GEORGIA DOT RESEARCH PROJECT 15-22

FINAL REPORT

ANALYZING THE IMPACT OF THE FIREFLY TRAIL ON ECONOMIC DEVELOPMENT IN NORTHEAST GEORGIA

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16. Abstract:

This research report contains the findings of the analysis undertaken to measure the economic impact of the proposed Firefly Trail on the local economy. An input-output model was constructed to study the economic impact of the project on the local economy. The entire analysis was conducted using county level data. Results of the analysis indicate that the construction of the project will lead to a one-time increase in total output by $32 million. The construction of the trail will also create 158 additional jobs, mostly in construction, real estate, and wholesale trade. As a result, household incomes will rise by $6.9 million. Construction activities will generate tax revenue of around $50,000 at the county level, $800,000 at the state level and $1.26 million at the federal level. Furthermore, assuming an annual turnout of about 1.13 million visitors to the trail, total output will increase by $14.7 million per year when the trail is operational. Thus the analysis concludes that investment in the Firefly Trail project will generate economic benefits to the local economy in multiple ways.

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Contract with
Georgia Department of Transportation
In co-operation with the U.S. Department of Transportation
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EXECUTIVE SUMMARY

Project Objective: This research report contains the findings of the analysis undertaken to measure the economic impact of the proposed Firefly Trail on the local economy. The Firefly Trail is a 39 miles long planned rail-trail which will pass through three counties in Northeast Georgia--Clarke, Ogelthorpe and Greene. The analysis measured the impact of the investment in the trail project on job creation and economic activity.

Procedure: A detailed analysis was undertaken to understand the regional economy. Data were compiled on numerous indicators of income, education, population and transportation in the three counties. A detailed review of the literature was conducted. The report contains a summary of multi-use trail studies. The analysis used IMPLAN model which is based on a 440 sector social accounting table and input output-matrix. Economic impact was measured in terms of five indicators: 1) total economic output, 2) value added in production, 3) new jobs created, 4) household income arising from wages paid to employees and 5) tax receipts. A unique feature of the study is that the entire analysis was conducted using county level data.

Significant Findings: Listed below are the economic benefits arising from the construction and operations of the Firefly Trail

- The construction of the project will lead to a one-time increase in total output by $32 million. Assuming construction costs of about $24, this implies that every dollar spent on the trail will generate a total economic impact of $ 1.33.
- This will include a direct impact of $24 million due to the construction activity, an indirect impact of $5 million due to the purchases of goods and services made towards

the construction of the project and an induced impact of about $3 million due to the spending undertaken by employees on restaurants, shops, and so on.

- The total value added in production will be around $11 million. This indicates the net worth of goods and services produced as a result of the construction activity.
- The construction of the trail will also create 158 additional jobs in the local economy, mostly in construction, real estate, and wholesale trade.
- Household incomes are expected to rise by $6.9 million.
- Construction activities will generate tax revenue of about $50,000 at the county level, $800,000 at the state level and $1.26 million at the federal level.
- Assuming an annual turnout of about 1.13 million visitors to the trail, total output will increase by $14.7 million per year when the trail is operational.

Recommendations: The Firefly Trail passes through three counties in Northeast Georgia, all of which have median incomes lower that the state median income. Poverty rates in this region are high, in particular, in Clarke and Greene counties. The construction of the Firefly Trail will provide a much needed economic boost to this region. As detailed in the analysis investment in the Firefly Trail project will generate economic benefits in multiple ways: increase in income, creation of new jobs and generation of additional tax revenue. In the future, the estimates in the analysis may be revisited once more detailed data on construction and maintenance costs and on the potential number of visitors are available.

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I. INTRODUCTION

The Firefly Trail is a planned rail-trail in Northeast Georgia. The trail will be 39 miles long and will pass through three counties in Northeast Georgia, namely Clarke County, Oglethorpe County, and Greene County. It will be constructed along the historic rail line, known as the Athens branch of Georgia Railroad. The trail derives its name "Firefly" from the local nickname for the locomotive that ran the line from 1891 until 1984, because of the sparks that flew from its wood-burning engine. The trail will be a multi-use path for car-free recreation and transportation.

According to the Outdoor Foundation's Outdoor Recreation Participation Report (2010), 137.8 million Americans (48.9% of the total U.S. population) engaged in some type of outdoor activity. As Georgia's state population is growing at a rapid speed (5.4% between 2010 and 2015), so is the demand for multi-purpose recreational facilities. A 2011 survey asked if Georgian's would ride a bicycle more frequently if their community had better bicycle facilities such as bike lanes or multi-use paths and 81% of the respondents agreed.[1] Thus, there is a growing need to develop bicycle and pedestrian friendly trails in the State and the proposed Firefly Trail in Northeast Georgia is one among several trail projects, which will be undertaken in the coming years.

