The Economic Impact of Cycling in the Pikes Peak Region
1 Executive summary

Outdoor enthusiasts have long understood that the Pikes Peak region’s natural environment and bicycling infrastructure contribute to the local economy, luring tourists and outdoor-equipment companies, as well as attracting and retaining employees in all local industries who enjoy the network of trails and ideal cycling weather. This report examines numerous studies conducted around the country, available local data, and the IMPLAN model, a highly-accurate and adaptable economic impact model containing county, state, zip code, and federal economic statistics specialized to each locality, not estimated from national averages. This allows it to measure the economic effect of a given change or activity on a regional or local economy to quantify benefits.

Tourism is an important component of Colorado’s economy. One study conducted in the 1990s estimated that cyclists from out-of-state contribute approximately $1 billion to the local economy. Total direct travel spending in the state is nearly $17 billion and supports approximately 150,000 jobs. For the Pikes Peak region alone, travel-generated earnings constitute an estimated 1.5 percent of total earnings, or accrued economic benefits. In 2010, bicycling’s direct impact on the Pikes Peak area economy amounted to approximately $28 million.

Currently, estimates show more than 1.2 million annual cycling days (one person bicycling for at least part of one day for a given purpose), including commuter and errand trips; cycling for exercise, fun or family time; and cycling by in- and out-of-state visitors. Each year, 80,000 cyclists visit the Pikes Peak region and stay overnight, while an additional 22,400 cyclists visit for the day. These visits result in restaurant outings, tour-package purchases, and hotel stays, and contribute to sales tax dollars available to local and state governments.

The region’s bicycle-friendly reputation has also attracted a number of cycling-related nonprofits and businesses, such as USA Cycling, SRAM, Rotor, EVOC, Borealis, and Barnett Bicycle Institute for Bicycle Mechanics. These companies, as well as numerous bicycle sales and repair shops, continue to employ well-educated, active employees in the region.

Analysis shows the region could triple its economic benefit due to cycling-friendly weather conditions and an unfilled demand for cycling facilities. Cycling accounts for just 1 percent of
trips in the Pikes Peak region, compared to commuting rates of 7 percent in Ft. Collins, 6.1 percent in Minneapolis, and 7.1 percent in Portland.

Of the Pikes Peak region’s 2.5 million daily trips, most are short, so a high potential exists to convert these short auto trips into bicycle trips:
- 20 percent are less than 5 miles
- 20 percent take less than 5 minutes
- 43 percent take less than 10 minutes

Increasing the local cycling rate to just half of those benchmark cities would require an investment of approximately $30-45 million in trail connections and other infrastructure projects identified in the Regional Nonmotorized Plan, yielding a total economic benefit of $81 million per year. This could realistically be achieved over three to five years.

Bicycle tourism currently contributes significantly to the local economy: $22,646,000 in direct economic impact each year comes from non-residents making day and overnight cycling trips. Just as opening world-famous Pikes Peak to bicyclists has drawn additional tourists, completing high-profile trails like Ring the Peak and the American Discovery Trail could also increase tourist visits to the region. Completing critical urban and suburban trail connections would not only enable increased commuter trips, but would also support charity and century rides that are popular in other cities.

For each dollar invested in cycling, the Pikes Peak region can yield $1.80 to $2.70 in direct economic benefits to the community. That doesn’t include the benefits of better air quality, healthier residents, or reduced traffic congestion.

The goal of this report is to estimate the present economic impact of cycling in the Pikes Peak region by measuring bicyclists’ annual purchases of goods and services, and to predict the effects of investing in cycling. In addition to purchasing equipment (i.e., bicycles), this would include ways in which cyclists support economic activity through expenditures on food, beverages, entertainment, transportation, accommodation, government fees, and other retail shopping while bicycling. This includes direct impacts, indirect impacts (purchases made to support bicycle-related businesses or related services) and induced impacts (purchases made by those employed by businesses that serve cyclists).

The analysis indicates that the bicycling economy supports more than 370 jobs, contributing to $11.5 million in labor income, adding $19 million in value, and creating a total of $33.8 million in direct, indirect, and induced economic output.
<table>
<thead>
<tr>
<th>Cycling Days</th>
<th>Expenditures per Cycling Day</th>
<th>Direct Economic Impact</th>
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<tbody>
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<td>Residential Recreational Days</td>
<td>692,627</td>
<td>$3.00</td>
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<td></td>
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<td>$2,077,881</td>
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<tr>
<td>Non-Resident Recreational Days</td>
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<tr>
<td>Overnight</td>
<td>80,000</td>
<td>$250.00</td>
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<td>Day trips</td>
<td>22,400</td>
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2 Context

As cities worldwide endeavor to make their transportation portfolios more diverse and sustainable, cycling is increasingly relied on as an essential component. Furthermore, it is helpful for public officials to better understand the impacts of different types of travel and in particular, the benefits associated with cycling. Comprehensively assessing the benefits of cycling helps better justify various investments, particularly those associated with cycling infrastructure. The benefits of cycling, generally speaking, fall into one of three categories:

1. Economic benefits: Finally, many communities are increasingly recognizing and trying to quantify the economic benefits of cycling. Most widely discussed are the economic benefits derived from health benefits, including reduced health care costs.1 However, the list of possible economic benefits are many, including those stemming from expenditures by cyclists, impact on property values, heightened levels of economic productivity, and tourism dollars.

2. Health benefits: Cycling helps improve cardiovascular fitness and reduces obesity. While there is concern that such benefits may be offset by exposure to air pollutants and increased crash risks, depending on the study and the context, public health benefits usually prevail, although, they are by no means automatic or easily quantified.

3. Environmental benefits: These are widely recognized and include reduced energy consumption, lower levels of greenhouse gas and other emissions, reduced road wear and tear and so forth. The magnitude of these benefits depends on the degree to which cycling is a substitute for driving, and this is often difficult to measure.2 Quantifying any reduced driving owing to cycling is difficult since it requires knowledge of the distance that would have been traveled in the absence of cycling.

