (for example running, football, quick pedal cycling or fitness training)

- ❍ Yes
- ❍ No

Answer If Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate for at least 10 minutes continuously? (for example brisk... Yes Is Selected

In a typical week, on how many days do you do **vigorous-intensity** sports, fitness or recreational (leisure) activities?

Hint: Move the slider.



_____ Days per week

Answer If Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate for at least 10 minutes continuously? (for example brisk... Yes Is Selected

Typically, how much time do you spend doing **vigorous-intensity** sports, fitness or recreational activities on such a day?

Hours

Minutes

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Do you do any **moderate-intensity** sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate for at least 10 minutes continuously? (for example brisk walking, hiking, casual cycling or swimming, gymnastics)

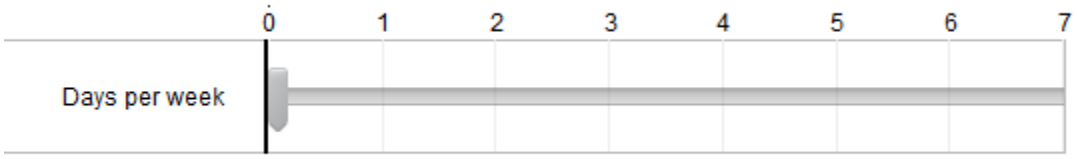
❍ Yes

❍ No

Answer If Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate for at least 10 minutes continuously? (for example brisk... Yes Is Selected

In a typical week, on how many days do you do **moderate-intensity** sports, fitness or recreational (leisure) activities?

Hint: Move the slider.



_____ Days per week

Answer If Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate for at least 10 minutes continuously? (for example brisk... Yes Is Selected

Typically, how much time do you spend doing **moderate-intensity** sports, fitness or recreational activities on such a day?

Hours

Minutes

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

The following question is about **sitting or reclining** at work, at home, getting to and from places, or during leisure-time. (for example time spent sitting at a desk, eating, traveling in car, bus, train, reading, watching television, using the computer).

Time spent sleeping should not be included. How much time do you usually spend sitting or reclining on a typical day?

Hours

Minutes

Finally, we would like some questions about you.

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

What is your height?

Feet

Inches

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

What is your weight? (Lbs)

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

How many children are there in your household?

	Number of children
Age 2 and under	
Age 3 to 6	
Age 7 to 16	

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

Do you own any of the following? (check all that apply)

- ❑ Car
- ❑ Bike
- ❑ Dog

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

What is the highest level of education you have completed?

- ❍ Less than High School
- ❍ High School / GED
- ❍ Some College
- ❍ 2-year College Degree
- ❍ 4-year College Degree
- ❍ Masters Degree
- ❍ Doctoral Degree
- ❍ Professional Degree (JD, MD)

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

What is your approximate annual household income?

- ❍ less than $10,000
- ❍ up to $30,000
- ❍ up to $60,000
- ❍ up to $100,000
- ❍ over $100,000
- ❍ Prefer not to answer

Answer If Thank you for your interest in Rails-to-Trails Conservancy's trail user survey. We ask you to fi... Yes Is Selected

What is your race/ethnicity?

- ❑ White (not Hispanic or Latino)
- ❑ Hispanic or Latino
- ❑ Black or African American
- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Native Hawaiian or Other Pacific Islander
- ❑ Other _____

Thank you for participating in our survey! If you would like to be entered into the raffle to win a custom, limited-edition Club Ride jersey, please enter your **email address** here. Your email address will be used only to contact you if you win so that you can choose your jersey style and size, and provide a shipping address for your prize

F. Revised Tracking Users Form

Trail: Time:
Date: Weather:

	Male	Female	Unknown	Child
Walk				
Run				
Bike				
Other				

G. Distribution Protocol

Background

The T-MAP survey will be conducted as intercept and online survey in summer 2015. It primarily serves the purpose to complement other data collection tools (i.e. counts) with the objective to have all data needed to conduct impact calculations. Two field workers will administer the T-MAP trail user intercept survey at selected trail locations. This document outlines the distribution protocol for the T-MAP survey, including guidelines for the scheduling, setup, and administration of the survey.

For each of the sections below, there is an accompanying section in the literature review that provides examples of how other studies and surveys approached these issues.