This economic impact study projects the potential benefits to the community and regional economy if the trail is developed. The proposed trail is expected to boost the local economy, stimulate tourism in the region, alleviate rural poverty, provide an environmentally sustainable transportation choice and generate health and safety benefits. In order to underscore the importance of the trail to the various stakeholders, it is pertinent to quantify the economic impact of the trail. This study undertakes a rigorous analysis to provide precise estimates of the economic impact of the Firefly Trail.

[1] http://www.fireflytrail.com/proposed-trail.html

Furthermore, understanding the full economic impact of the trail is not only important for different local stakeholders but it is also important in a national context. Transportation infrastructure investment is a national priority because of the anemic job market recovery following the Great Recession (Boston and Oyelere, 2014). Approximately eight million jobs were lost during the Great Recession and the pace at which the economy recovered was unusually slow. As a result, measuring the number of new jobs associated with the large and small transportation projects has become a top policy priority.

II. THE REGIONAL ECONOMY

The state of Georgia comprises of 159 counties. The Firefly Trail will pass through three counties in the northeast part of the state, namely Clarke, Oglethorpe and Greene County. Table 1 summarizes relevant demographic information of these three counties. The rural-urban composition of the three counties is very distinct. Oglethorpe County is 100% rural, Green County is 82% rural, while Clarke County is more than 90% urban. Among the three counties, Clarke County stands out as urban, less rich and with racially diverse population. Evidently the college town of Athens dominates the demographics in Clarke County. The median age in Clarke County is 27 years, whereas it is between 40 and 50 years in the other two counties. Clarke County will potentially have more users on bicycles, or joggers on the Firefly Trail. However, note that compared to Greene and Oglethorpe counties, Clarke County's median household income is relatively low and the poverty headcount ratio is relatively high. There is not much variance in the unemployment rate in the three counties; on average, the unemployment rate is about 7% and slightly less than the state average rate of 8%.

Table 1: Demographic Summary of the Three Counties

Demographics	Clarke	Oglethorpe	Greene	GA Total
Median Household Income, Total, 2012	$32,720	$42,992	$43,406	$47,125
Below Poverty, % of Persons, 2012	34%	16%	23%	19%
Per Capita Income, 2012	26,270	34,083	45,573	37,229
Persons Age 25+, % High School Graduate, 2008-2012	22%	34%	39%	29%
Persons Age 25+, % w/Bachelor's Degree, 2008-2012	21%	9%	12%	18%
Unemployment Rate, 2013	6%	6%	9%	8%
Total Population, Estimate, 2013	121,265	14, 548	16,321	9,992,167
Total Pop, % Change, 2000-2010	15%	18%	11%	18%
Urban, Total %, 2000	91%	0%	18%	72%
Rural, Total %, 2000	9%	100%	82%	28%
Black Pop Alone, %, 2013	27%	18%	37%	31%
White Pop Alone, %, 2013	66%	80%	61%	62%
Median Age, Total Population, 2013	27	42	49	36

Source: http://georgiastats.uga.edu/

The other two counties are rural and have significantly lower educational levels compared to Clarke County. For instance, in Oglethorpe County, only 9% of the population aged 25 years and above has bachelor's degree or higher whereas in Clarke County it is 21%. Both Clarke (34%) and Greene (23%) counties have higher poverty rates than state average (19%). The construction of the Firefly Trail will provide a much-needed economic boost to these counties, the details of which are discussed later in the report.

Table 2 presents a summary of the transportation statistics in the three counties. Clarke has 700 miles of highway most of which is paved, unlike highways in Oglethorpe County and Greene County. Daily vehicle miles travelled and the number of registered motor vehicles in Clarke is more than double the numbers in Oglethorpe and Greene counties.