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Some of these benefits are more immediately relevant than others; some benefits are easier to measure. A 2014 report by the Alliance for Biking and Walking provides a variety of estimates from various settings across the U.S.\(^3\) Empirically evaluating and quantifying the benefits of cycling should be approached cautiously to ensure robust estimates of the community benefits that may be due to bicycling.

This report focuses on valuing the economic impact of bicycling. This approach can take many forms based on the choice of input parameters. These inputs could be used to measure different outputs (e.g., economic impacts or even welfare impacts), depending on the type of question being asked. As an example, tourism is an important component of Colorado’s economy. One study conducted in the 1990s estimated that cyclists from out-of-state contribute approximately $1 billion to the local economy.\(^4\) Total direct travel spending in the state is nearly $17 billion and supports approximately 150,000 jobs. For the Pikes Peak region alone, travel-generated earnings constitute an estimated 1.5% of total earnings.\(^5\)

The goal of this report is to estimate the economic impact of cycling in the Pikes Peak Area Council of Governments region (including Park, Teller, and El Paso counties) via the annual purchase of goods and services by bicyclists. In addition to purchasing equipment (i.e., bicycles), this would include ways in which cyclists support economic activity through expenditures on food, beverages, entertainment, transportation, accommodation, government fees, and other retail shopping while bicycling. This includes direct impacts, indirect impacts (purchases made to support bicycle-related businesses or related services) and induced impacts (purchases made by those employed by businesses that serve cyclists).

We project the economic impact (direct + indirect + induced) of a particular dollar amount to the region (annually), which can be translated into an estimate of full-time equivalent jobs. To do this, an input/output model was used, specifically IMPLAN, a widely-recognized software package used to assess economic impacts. The IMPLAN model, an analytical software tool, is the standard for economic modeling data, customized for each region. The model examines how policy or structural changes affect different sectors of the economy.

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\(^3\) See, for example, chapter 4 from the 2014 report available at: www.BikeWalkAlliance.org/Benchmarking

\(^4\) See: http://atfiles.org/files/pdf/CObikeEcon.pdf

3 Cycling activity

3.1 Overview of inputs

The first step in organizing inputs for an input/output model such as IMPLAN is to begin with appropriate input measures. This report calculates the following:

\[
\text{# of bicyclists (annually) by type} \times \text{average expenditure per type}
\]

\[
(A) \quad (B)
\]

where

(A) = measure of the amount of cycling by different user groups, and

(B) = measure of the type and amount of economic activity attributed to cycling.

Within each of the above steps there are a number of smaller steps aimed to specify the metrics as comprehensively as possible. For our purposes, and to align this work with similar efforts, we approach cycling in terms of the number of days per year, or annual cycling days. Having determined the annual cycling days, we then assign expenditures based on a variety of different type of cycling days (e.g., commuting versus recreational). Expenditures by type implies different types of cycling, and for our analysis, we partition cycling types into four different categories: commuter, utilitarian, resident recreation, and non-resident recreation.

Cycling use is ultimately distilled to a number of “person days,” which means one person bicycling for at least part of one day for a given purpose. The details, rationale, and methodology for arriving at specific values for the above formula are described in the following sections.

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3.2 Methodological and data challenges to estimate level of bicycling

Typical travel surveys endeavor to collect a representative sample of the larger population using a probability-based survey. The minimum sample required to achieve a representative sample size depends on the behavior of interest. Achieving a representative sample of drivers in the United States is relatively easy, since most people in the U.S. drive on a regular basis. Because so few individuals bicycle on a regular basis in the study area, and in the U.S. in general, probability-based surveying techniques are prone to miss such behaviors. Another challenge is that both local and national surveys focus on utilitarian travel (travel completed with a purpose or destination in mind) and often fail to detect recreational travel (travel for exercise or enjoyment, without a specific destination or purpose). This is especially important for bicycle research, since people bicycle for a variety of different reasons, and often simply because they enjoy bicycling.

3.2.1 The American Community Survey

Several past efforts to gauge cycling activity among residential populations rely on data collected as part of the American Community Survey (ACS). The ACS includes 48 questions on sex, age, income, race, ethnicity, household size, and other personal and household attributes. A subset of questions directly query individuals about their place of work, means of transportation to work and travel time to work. These questions are directed at workers aged 16 and older who are residents of the study area. The survey is administered year-round and uses the previous week as a reference week for this set of questions. More information about the ACS and specifically cycling (and walking) is available in summary format for 2008-2012. While robust, there are at least four concerns when using ACS data to estimate annual bicycle person days, however. They include:

1. Usual mode: The specific question from the ACS asks, “How did this person usually get to work LAST WEEK? If this person usually used more than one method of transportation during the trip, mark (X) in the box of the one used for most of the distance.” The means of transportation to work question asks how the individual usually travelled to work in the previous week. If the person usually used more than one mode (e.g., walked two blocks and then took a bus) only the mode used for the greatest distance would be checked.

2. Only employed individuals: The question only applies to those who are employed, thereby not including the behaviors of individuals who are unemployed, and those not in the labor force.

3. Type of trip: This question does not account for recreational trips, trips to school, trips for errands or other purposes. This does not include those who work but might make a cycling trip for a purpose other than work. This does not include those who do not

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work (the ACS tells us that less than half of the population works full time and less than half of cycling trips are for work related travel).

4. Seasonal differences: The ACS is administered year-round, sampling select residents per month. Because walking, and especially bicycling, are more prevalent modes in warmer months in the U.S., these may be underrepresented when compared to warmer geographies. Year-round sampling may also yield inconsistent results from year to year and may be impacted by abnormally harsh or mild winters. It is possible to apply seasonal factors specific to non-commute travel and some efforts have done so by adjusting for weekend days (Saturday or Sunday) and arrive at an annual estimate of recreational bicycle travel days.\textsuperscript{10}

5. Longest portion of trip: If an individual walks or bicycles a short distance to a transit station, that trip is not counted in cases where the transit portion of the trip is longer than the walking or bicycling portion of the trip. For this reason, bicycling and especially walking tend to be underrepresented because those two modes are integral parts of most transit trips.