Distribution Schedule

The schedule employed for surveying trail users will impact the number and type of users evaluated. The Rails-to-Trails Conservancy should have specified which weeks or months during summer 2015 it hopes you will conduct the trail surveys on your local facilities. The following sections will provide guidance on calculating the total survey time, weekends vs. weekday ratio, the times of day surveyed, seasonality, scheduling methods, and how to address inclement weather.

A sample schedule is included in Appendix 1.

Total Survey Time

The total survey time will be function of the organization's capacity and the needed sample size. For T-MAP, the sample size required per site is 200. Based on traffic on the trail, and the expected response rate, the total number of hours surveyed on the trail will vary.

In the pilot study, 21 intercept surveys were completed in person for every 100 trail users. Five surveys (from trail cards, not the trailhead) were completed online for every 100 trail users. Therefore, agencies should use the existing T-MAP counts to determine how many survey hours will be required to meet the 200 survey baseline. However, given the effort of training and employing volunteers, a minimum of 12 hours should be employed at all sites, even if this leads to collection of far more than 200 surveys.

Weekends and Weekday

Both weekdays and weekends will be surveyed. These are expected to correlate with recreational and utilitarian trail use, both of which are relevant for impact calculations and affect relevant variables, such as trip duration, age of users, etc. The survey schedule should include a mix weekend hours and weekday hours proportional to facility use. For example, if a trail experiences 75 percent of its use on weekends, then 75 percent of survey time should be allotted for weekend shifts.

Time of Day

The survey schedule should cover all peak hours of trail usage, which may include early morning or afternoon commutes, midday recreational trips, etc. Survey time should be allotted among various times of day in proportion to trail use during those times. If few people use a given trail during midday weekday hours, or during weekend evening hours, these times may be omitted from the survey. Survey sessions should therefore be distributed between morning, midday, and evening. They may be broken into shifts ranging from 2-4 hours, based on volunteer and staff availability.

Seasonality

Seasonality affects traffic volume on the trail (due to weather), and this variation is captured by the automated counters. Distributing the survey across seasons is only warranted if we expected substantial shifts in usage (e.g. between recreational and utilitarian).

Scheduling Methods

The methods used to determine the distribution schedule will vary. Once the above variables are determined – number of hours, weekend vs. weekday ratio, shift times, and seasonal schedule – then the actual survey times must be selected. These can be randomized over the selected survey period or selected to match volunteer availability. As stated above, the schedule should mirror trail use with proportional survey time allotted based on high traffic hours and days.

Inclement Weather

Given that the survey is conducted on an iPad and that the survey cards are not on laminated paper, surveys shifts cannot be completed during inclement weather. Should there be a high likelihood of rain or other precipitation, surveyors should plan to reschedule for another comparable shift (in terms of time and type of day). In addition, the distribution schedule should include an extra 20 percent set of shifts to account for the possibility of inclement weather. These shifts do not need to be completed if 10 hours of surveys have been completed and over 200 responses have been collected.

Setup

Survey setup will be uniform (or as close as possible) across all locations. This section will provide guidance for determining the survey location along the trail, signage, administrator positioning, and provided incentives.

Survey Location

Ideal survey locations included high levels of active transportation travel and natural slowing or stopping points so that surveyors could easily approach travelers. Survey location will vary based on the characteristics of the individual trail and its use.

Some locations may have higher traffic during weekday peaks, capturing commutes, while other locations may capture more recreational trips and have high weekend traffic. Should multiple survey locations be selected, the shift times at these sites should be proportional to trail use at these locations.

When possible, surveyors should locate within the same trail segment as the T-MAP automated counters. This will provide accurate use forecasts for determining the trail schedule, and it will also permit more accurate extrapolation of survey results to overall segment use.

Signage

Along the trail, surveyors will post signs both 100 feet and 25 feet away (in both directions) from the interview location on the trail. The signs will be provided by the Rails-to-Trails Conservancy. Two types of signs will be used: one generally advertising that there is a survey ahead, and one promoting the incentive provided for participation. The incentive signs should be posted closer to the survey station.

Incentives

Incentives will be provided for all trail users that participate in the survey. Those trail users completing the survey in person will receive a Camelbak water bottle for their participation. Trail users participating online, either through the trailhead cards or cards distributed at the survey point, will be entered into a lottery to receive a free bicycle. All incentives will be provided by the Rails-to-Trails Conservancy.