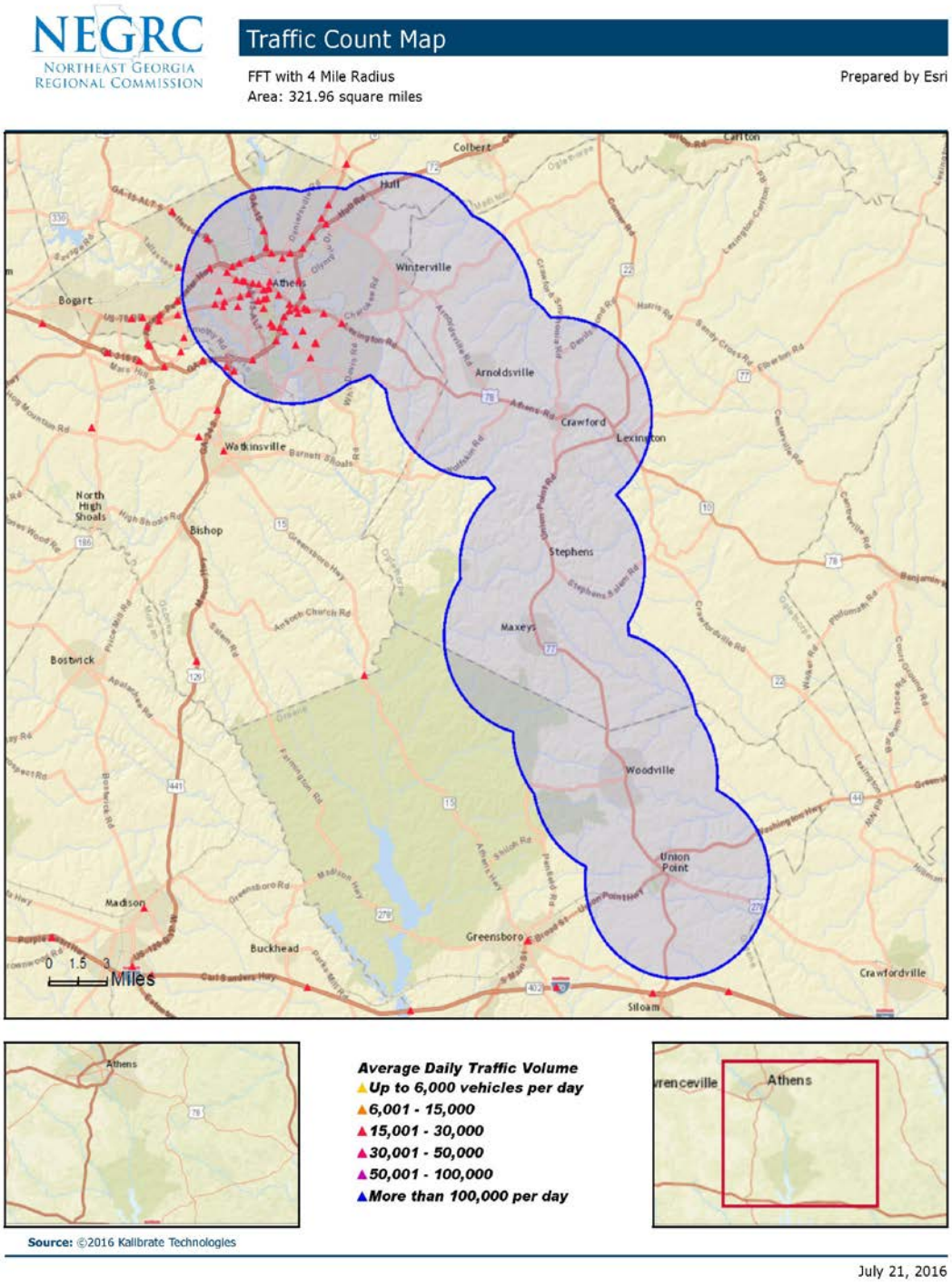
Table 2: Summary of Transportation Statistics in the Three Counties

Transportation Stat.	Clarke	Oglethorpe	Greene	GA Total
Highway Mileage, Total, 2013	700	609	597	125,404
Highway Mileage, Unpaved, % of Total, 2013	1%	42%	29%	28%
Daily Vehicle Miles Traveled (000), Total, 2013	2,700	359	839	299,020
Motor Vehicle Registrations, Total, 2014	77,877	18,603	19,555	8,986,366
Fatalities in Crashes, Rate per l00,000 Population, 2012	6	14	25	12
Fatalities in Crashes, Involving Drunk, Rate per l00,000 Pop, 2012	2	7	6	3
% of Occupied Housing Units with No Vehicles, 2008-2012	8%	3%	6%	7%

Source: http://georgiastats.uga.edu/

Figure 1 shows a traffic count map for the area adjacent to the Firefly Trail corridor. It is evident from the map, that the town of Athens in Clarke County has relatively high volume of traffic compared to other mostly rural areas. The Firefly Trail will provide another transportation choice for the urban population in Athens. Furthermore, as seen in Table 2, the number of fatalities in both Oglethorpe and Greene Counties is greater than the state average. Though Clarke has higher traffic congestion, the county statistics on fatalities is relatively lower. The state of Georgia has 12 fatalities in crashes per 100,000 people whereas this number is 14 for Greene County and 25 for Oglethorpe County. Fatalities in crashes involving drunken driving are also high: Georgia (3), Greene County (7) and Oglethorpe County (6). The Firefly Trail when used for commuting will hopefully help reduce the number of auto-related accidents.

Figure 1: Traffic Count Map



The Firefly Trail starts in Athens in Clarke County, passes through Oglethorpe and ends in Union Point in Green County. Figure 2 shows a detailed map of the trail (more information about the trail route can be found at: http://www.fireflytrail.com/proposed-trail.html). Some towns along the trail are: Athens, Winterville, Arnoldsville, Crawford, Maxeys, Woodville and Union Point.