As a result, any variance in ACS numbers used in this analysis erred on the conservative side.

4 Measuring cycling activity

The following describes our data, methodology, and assumptions to approximate the number of annual person-cycling days in the region based on different cycling populations (e.g., residents, non-residents). Cycling activity, in reality, is not drawn strictly from each of these separate populations. There is often crossover between each; a single individual may be in more than one category. Furthermore, the process of estimating the amount of: (a) people in each category and (b) frequency by which they are cycling are subject to wide errors and approximations. We thoroughly read many of the procedures and estimates that are reported in over 100 studies to ensure the most appropriate estimations were derived. Then, based on these parameters from national and international studies, we employed our best judgment and assumptions to apply these values to socio-demographic data for the three county study area; we used 2010 values from the Colorado Department of Labor Affairs (DOLA) and supplemented such with measures from the American Community Survey.

In the analysis below, even if an individual makes more than one cycling trip (regardless of category), their behavior is captured as a single cycling day.

4.1 Population (A): residential commuting

We began our analysis by estimating the full and part-time employed resident population in 2010: 291,287 people. Among this employed population, the ACS suggests 0.5% cycle to work on a daily basis during the workweek (1,456 residents). Assuming an approximate 230

\[\text{Number of commuting cycling days} = 1,456 \times 230\]

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11 This list of studies is available at: http://www.peopleforbikes.org/statistics/category/participation-statistics

12 Department of Local Affairs website : http://www.colorado.gov/cs/Satellite?c=Page&childpagename=DOLA-Main%2FCBONLayout&cid=1251593349151&pagename=CBONWrapper

13 See Table 1 in Modes Less Traveled – Bicycling and Walking to Work in the United States: 2008-2012. American Community Survey Reports, By Brian McKenzie Issued May 2014
work days\textsuperscript{14} in the year (with 90\% of these workdays having cycle-friendly weather in Colorado Springs\textsuperscript{15}) yields 301,482 cycling days. Given the peculiarities of the ACS data as described above, alternatively, one could assume that one percent of the estimated 291,287 full and part-time workers in the region who are cycling commuters are making three commute days / week for three months of summer, 1.5 days/week during six months of shoulder season and no trips / week during three months of winter to produce an average of 1.5 bicycle travel days per week (or 78 bicycle travel days), yielding 227,204 cycling days. Averaging these two estimates yields 264,343 annual cycling days for work travel.

4.2 Population (B): residential utilitarian cycling

A second general population is those who might not cycle to work specifically, but may cycle for other utilitarian purposes. This group would largely be drawn from adults categorized as unemployed (looking for work, those not in the work force, retired individuals or other) or employed individuals who might cycle to shop or complete an errand. It is difficult to arrive at a reliable estimate the magnitude of this population; we have therefore used a conservative process for our estimates. Our approach entails the following:

- Unemployed individuals who are part of the labor force travel as much, or possibly more than, those who are employed. DOLA measures 31,660 unemployed individuals; assuming that a mere 2\% of this group cycles consistently,\textsuperscript{16} this then produces 131,072 cycling days.

- The Colorado Department of Local Affairs reports there are there are 67,856 people who are age 65 or older in the three county area. The ACS reports that 78.95\% of those age 65+ did not work in the past 12 months.\textsuperscript{17} Multiplying these two values together and assuming a minimal 2.5\% of these individuals cycle for utilitarian purposes at least three times per week over the course of 47 cycle-friendly weeks per year would yield 188,842 cycling days (it is presumed that these activities are separate from purely recreational trips).

- Finally, there are employed residents who might not cycle to work but for other utilitarian purposes (e.g., before or after work), for whom we assume some amount of additional utilitarian travel. This is a difficult population to estimate because these individuals tend to be more time constrained (owing to work schedules) and may seldom choose cycling. However, they may still cycle occasionally to the supermarket, restaurants, or to other social obligations. A study from Portland estimated that

\textsuperscript{14} Factoring in vacation, holidays, and sick time, we figure there are 230 work days per year.

\textsuperscript{15} The 90\% value is based on the fact that, in addition to generally cycle-friendly weather, daily commuter cyclists captured through the ACS are less likely not to cycle due to weather than other types of riders. Admittedly, these values are estimates. Including vacation, holidays, and sick time, this value may more closely resemble 230 days; and in the Colorado Springs area, cycling may be attractive for less than 95\% of these days. However, the bulk of the literature suggests that commuter cyclists fall into the category often referred to as “strong and fearless” or “enthused and confident,” suggesting reasons to error on the larger side.

\textsuperscript{16} Again, assuming 230 days per year and 90\% of these days being cycling friendly.

\textsuperscript{17} However, this does not mean they were not in the labor force.
utilitarian bicyclists, on average, make ~3 utilitarian shopping trips per week. That study did not comment on the year-round activity of such behavior or the portion of the general population that would fall into such a category; it is therefore difficult to directly translate such rates to the Colorado Springs population. For comparison purposes, specific survey estimates for the PPACG region suggest that the average person completes only 4.1 motorized trips per day (non-motorized trips would be considered in addition to such). Of the working population (291,287, assuming that only 1% of them make 2 cycling days for 47 cycle-friendly weeks per year would total 273,810 annual cycling days.

In total, annual cycling days accounting for residential utilitarian cycling for the study area (including retired, unemployed and so on) would therefore total 593,724 annual cycling days.