Administration

This section describes the survey administration – addressing the platform used, the user sampling strategy, and guidance for the interactions between the surveyor and participant.

Platform

The survey will be administered through Qualtrics, an online survey provider. If the trail user chooses to take the survey on-site, it will be completed on the surveyor's iPad; if the survey is completed online, questions will be answered through a link to the Qualtrics survey.

Roles

There will be two surveyors per site. One will count all trail users using a provided form, and will encourage trail users to stop and complete the survey. The other surveyor will conduct the actual survey on the iPad.

User Sampling

On some trails, it will not be feasible to invite every trail user to complete the survey. Below are some guidelines for selecting potential participants for the survey. On low-traffic trail locations, all trail users should be approached for participation. In high-traffic locations the surveyor should approach every user, except 1) only one out of groups up to four and 2) only two out of group larger than four. Only trail users over 18 will be approached to complete the survey.

Survey Procedures

This section pertains to the interaction between the surveyor and the respondent.

Approach

A two-step intercept procedure will be used. First, trail users are approached and asked whether they would agree to partake in the study. The surveyor will highlight both that it is an

anonymous survey, and that it will only take about five minutes to complete. Based upon their response, they are surveyed or handed a card with information for the online survey.

However, fast moving runners or cyclists should only be asked one of the approach questions, as there is limited passing time to interact with these users. Surveyors should prioritize passing these users a survey card rather than soliciting on-site participation. In addition, sometimes the surveyor may need to move with the trail user to pass them the card without requiring the user slow down at the survey point.

When approaching respondents, surveyors should:

a. Manage clumping – don't block the trail for those who don't want to stop
b. Make clear eye contact
c. Loudly voice introduction

Interview

The on-site survey will be conducted as an interview. The surveyor will hold the iPad, ask questions of the participant, and record answers. The surveyor will not read the response options unless the participant asks for further information or is confused by the question. The surveyor should interpret the trail user's answer and select the correct multiple choice or open-ended response.

Observations

Part of the survey will be completed by the surveyor. These include:

- Activity/mode
- Gender
- Number of people in the group

The surveyors will track the number of trail users, the number of trail users approached to be surveyed, total survey responses, and the number survey cards distributed.

Training

In order to acquire accurate and consistent responses, interviewers and volunteers must administer the survey in a neutral way. Survey training will include review of this protocol and an in-person training session. During training, interviewers will review and discuss the questionnaire and rehears several practice interviews. Important features of the training sessions include clear explanations of the frame of reference for each question, how to control the pace and structure of the interview, and how and when to use prompts and other questions.

Other Distribution Details

The survey protocol should be tailored to meet the needs of the given location. For example, on some trails, it may make sense to conduct surveys in both Spanish and English.

Appendix

Sample Distribution Schedule

Counts on Trail X show that there are about 10,000 weekly trips. You know the breakdown of trips over different segments of the trail by both time of day and day of the week (Table 1) (If you only plan to survey one location on the trail, retain the "East Branch" portion of the table, but leave the "West Branch section blank).

Table 1: Trip Distribution based on Day Type, Time of Day, and Location

East Branch				West Branch			
Peak		Off-Peak		Peak		Off-Peak	
Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
2,000	-	750	3,000	1,000	-	250	3,000
20%	0%	7.5%	30%	10%	0%	2.5%	30%

You have determined that you will survey for a total of 40 hours on the trail. Based on the distribution of trips on the trail, you plan your schedule, multiplying the distribution percent by the total number of hours. While this helps generally determine the number of hours that should be surveyed in a given location, the actual distribution schedule should be a practical and efficient use of volunteer time. Instead of surveying for one hour of an off-peak weekday on the West Branch, this extra hour of surveying should be moved to an off-peak weekday survey hour on the East Branch. This allows for a survey schedule easily divisible into 10 four-hour shifts (Table 2).

Table 2: Survey Schedule Based on Trail Counts

East Branch		West Branch	
Peak		Peak	
Weekday	8	Weekday	4
Weekend	0	Weekend	0
Off-Peak		Off-Peak	
Weekday	3	Weekday	1
Weekend	12	Weekend	12

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