Figure 2: Map of Firefly Rail Trail

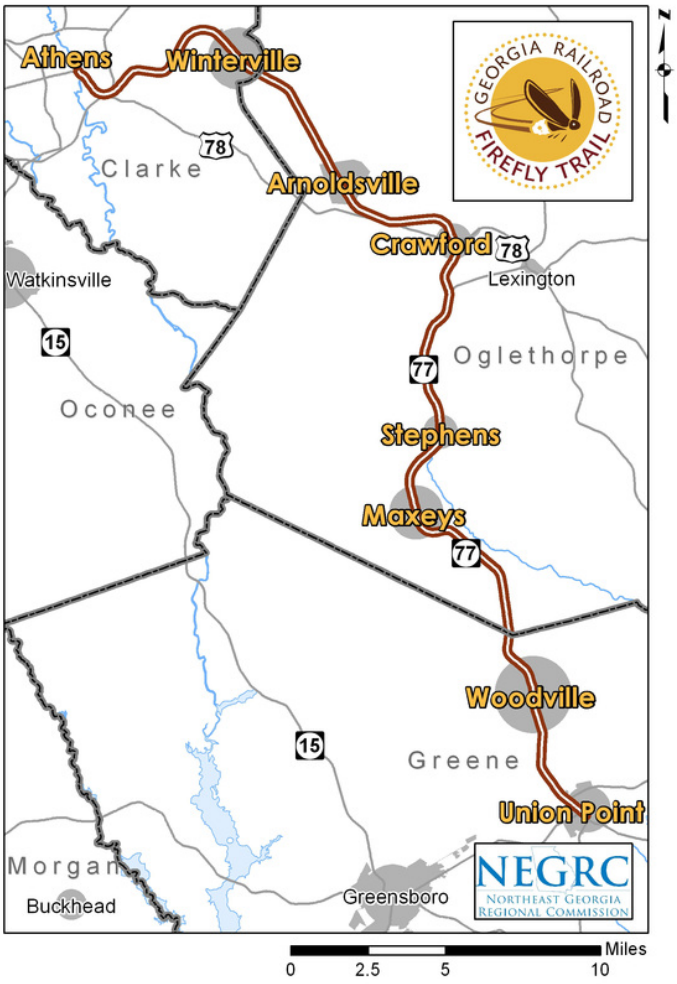


Table 3 provides a summary of the demographic characteristics of these towns along the Firefly Trail. Among these towns, Athens is the largest with a total population of about 85,000, while the towns of Maxeys, Woodville and Arnoldsville have less than 500 residents. It is hoped that the Firefly Trail will encourage the largely student population in Athens to explore the neighboring counties and give a boost to the smaller local communities and towns along the trail. Winterville and Arnoldsville have

higher average incomes (about $28,000) whereas Union Point has about half that income (about $13,000) and a very high poverty rate (40.6%). By connecting these communities, bringing in tourism and improving property values, the Firefly Trail will help reduce poverty and income inequality in the region.

Table 3: Demographic Summary of Selected Towns

	Athens	Winterville	Crawford	Maxeys	Woodville	Union Point	Arnoldsville
Per capita income (2013)	$17,534	$28,530	$14,649	$22,496	$17,291	$12,673	$28,462
% of residents living in poverty (2013)	32.5%	12.8%	34%	9.9%	21.1%	40.6%	2.5%
Persons age 25+, % high school grad	81.6%	91%	62%	85.2%	76.3%	72.8%	90%
Persons age 25+, % bachelor's degree	44.2%	39.3%	13.4%	24.2%	7.8%	7.8%	29.4%
Unemployment Rate (September 2015)	5.9%	5.9%	5.2%	5.2%	6.6%	6.6%	5.2%
Total Population (2014)	85,116	1,155	816	221	329	1,676	349
Urban Total	72,324	921	0	0	0	0	0
Rural Total	4,176	159	816	221	329	1,676	349
Black population alone %	25.1%	22%	32%	5.8%	68.2%	53.1%	7.3%
White Population alone %	64.3%	70.5%	61.8%	92.9%	28.7%	40.6%	84.3%
Median Age total population	24.2	47.3	47.2	41.7	43.4	35.5	41.7
% of population commuting by car	74%	84%	78%	87%	80%	74%	89%
Mean travel time to work (min), 25 yrs +	17.4	23.6	29.1	47.9	27.4	30.3	22.8
Air quality index	57.5	57.5	57.5	57.5	57.5	57.5	57.5

Source: www.city-data.com/

III. REVIEW OF RELEVANT TRAIL STUDIES

Numerous studies have analyzed the impact of trails on different aspects such as health, environment and the local economy. A brief summary of some of the relevant reports is given below:

Title: *The Economic Impact of the Proposed Chattahoochee Valley Blueway Project*, Blair, The Trust for Public Land (2012). The purpose of this study is to measure the potential economic impact of the proposed Chattahoochee Valley Blueway, which is a paddling trail that runs from West Point, Georgia to Phenix City, Alabama and Columbus, Georgia. The study quantifies the economic impact of the project using three different spending scenarios: high, medium, and low.