### 4.3 Population (C): residential recreational cycling

The third category turns to non-utilitarian cycling activity—what is referred to as recreational cycling activity. We assume that roughly 5% of the employed population (including existing bicycle commuters) and 10% of the unemployed/retired population engage in recreational cycling at some level. We assume that attractive recreational cycling activity for the above residents is limited to periods between the beginning of April and the end of October and that within this period, there are an estimated 30 trips. This yields a total of 692,627 recreational cycling days.

### 4.4 Population (D): Non-residential cycling

To understand non-resident cycling activity in the study area, we employ findings from visitor studies for the state as a whole—and also those specific to cycling—to best interpolate a reliable estimate of cycling days.

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19 The calculations break down in the following matter: 248,769 households with 631,383 total persons make 2,559,026 motorized daily trips, converting to 10.3 motorized daily trips per household or 4.1 motorized daily trips per person.

20 May 8, 2014 internal memo between Mary Lupa, Parsons Brinckerhoff (including Ken Prather & Maureen Paz de Araujo) to Dan Piatowski regarding the PPACG Model & Front Range Survey

21 The 2012 National Survey of Pedestrian and Bicyclist Attitudes and Behaviors suggests that roughly 20% percent of the population age 16 or older, rode a bicycle at least once during the summer of 2012; this combines recreational and utilitarian cycling and supposedly applies to the entire summer. The 5% and 10% values are obviously less than this, but are also informed by approximations that are reported in studies available from: http://www.peopleforbikes.org/statistics/category/participation-statistics

22 Communication with Craig Casper from 6 June 2014
Previous studies estimated that Colorado attracted almost 60 million out-of-state visitors in 2012\(^{23}\) and tourism accounted for $16.6 billion dollars in direct economic impacts to the state.\(^{24}\) However, owing to a diverse range of activities offered in Colorado, in particular a vibrant winter activity scene,\(^{25}\) it is important to narrow visitor numbers to understand how they might specifically apply to cycling.

Of the 1.38 million summer visitors to Colorado, approximately 70 percent come to resort towns from out-of-state; the remaining are assumed to come from in-state. Roughly half of these visitors (699,000) engage in bicycling as part of their stay.\(^{26}\) The economic impact of these visitors is derived from overnight visitors as well as one-day visitors—what we are referring to as cycling days (e.g., a non-resident visitor may spend two nights but engage in three cycling days; alternatively a non-resident may spend no nights but engage in one cycling day in the region).

Data compiled from resorts on the breakdown of overnight and day visitors indicate that 419,000 of these visitors stayed overnight, and the remaining 280,000 were day visitors. The total number of nights spent at resorts by those engaged in bicycling was 955,400, with a typical number per trip varying between two and five.\(^{27}\)

The study area in question does not contain some of the well-known mountain resorts; it does, however, boast numerous tourist destinations, renown road cycling climbs, outstanding mountain biking, multiple annual cycling events (e.g., those hosted in conjunction with the USA Cycling Olympic Training Center), and a regional airport. Given that the entire state hosts roughly 1 million overnight cycling visitors per year—and that resort towns host 280,000 annual cycling day visitors, the relevant question is what proportion of such is contained within the study region. Applying the above estimates, our approach distinguishes between overnight and day cyclists for the non-resident population.

- In general, travel-generated earnings for Colorado have been shown to distribute roughly 47 percent to the Denver Metro region, 25 percent to the Mountain Resort region, eight percent to the Pikes Peak region (defined in this report as El Paso, Teller and Park Counties), and the remainder to all other counties.\(^{28}\) Such proportions apply to overall overnight travel. Assuming eight percent of the 1 million overnight cycling visitors to Colorado go to the region would yield 80,000 overnight visitors (or cycling days).

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\(^{26}\) The Center for Research on Economic and Social Policy (CRESP) of the University of Colorado at Denver. “Bicycling and Walking in Colorado: Economic Impacts and Household Survey Results” (April 2000).

\(^{27}\) The Center for Research on Economic and Social Policy (CRESP) of the University of Colorado at Denver. “Bicycling and Walking in Colorado: Economic Impacts and Household Survey Results” (April 2000).

• In addition, there are several reasons for people from other parts of Colorado to frequent the area for its attractive cycling conditions, in addition to the overnight visitors. Day cyclists, for example, may come from the Denver or Boulder area and would technically be considered “non-residents” in terms of this analysis. Most of these trips would likely fall between April and November and would most consist of small groups (~4 to 6 individuals). Given such—and assuming that the region also attracts eight percent of the 280,000 day visitors, this suggests 22,400 individuals per year who would come to the area from other areas of Colorado (or nearby regions) as a cycle day activity.

4.5 Cycling activity summary and relative estimates

Combining these four populations produces a total of 1,653,094 cycling days in a year for the three-county region.

As a means to ground-truth the final value, projections using the Front Range Travel Survey\(^29\) estimate a total of 2,559,026 trips generated in a day for the region.\(^30\) Assuming cycling comprises 1% of all trips,\(^31\) across all travel by all age groups, we can arrive at a coarse estimate: 25,590 daily utilitarian cycling trips.Attributing two cycling trips (there and back) to an individual (i.e., divide the number of trips by two to get 12,796), and 90% of 230 annual work days are cyclable, this very rough calculation suggests 2,648,772 utilitarian cycling days for the region under study (recreational trips would be in addition). For comparison, assuming cycling comprises 0.5% of all trips would suggest 1,324,296 cycling days (recreational would be in addition). Our estimates suggest that the number of calculated non-recreational cycling days (858,067) would roughly equate to 0.3% of all trips. Other research efforts predicted just under 13 million cycling days across the entire state of Wisconsin (not just a single metropolitan area).\(^32\)

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\(^29\) Front Range Travel Counts (FRTC) consists of a travel survey of nearly 12,000 households across Colorado’s front range from Pueblo to the south, to Fort Collins to the north.