The study predicts that the Blueway will have an annually recurring impact of $3.3 million, after it has been in place for 4 years. Using employment multipliers as well as personal income multipliers, the model also predicts that after 4 years, the Blueway will support 54 annually recurring jobs, and increase personal income by almost $1.2 million. The study also measures the predicted impact of one time construction costs associated with the project as well as the predicted economic impact if festivals or other cultural events were to develop because of the Blueway.

Title: *Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts*, Garrett-Peltier (2011). The goal of this study is to estimate the employment impacts that result from the construction of different types of transportation infrastructure, namely bicycle, pedestrian, and road. To conduct the study, data were collected from a total of 58 projects conducted in 11 cities across the United States. The study concludes that infrastructure projects related to cycling had the greatest level of job creation, averaging 11.4 jobs created per $1 million spent. This high level of job creation results from the relatively high level of labor intensity as well as the relatively low number of inter-state leakages that

cycling and walking infrastructure requires. The lowest level of job creation is road-only infrastructure projects, with only about 7.8 jobs created per $1 million spent.

Title: *Cost effectiveness of a bicycle/pedestrian trail development in health promotion*, Wang et al (2004). This research conducts a cost-effectiveness analysis of bicycle/pedestrian trails. Physical inactivity has a high economic burden, and the construction of trails has the potential to increase physical activity. The authors, therefore, focus on the influence of trails on: promoting overall physical activity, promoting physical activity for general health purposes, and promoting physical activity specifically for weight loss. The costs of trail construction and maintenance were gathered using data from four trails in a Nebraska city. A sample of trail users was gathered through a census report, and an interview questionnaire was used to assess how trails affect the user's level of physical activity. The final cost-effectiveness ratios show the cost for one person whose level of physical activity increased after using the trail. Average annual cost for per person, for a user becoming more physically active in general is $98, the cost of a user becoming more physically active for general health purposes is $142, and the cost of a user becoming more physically active specifically for weight loss is $884.

Title: *A Cost-Benefit Analysis of Physical Activity Using Bike/Pedestrian Trails*, Wang et al (2005). This research quantifies the economic impact of bike/pedestrian trails on public health by developing a cost-benefit analysis. The authors argue that physical inactivity is one of the leading causes of current health problems, and that the creation of more facilities, such as bike and pedestrian trails, could potentially encourage greater levels of physical activity. The costs for construction and maintenance of five trails in Lincoln, Nebraska were used along with census data to project the number of total trail users per year for these specific trails. To project the direct health benefits of an active lifestyle, this research uses the estimated difference between medical expenses of an active versus inactive person. This medical cost

saving was then divided by total trail cost to develop a cost-benefit ratio. The resulting ratio was 2.94 meaning that every $1 investment in trail use leads to $2.94 in direct medical benefits.

Title: *Economic Impact Analysis of the Proposed Pike2Bike Trail*, Prepared by Bedford County Planning Commission and Fulton County Planning Commission (2014). The Pike2Bike trail is a proposed project that would transform the current abandoned Pennsylvania Turnpike into an 8.5-mile multi-purpose trail. This report measures the potential economic impact of such a project. In addition to the economic impact analysis, a literature review was conducted that outlines different benefits of trail development including increased levels of tourism, development of new businesses, promotion of a more active lifestyle, and property value increases.

In assessing the potential economic impact of the trail, three different investment scenarios were considered. Each scenario differs in the number of expected visitors per year under the assumption that more developed facilities made possible by higher levels of investment will attract more visitors. A combination of survey responses and data from comparative trails were used to develop visitation estimates. The inputs were divided into construction impacts and operations impacts. The level of each input differs according to each scenario.

1. Scenario 1 represents basic investment required to make the trail safe and accessible to users, with no additional amenities. Overall economic impact for this trail is estimated to be $4.8 million during construction and $370,000 annually after the trail is fully operational.

2. Scenario 2 represents a mid-level of investment and adds some amenities such as access to water and a museum. This scenario is projected to yield $6.1 million during construction and have an impact of $1.5 million each year the trail is fully operational.

3. Scenario 3 represents the highest level of investment. At this level, the trail would include a nature reserve, connections to other trails, a highly developed museum, events, and additional trailheads. Scenario 3 is projected to have a construction impact of $8.8 million and an annual impact of $3.3 million once the trail is fully operational.

Title: *Silver Comet Trail Economic Impact Analysis and Planning Study*, Northwest Georgia Regional Planning Commission (2013). The Silver Comet Trail is a 61 mile long paved rail trail. It is the nation's oldest and longest trail of this type. This study is two-part and analyzes the current economic impacts of the trail as well as the potential future economic impacts of the trail if it is expanded. The proposed expansion would increase the trail length by 66 miles. The economic impact of the trail is measured through 11 different impact areas: direct activity, tourism activity, spillover impacts, unmet demand, fiscal impacts, property value impacts, new development, employer and employee attraction, mobility, health benefits, and ecological services rendered.

The estimates of the economic benefits resulting from each of these impact areas were based on survey results, past research, literature, and some assumptions. The Silver Comet Trail in its current form is estimated to generate approximately $57 million in direct spending. Including spillover impacts, total expenditures are $100 million in the region. If expanded, the trail would generate approximately $86 million in direct spending. Including spillover effects, total expenditure would be about $150 million in the region. Fiscally, the current trail is estimated to generate about $3.5 million in current tax revenues per year for the State. If expanded, this number is estimated to increase to about $5 million per year.

Figure 3: Benefits of Multi-use Trails

IV. BENEFITS OF MULTI-USE TRAILS

As shown in Figure 3, trails benefits origin in multiple ways. The economic impacts of trail projects are discussed in the next section. Some of the other benefits of multi-use trails are listed below.

Improved Property Values

In a survey of home buyers by the National Association of Realtors and the National Association of Home Builders (Consumer's Survey on Smart Choices for Home Buyers, 2002), trails ranked as the second most important community amenity out of a list of 18 choices (highway access was number one). Numerous studies have shown that since trails provide recreational and transportation needs, they help improve the property values. For example, the Effect of Greenways on Property Values and Public Safety in Colorado (1995) is one of the most cited studies on this topic. On the other hand, in some cases, there is resistance by members of the community who worry that property values may be negatively impacted by trail projects since there will be loss of privacy, and the potential for more crime in their neighborhood. However the Rails-To- Trails Conservancy conducted a survey of 372 trails representing a diverse set of trail types, lengths, and geographic locations from 38 states and found that

occurrence of major crimes committed on trails is vastly below national rates for those crimes. The negative impact of crime on property values will decrease if the trail is well maintained, and used regularly by the local residents.

Improved Health Benefits

Trails create better opportunities to lead an active lifestyle by offering people attractive, safe, and accessible places to bike, walk, hike, jog and run. Unlike gyms and health clubs, trails provide a low cost solution to people who attempt to reach the recommended 30 minutes each day of moderately intense physical activity. They also serve as a place where people can see and interact with other people exercising. Furthermore, when trails are used for daily commute, they help reduce traffic congestion. For example, in Denver, the Weir Gulch Trail provides a safe neighborhood route for elementary-aged children, the trail's primary users.

Decrease in Transportation Costs

Bike-pedestrian trail projects such as the Firefly project help reduce households' transportation costs. Walking is virtually free and the cost of operating a bicycle is far less than operating a car. A study cited by the Silver Comet Trail Study found that households in automobile dependent communities devote 50% more of their income to transportation (more than $8,500 annually) than households in communities with more accessible land use and more multi-modal transportation systems (less than $5,500 annually). Of course, the reduction in transportation costs will come into effect if commuters are able to use the trail to go to their workplaces, grocery stores or schools and parks. Surveys by the Federal Highway Administration (1992), show that Americans are willing to walk as far as two miles to a destination and bicycle as far as five miles. But the choice to bike or walk rather than to drive may not be available by the way our cities and towns have developed. Hence with the start of the Firefly Trail it will be important to develop a system of expanded trails in the northeast Georgia region.

Environmental Benefits

Trails generate multiple environmental benefits. Trails help improve air quality by protecting plants and reducing pollution. They are part of green space corridors and provide a respite in the urban landscape, e.g. the Beltline Trail in metro Atlanta. Trails help restore wildlife habitat as well as natural ecosystems for plants and trees. The Firefly Trail will pass through fields and forested areas, where deer, opossums, armadillos, coyotes and a variety of birds have been spotted (Rails to Trails magazine, 2015). The proposed trail will bring awareness among communities to help conserve the natural habitat for these animals and birds.

V. ECONOMIC IMPACT

The several economic benefits arising from trail projects can be broadly categorized as originating from two types of impacts, namely the construction impact and the operations impact.

Construction Impact

First, the construction of the Firefly Trail will provide a boost to the regional economy. More people will be employed on construction related jobs, trucks will be hired, construction equipment will be rented and raw materials will be purchased on a large scale. However, the construction impact will provide an economic boost in the short term.