\(^30\) May 8, 2014 internal memo between Mary Lupa, Parsons Brinckerhoff (including Ken Prather & Maureen Paz de Araujo) to Dan Piatowski regarding the PPACG Model & Front Range Survey


5 Expenditures

A variety of studies estimate the daily expenditures of bicyclists. Most efforts focus on cycling expenditures of bicyclists who have been drawn to a location, owing in part to bicycle-specific amenities.33 A variety of factors influence the range of expenditures to be included: equipment purchases, expenditures at local businesses (e.g. restaurants and shops), even lodging costs for out-of-town visitors (such expenses impact local businesses, and in turn results in increased tax revenues for a community). Studies of daily expenditures by resident cyclists may be based on intercept surveys of bicyclists at off-street trails. For example, available intercept surveys conducted in Wisconsin along a multi-use trail and a 2006 study of local cyclists using a national forest trail estimate average daily resident bicyclist spending at $21.97 and $14.01 per day, respectively (WI report). Any value depends in large part on personal characteristics of bicyclists, in particular, on whether a bicyclist is a resident or non-resident.

5.1 Expenditures for (A): residential commuting

We apply the average daily expenditure value ($3.56) from multi-use trail users after adjusting for the study area. A 2003 study of the San Francisco Bay Area suggests ~$400 spending per year, dividing by 250 cycling days provides a daily expenditure value. Because the cost of living in Colorado Springs is approximately 30% to 40% less than San Francisco, CA,34 but one 2003 dollar is worth about 30% less than today,35 we have chosen to leave this value unadjusted, an estimate that is likely conservative.36 While this value is relatively low, it reflects trips that are

33 See: http://www.ncdot.gov/bikeped/download/bikeped_research_eiafulltechreport.pdf

34 See: http://www.expatistan.com/cost-of-living/comparison/san-francisco/colorado-springs

35 See: http://www.usinflationcalculator.com

36 This value may be a bit low, possibly not reflecting the economic impacts of residents (i.e., residents choose to live, and pay a premium, for more accessible housing in urban areas).
relatively short (less than 20 minutes) and which do not contribute much directly to economic activity.

5.2 Expenditures for (B): residential utilitarian cycling

This category of expenditures includes weekly shopping and regular errands as well as typical expenditures on lunch and coffee – expenses not directly accounted for by the commuting, but are often over and above commuting expenses. Recent research can help guide such estimates. Results from a survey in Portland suggest that customers who arrive by automobile spend more on average per trip than others; however, taking the frequency of visits into account reveals a different result—cyclists are greater spenders on average. While cyclists may spend less money at supermarkets, restaurants, convenience stores, and bars, per visit, they tend to visit these establishments more frequently than drivers.

The outstanding question is: (1) how much more cyclists might spend and (2) attributing such to bike-related expenditures (i.e., as opposed to purchases they would have otherwise made). Taking account both spending and trip frequency, findings suggest that bicyclists spent roughly 40% more than car drivers at bars, convenience stores, and restaurants. Assuming a standard/average expenditure is $10 per trip, and subtracting $6 that is the average residential expenditure per trip, the added value for cyclist travel is assumed to be $4.00—the value we use for each utilitarian cycling trip.

5.3 Expenditures for (C): residential recreational cycling

A Wisconsin study collected data on average expenditures among road cyclists (including athletic cyclists and casual riders), determining that daily expenditures for resident recreational cyclists amounted to $39.57. The same study used data from surveys of trail users in national forests, finding daily expenditures among off-road recreational cyclists averaging $17.99. While these values were largely applied to profile residents, some of the assumptions suggest that such rates would be better applicable to out of area users.

39 We understand that this is not direct biking expenditure but induced expenditure. The study by Clifton et al found that cyclists had significantly different spending patterns when compared to drivers, therefore their extra expenditure is not considered incidental but induced by their bicycling. There is an especially strong case for this interpretation for retired individuals. We have therefore decided to include this expenditure in arriving at our average expenditure per utilitarian cycling day.
40 Calculations performed on Table 4-2 for the first 3 categories showing cyclists spending roughly 40% more per month than car drivers. Furthermore, cyclists reported over 14 utilitarian trips per month (14 divided by 4 weeks = 3.5, conservatively rounded down to ~3 trips per week), see: Clifton, K., Muhs, C., Morrissey, S., Morrissey, T., Currans, K., & Ritter, C. (2012). Consumer Behavior and Travel Mode Choices. Oregon Transportation Research and Education Consortium. Report available from: http://otrec.us/project/411
A different approach to arrive at a value for residential recreational cycling would be to amortize the cost of a bicycle and other expenses. Borrowing values from a survey of Colorado households conducted in 2000 suggests the weighted average for a cost of a bike is $390 in 2000 dollars. Adjusting for a 39% cumulative rate of inflation suggests a 2014 average would be $540. Roughly speaking, assuming such a bike is kept for 10 years and used, on average, once per week, this suggests that a cycling day would be valued at ~$1.00. If they kept it 7 years and used it 100 times produces a ~$0.75 cost/use. A $1,000 bike used for 7 years and 100 times per year yields $1.42 per use. A good average is $1 per use.

Such estimates fail to include including expenditures for clothing, other accessories or maintenance, which could be noteworthy. Assuming an average cyclist annually spends $50 on a tune-up, $50 in accessories, and roughly $100 in cycle clothing (assuming they might use it 100 times over the year), this converts to $2.00 per cycling day. Summing these values suggests a residential recreational cycling expenditure of $3.00 per cycling day.

5.4 Expenditures for (D): non-residential cycling

Estimates of non-resident daily bicyclist expenditures are typically higher than residents because non-residents tend to spend additional funds on lodging and meals, and if they are visiting the region to participate in a bicycle event or tour, event/tour fees may apply as well. Tourist cycling expenditures in North Carolina were estimated to be between $58 and $60, including lodging costs. A study in Quebec, Canada estimated tourist cyclists spending $75 per day. Over 50% of Greenbriar Trail users West Virginia spend over $100, and most visitors are from out of state. A study of cycling tourism in Wisconsin, on the other hand, did not account for lodging costs, but did estimate daily non-resident expenditures accounting for daily event/tour fees, estimating daily expenditures at between $76.17 and $80.84.

To help arrive at our estimate for daily non-resident expenditures in the study area, we surveyed local bicycle tour companies. We found that a typical tour is $95 with an additional $15 for additional purchases, yielding $110 per cycling day. This value is higher than that of previous studies because the tour companies surveyed provide multiple, all-day activities that include bus transportation and meals for participants. Other reports suggest that overnight cycling expenditures averaged $179 per night in Colorado (per cycling day in 2000 dollars), which converts to ~$250 in 2014 dollars.

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42 The Center for Research on Economic and Social Policy (CRES) of the University of Colorado at Denver. “Bicycling and Walking in Colorado: Economic Impacts and Household Survey Results” (April 2000). Table 1.


47 See, for example, page 14 from: The Center for Research on Economic and Social Policy (CRES) of the University of Colorado at Denver. “Bicycling and Walking in Colorado: Economic Impacts and Household Survey Results” (April 2000).
The same source found that in-state visitors spent $79 per cycling day, which would convert to a present day value of ~$110 per cycling day. This might, for example, include trail/park fees, purchases at local shops, services at restaurants or other.

A summary of the cycling day calculations and the corresponding expenditures for different populations/activities are shown in Table 5.1. Multiplying the two and summing provides an annual direct economic impact of $27,857,838.

Table 5.1: Summary of Direct Economic Impacts

<table>
<thead>
<tr>
<th>Cycling Days</th>
<th>Expenditures per Cycling Day</th>
<th>Direct Economic Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Commuter Days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>264,343</td>
<td>$3.56</td>
<td>$941,061</td>
</tr>
<tr>
<td>Residential Utilitarian Days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-working</td>
<td>131,072</td>
<td>$524,288</td>
</tr>
<tr>
<td>Retired</td>
<td>188,842</td>
<td>$755,368</td>
</tr>
<tr>
<td>Bicycle Commuters (not commute trips)</td>
<td>273,810</td>
<td>$1,095,240</td>
</tr>
<tr>
<td>Residential Recreational Days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>692,627</td>
<td>$3.00</td>
<td>$2,077,881</td>
</tr>
<tr>
<td>Non-Resident Recreational Days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overnight</td>
<td>80,000</td>
<td>$20,000,000</td>
</tr>
<tr>
<td>Day trips</td>
<td>22,400</td>
<td>$2,646,000</td>
</tr>
<tr>
<td>Total</td>
<td>1,653,094</td>
<td>$27,857,838</td>
</tr>
</tbody>
</table>
6 IMPLAN projections

6.1 IMPLAN overview

We now turn to estimating the size of the bicycle-related economy and analyze the impact it has on other sectors in terms of output, value added, employment, and labor income. The analysis is conducted using an input-output model from IMPLAN, an analytical tool whose use is well-established for such applications. IMPLAN is a software program that comprises an input-output model and input datasets that constitute the study area.48

The first step requires estimates of how cyclists’ budgets are allocated across different economic categories (e.g., what is the relative portion spent on merchandise, food, other). Previous research efforts49 were used to estimate and inform expenditures; we consulted these studies and adapted values to better apply to local estimates as shown in Table 6.1.

48 For more information please see http://implan.com.

Table 6.1: Cycling Expenditure By Category

<table>
<thead>
<tr>
<th>Category</th>
<th>Residential Commuting</th>
<th>Residential Utilitarian</th>
<th>Residential Recreation</th>
<th>Non-resident Recreational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dining and drink</td>
<td>20.00%</td>
<td>22.00%</td>
<td>22.00%</td>
<td>20.00%</td>
</tr>
<tr>
<td>Grocery and convenience stores</td>
<td>15.00%</td>
<td>11.00%</td>
<td>11.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>Retail shopping</td>
<td>3.00%</td>
<td>2.50%</td>
<td>0.00%</td>
<td>1.00%</td>
</tr>
<tr>
<td>Bicycle repair and maintenance shops</td>
<td>30.00%</td>
<td>22.50%</td>
<td>3.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>Entertainment</td>
<td>10.00%</td>
<td>13.00%</td>
<td>5.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>Transportation (gas and auto)</td>
<td>10.00%</td>
<td>6.00%</td>
<td>22.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>Accommodation</td>
<td>2.00%</td>
<td>2.00%</td>
<td>14.00%</td>
<td>34.00%</td>
</tr>
<tr>
<td>Government revenue (fees collected)</td>
<td>0.00%</td>
<td>1.00%</td>
<td>6.00%</td>
<td>4.00%</td>
</tr>
<tr>
<td>Other</td>
<td>10.00%</td>
<td>20.00%</td>
<td>15.00%</td>
<td>4.00%</td>
</tr>
<tr>
<td>Event promoter</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.00%</td>
<td>12.00%</td>
</tr>
<tr>
<td>Sum</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

We allocated total expenditures to each respective category and this constituted the input into IMPLAN. This analysis used 2012 data from El Paso, Teller, and Park counties to construct the study area. The limits of the study area determine what is included in the calculation of impacts. Therefore, it is important to note that if expenditures accrue to economic entities outside the study area, these will not be captured by IMPLAN and are treated as ‘leakages.’ Similarly, if workers live outside the study area and commute to their place of work in the study area, this is not included as labor income because their paychecks are taken out of the study area.

Modeling via an input-output (IO) system captures inter-industry relationships and flows; it can be used to measure impacts as they reverberate through the economy. A change in one sector of the economy ripples through other sectors that are connected to it via supply change linkages. This connection is captured via multipliers; these multipliers measure the rate of change in the economy (for example the $ value change in output [y] that is required to increase output [x] by $1). These multipliers generally tend to be lower the smaller the study area.