Operations Impact

The operations impact, on the other hand, will recur annually. There is a boost to the local economy when people start using the trail; when pedestrians start walking short distances, commuters start biking to their workplaces, and tourists start visiting the trail. The trail users spend money on recreation rentals (such as bicycles, child seats and helmets), recreation services (such as shuttle buses, and guided

tours), historic preservation, restaurants, and lodging. Thus direct economic benefits accrue to many different local groups, including residents, businesses, and government agencies.

Both the construction and the operation impacts generate multiple rounds of economic benefits; namely, 1. direct benefits, 2. the indirect benefits and 3. the induced benefits. These benefits are measured by using the following indicators:

1. Total Output: When expenditure on new infrastructural projects such as the Firefly Trail is undertaken, there is a trickle down of different impacts on the total output in the economy. The first effect, also known as the "direct effect", is due to the initial spending that is undertaken by the firms that are the recipients of the project. A simple example is of a firm, which wins the contract, and hence will purchase concrete blocks to build the trail. Second, the initial spending creates demand for goods and services among firms operating in the supply chains of related industries. For example, the firm from whom the concrete blocks were purchased will spend money on purchasing raw materials such as gravel and sand. This demand is classified as the "indirect effect". Finally, the direct and indirect spending effects result in additional compensation to workers. With the added income, households undertake additional spending. Workers in the firm building concrete blocks, workers using concrete block to construct the trail, all will receive additional income, which they will spend on say, buying meals, clothes and other consumer goods. This additional spending is referred to as, "induced effects". In other words, each trail investment sets in motion secondary expenditures because prime contractors buy goods and services from suppliers, hire subcontractors and make payments to workers and suppliers. As suppliers, subcontractors and workers spend portions of their income on other goods and services, new rounds of spending occur. Taken together, these three effects lead to an increase in the

economic activity. Total output is the cumulative effect of numerous rounds of spending set in motion by the original expenditures on the trail project.

2. Value Added in Production: Value added is the output as measured by final sales minus the value of the intermediate goods and services required to create the new output. Value added measures the contribution to new economic output made by an individual producer, sector or industry. In case of the trail project, value added will be the final price of the project minus the cost of all the goods and services used during the production process.

3. New Jobs Created: Workers are required to produce the goods and services because of the new trail project. The new demand helps to sustain the existing workforce and typically results in an expansion of new hiring. Jobs created measures the number of new full and part-time employees. When each of these workers who receive additional revenue, further spend this revenue in the market, there is a chain effect or what is termed as the indirect economic benefits of the trail.

4. Household Income: This is the compensation to employees paid in return for the work they performed in creating the new final demand. A boost to household income is generated not only when more output is produced but also when more workers are hired to fill in the new jobs created.

5. New Tax Revenue: Additional tax revenues are derived from the increase in final sales. The revenues come from sales and excise taxes, customs duties, property taxes, motor vehicle licenses, severance taxes and special assessments.

Finally, it is important to note that the entire analysis is conducted using county level data. At the county level, the economic impact of a local highway project depends upon the extent to which the successive rounds of spending recirculates within the county, or leaks out to other areas. Leakages

occur when households and businesses make purchases from firms outside of the local economy. Examples include prime contractors hiring nonlocal subcontractors or buying supplies from nonlocal businesses. Another leakage is when households make purchases from vendors outside of the county. Thus, local economic impacts are influenced by the pattern of consumer spending, characteristics of businesses in the local economy, nature and location of firms in the supply chain and the kinds of products and services required by the highway construction project.

VI. ECONOMIC MODEL

The statistical software Impact Analysis for Planning (IMPLAN) was used to conduct the assessment. The software is widely used by governmental agencies and private organizations. It was created through a joint effort of the US Department of Agriculture Forest Service and the Federal Emergency Management Agency (FEMA) and was used by the US Department of Agriculture, Natural Resources Conservation Service to estimate the number of jobs created by the Fiscal Stimulus Act of 2009. Now it is one of the most frequently used software applications to estimate national and regional impacts.

The model is based on a 440 sector social accounting table and input output-matrix. The model replicates industry supply chain linkages and patterns of household expenditures occurring in each user-defined geographic location. It traces how expenditures on goods and services in one sector of the economy create demand for commodities and services in other sectors. The linkages are expressed numerically as multipliers. For example, in a 2014 study by Boston and Oyelere, the model of Georgia's economy produced a total output multiplier of 1.89 for highway construction expenditures. This means every dollar spent on highway projects generated a total economic impact of $1.89.

The multipliers in the model estimate how an initial stimulus of project investment affected total output, employment, wages (household income), value-added (new value created at each stage of

production), and tax receipts (county and state tax revenues). The multipliers create estimates of direct, indirect and induced effects.