Using this IO system we are able to calculate the direct effect, indirect effect, induced effect and total effect of a certain sector of the economy. The direct effect is the size of the expenditure on the bicycle related economy taking into account the underlying regional relationships and the study area limits (previously calculated). The indirect effect shows the impact on other sectors that are linked to the sector in question via supply-chain linkages. The indirect effect does not contain any expenditure that ultimately leaves the study area (i.e., all leakages are accounted for). The induced effect results from spending of wages by workers.
(who are affected by the direct and indirect routes). The sum of these effects is the total effect (or total economic impact).

The economic impact results calculated using IMPLAN are “high level” and sensitive to the underlying assumptions of the IMPLAN model including the assumptions that govern industry classification and treatment. We view these results as a high-level analysis and that they could provide the foundation for more in-depth analysis that would be based on local surveys (both cycling use and economic expenditures)—analysis that could also be complemented with methods other than input-output modeling.

These results are useful in understanding approximate levels of impact the bicycle economy has on other sectors and also the impact of a stimulus (either artificial or due to a natural increase in biking activity) on the bicycle sector and the sectors associated with it via supply-chain linkages.

6.2 Inputs

The total value of the cycling economy based on this analysis is $28 million, divided across the categories below (Table 6.2).

Table 6.2: Bike Usage and Spending by User Category

<table>
<thead>
<tr>
<th>User</th>
<th>Cycling Days per Annum</th>
<th>Average Expenditure per Cycling Day</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential commuter cycling</td>
<td>264,343</td>
<td>$3.60</td>
<td>$0.9 M</td>
</tr>
<tr>
<td>Residential utilitarian cycling</td>
<td>593,725</td>
<td>$4.00</td>
<td>$2.4 M</td>
</tr>
<tr>
<td>Residential recreational cycling</td>
<td>692,627</td>
<td>$3.00</td>
<td>$2.1 M</td>
</tr>
<tr>
<td>Non-resident recreational cycling</td>
<td>102,400</td>
<td>$219.40</td>
<td>$22.5 M</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>-</td>
<td>$27.9 million</td>
</tr>
</tbody>
</table>

6.3 Assumptions and methodology

The four expenditure categories above were subdivided further into the following expenditure categories: dining and drink; grocery and convenience stores; retail shopping; bicycle repair and maintenance shops; entertainment; transportation (gas and auto); accommodation; government revenue (fees collected); other; event promoter.

In order to map these categories into IMPLAN our analysis employed the following assumptions:

- The data are for 2014 and in 2014 prices.
- Transportation and gas has been mapped to gasoline.
- Since the three county study area produces petroleum and IMPLAN works in producer (not purchaser) prices, rather than mapping the expenditure to retail gasoline stores...
where the expenditure could go towards goods other than gasoline purchased at gas stations, we chose to map the $2.9 M expenditure on gasoline directly to refineries. To this we have applied local purchase percentages default values (0.16%) available in the Social Accounting Matrix built into the IMPLAN model.

- We employed reasonable simplifying assumptions in allocating some of the expenditure to specific categories (e.g., government revenues (fees collected) have been mapped to the ‘Museums, historical sites, zoos and parks’ sector, and entertainment expenditure is mapped to cinemas).

This expenditure (excluding $1.8 million ‘other’ expenditure) was combined to provide the following approximately $26 million\(^{50}\) as shown below in Table 6.3.

Table 6.3: Cycling Economy Composition

<table>
<thead>
<tr>
<th>IMPLAN Sector Name</th>
<th>Expenditure ($ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail stores - Sporting goods, hobby, book and music</td>
<td>0.3</td>
</tr>
<tr>
<td>Grocery and convenience stores</td>
<td>1.8</td>
</tr>
<tr>
<td>Food services and drinking places</td>
<td>5.7</td>
</tr>
<tr>
<td>Hotels and motels, including casino hotels</td>
<td>8.0</td>
</tr>
<tr>
<td>Bicycle repair and maintenance shops</td>
<td>1.8</td>
</tr>
<tr>
<td>Cinemas</td>
<td>1.8</td>
</tr>
<tr>
<td>Museums, historical sites, zoos and parks</td>
<td>1.0</td>
</tr>
<tr>
<td>Managers and organizers of sports events</td>
<td>2.7</td>
</tr>
<tr>
<td>Petroleum Refineries</td>
<td>2.9</td>
</tr>
<tr>
<td><strong>Total Expenditure</strong></td>
<td><strong>26.1</strong></td>
</tr>
</tbody>
</table>

6.4 Results

The analysis indicates that the bicycling economy supports more than 370 jobs, contributes $11.5 million in labor income, and adds $19 million in value, resulting in a total of $34 million in economic benefits. This is shown in Table 6.4:

Table 6.4: Summary Results [2014 Prices]

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Employment</th>
<th>Labor Income ($M)</th>
<th>Value Added($M)</th>
<th>Output($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effect</td>
<td>278</td>
<td>7.7</td>
<td>12.3</td>
<td>22.5</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>49</td>
<td>2.0</td>
<td>3.5</td>
<td>5.7</td>
</tr>
<tr>
<td>Induced Effect</td>
<td>46</td>
<td>1.8</td>
<td>3.5</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total Effect</strong></td>
<td><strong>373</strong></td>
<td><strong>11.5</strong></td>
<td><strong>19.3</strong></td>
<td><strong>33.7</strong></td>
</tr>
</tbody>
</table>

\(^{50}\) The total expenditure (including the ‘Other’ category) does not add up to $27,857,838M but is less because we have averaged daily expenditure for the ‘non-resident recreational cycling’. The weighted average is $219.4/day.
Table 6.5 below shows the top ten industries (by employment) that are supported by the cycling sector.

Table 6.5: Top Ten Industries by Employment Supported by the Cycling Sector [2014 Prices]

<table>
<thead>
<tr>
<th>Description</th>
<th>Employment</th>
<th>Labor Income ($M)</th>
<th>Value Added ($M)</th>
<th>Output ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food services and drinking places</td>
<td>108</td>
<td>2.4</td>
<td>3.5</td>
<td>6.3</td>
</tr>
<tr>
<td>Hotels and motels, including casino hotels</td>
<td>71</td>
<td>2.3</td>
<td>4.3</td>
<td>8.0</td>
</tr>
<tr>
<td>Promoters of performing arts and sports and agents for public figures</td>
<td>49</td>
<td>1.1</td>
<td>1.3</td>
<td>2.9</td>
</tr>
<tr>
<td>Personal and household goods repair and maintenance</td>
<td>17</td>
<td>0.9</td>
<td>1.2</td>
<td>1.8</td>
</tr>
<tr>
<td>Motion picture and video industries</td>
<td>15</td>
<td>0.3</td>
<td>0.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Retail Stores - Sporting goods, hobby, book and music</td>
<td>10</td>
<td>0.2</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Retail Stores - Food and beverage</td>
<td>9</td>
<td>0.3</td>
<td>0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>Museums, historical sites, zoos, and parks</td>
<td>9</td>
<td>0.3</td>
<td>0.6</td>
<td>1.1</td>
</tr>
<tr>
<td>Real estate establishments</td>
<td>9</td>
<td>0.1</td>
<td>0.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Retail Stores - Gasoline stations</td>
<td>7</td>
<td>0.2</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>303</strong></td>
<td><strong>8.1</strong></td>
<td><strong>13.6</strong></td>
<td><strong>24.5</strong></td>
</tr>
</tbody>
</table>

6.5 Interpretation

Input of $26 million results in a direct impact of $22.5 million output (table 6.2) because some of the expenditure accrues to production outside the limited area covered by the three counties under question. For example, only 0.16 percent of the some $2.9 million spent on gasoline is produced from refineries within the study area (according the existing economic model in IMPLAN). Similarly, while bicycles are purchased within the three-county area, they are unlikely to be manufactured within that economic area and are likely to have been manufactured outside the U.S. This is accounted for and is an explanation for the lower value of the output compared to the expenditure.

Labor income is comprised of employee compensation (wages and benefits) and proprietor income accruing to self-employed individuals. The bicycle economy directly provides $7.7
million in labor income. Value added is the sum of labor income, other property type income (corporate profits, interest income, rental payments) and indirect business taxes (sales, excise, property tax, etc.). The direct impact amounts to $12.3 million. We similarly obtain employment, labor income, value added and output for the indirect and induced effects. The total value added is $19.3 million.51

6.6 Example impacts of cycling interventions

The next step in the analysis is to extrapolate economic impacts of a change (policy, infrastructure, or other) that would conceivably spur more cycling. In other words, additional cycling on top of the above calculated baseline estimates would spur additional expenditure on bicycle-related activities, both on the bicycle economy and on other sectors related to it via the supply chain. Such values can, for instance, be used to forecast the economic impact of various travel demand management strategies that may result in increased levels of cycling. Alternatively, they can be used to value hypothetical improvements to cycling infrastructure.

Based on prior studies from other cities, it is possible to extrapolate future levels of cycling spurred by increases in cycling facilities. For example:

- Using data from 90 large U.S. cities, analysis shows that cities with a greater supply of multi-use paths and bike lanes have higher cycling commuting rates; cities with 10 % more bike lanes or paths corresponded with roughly 2-3 % more daily bicycle commuters.52

- Examining 35 large US cities calculated that that building one mile of bike lane per square mile corresponds to roughly a 1% increase in the share of workers commuting by bicycle.53

These estimates show that improved cycle provision can result in increased cycle usage. If improved cycling infrastructure as discussed in the Pikes Peak region resulted in a 10% increase in cycle usage (i.e. the cycle mode share for all trips would go from around 1% to 1.1%), then we would expect the associated increase in cycling expenditure to be around $2.6 million in a given year and support 37 additional jobs, assuming the increase was the same across different categories of cyclist (see table 6.3). Initiatives that promoted, for example, a

51 For comparison purposes, other research efforts have estimated cycling to produce just under $52M in direct and indirect benefits for the entire state of Iowa (see: http://www.peoplepoweredmovement.org/site/images/uploads/Economic_and_Health_Benefits_of_Bicycling_in_Iowa.pdf). For the entire state of Wisconsin, cycling recreation is estimated to support more than $924 M in economic activity (see: http://www.sage.wisc.edu/igert/download/bicycling_final_report.pdf)


53 Dill, J., Carr, T.: Bicycle commuting and facilities in major US cities: If you build them, commuters will use.
higher level recreational cycling (where spending per person is greater) would have a greater economic impact.

6.7 Conclusion

Using data from surveys, in conjunction with other socio-demographic, we estimated the size of the bicycle-related economy in the three-county (Teller, Park and El Paso) study area. This is found to be just under $28 million and is calculated using the number of cycling days and the expenditure per cycling day across different categories of cyclists. We then use Input Output modeling via IMPLAN to calculate the total economic impact of cycling in the study area. This shows that a bicycle-related sector of size $26 million (a number arrived at after small adjustments were made to the $28 million for conservative rounding) has a direct effect of $22.5 million, an indirect effect of $5.7 million, an induced effect of $5.5 million, for a combined total effect in terms of output of $33.8 million. The sector directly provides 278 jobs on average annually, indirectly 49 jobs, has an induced employment effect of 46 jobs and supports a total of 372 jobs in the study area. The sector generates labor income of $7.7 million per year directly, $2 million indirectly and induces another $1.8 million in labor income for a total of $11.5 million. The value added is over $19 million per year, $12 million of which comes directly from the biking sector. These results are useful because they provide an estimate of the impact of biking activities on the Pikes Peak economy. Additionally, they also demonstrate the impact of increased bicycle usage and can therefore be used to inform policy.