VII. ESTIMATES OF THE ECONOMIC BENEFITS

Economic benefits resulting from the construction and the operations of the Firefly Trial are estimates in this section. Consider first the construction costs and the resulting benefits.

Table 4: Construction Cost Estimates of the Firefly Trail

Items	Estimated Cost	Percent Share of Cost
Master Planning	$ 150,000	1
Property Research	$ 200,000	1
Acquisition	$ 3,652,823	15
Clearing	$ 450,000	2
Construction	$ 16,000,000	66
Contingency	$ 3,200,000	13
Subtotal	*$ 23,652,823*	*97*
Project Management	$ 709,585	3
TOTAL	**$ 24,362,408**	**100**

Source: John Devine, Senior Planner, Northeast Georgia Regional Commission

Construction Costs

Table 4 summarizes the construction costs estimated for the project. The total cost of the trail project is estimated to be around $24.36 million or about $0.62 million per mile. The construction costs assume 12 (23 miles) and 14 feet (15 miles) trail width and includes costs of two trestles (North Oconee and Rhode Street) along the trail. The contingency costs are 20% of the construction costs and the project management costs are 3% of the subtotal.

Economic Benefits of Construction Costs

Table 5 summarizes the economic benefits that will be generated due to the impact of the construction of the Firefly Trail. An expenditure of $24.36 million on the trail, will result in total economic output of

around $32.57 million dollars. Of these, $24 million will be generated as a direct effect of the investment. Additionally, 93 new jobs will be created; 39 of which will be in construction, 28 in real estate, 20 in the asphalt related industry and six in wholesale trade. The indirect effect will add another 42 jobs, in sectors such as management of companies and architectural and engineering services and $6 million to the total output. The indirect effect will result in additional economic output of $5.49 million. Finally, the induced effect will give a boost to other sectors such restaurants, shops and hospitals by adding almost 24 jobs and $2.7 million to the total output. Construction activities will generate tax revenue of $50,702 at the county level, $819,196 at the state level and $1,266,339 at the federal level.

Table 5: Summary of Economic Benefits of Construction Impact

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	93.31	$4,606,877	$6,693,245	$24,362,408
Indirect Effect	41.73	$1,532,808	$2,813,416	$5,498,150
Induced Effect	23.46	$800,926	$1,526,180	$2,709,946
Total Effect	**158.50**	**$6,940,611**	**$11,032,842**	**$32,570,503**

Source: Author's calculations based on IMPLAN model

Table 6 shows a comparison of the economic benefits of the construction impact with two recent trail studies, the Pike2Bike Trail and the Silver Comet Trail. As noted previously in the literature review, the Pike2Bike Trail study estimates the impact of an 8.5-mile multi-purpose trail along the Pennsylvania Turnpike while the Silver Comet Trail study estimates the impact of the expansion of the prevailing trail.

Table 6: Comparison of Economic Benefits of Trail Projects

	Cost of the Project ($ million)	Cost per mile ($ million)	Construction Impact ($ million)	Construction Impact per million expenditure	Jobs Created	Jobs per million expenditure
Pike2Bike (8.5 miles)						
I.	3.85	0.45	4.8	1.24	56.5	14.7
II.	4.87	0.57	6.1	1.25	87.97	18.1
III.	6.87	0.81	8.8	1.28	143.8	20.9
Silver Comet (66 miles)						
I.	59	0.89	150	2.54	1,100	18.6
Firefly (39 miles)						
I.	24.36	0.62	32.57	1.34	158.50	6.5

Source: Author's summary

Given the relatively shorter length of the Pike2Bike Trail, the expenditure of the project under three different scenarios is small and hence the total economic impact is small as well. On the other hand, the Silver Comet Trail's expansion of 61 miles is relatively large and so are the cost and benefits. Hence instead of the total benefits, it is useful to compare the benefits per million dollar spent. The construction impact per $1 million spent varies from $1.24 to $2.54 million and the estimated impact of the Firefly Trail ($1.34 million) is within this range. Similarly the estimated costs per mile of the Firefly Trail ($0.62 million per mile) lie within the range ($0.45 to $0.89 million per mile).

Table 7: Top Ten Employers in the Region

Items	Total Employees
Employment and payroll of state govt., non-education	8425
Employment and payroll of state govt., education	7892
Hospitals	4296
Full-service restaurants	3798
Real estate	3647
Wholesale trade	3154
Limited-service restaurants	3135
Employment and payroll of local govt., education	3045
Offices of physicians	2620
All other food and drinking places	1994

Source: IMPLAN data

The estimated jobs created per $1 million spent are slightly less than those from the previous studies. The reason is evident from Table 7. In Table 7 lists the top ten employers in the region. State government forms the largest source of employment, followed by hospitals and physicians, restaurants and wholesale trade. Thus the direct impact of the construction activity on job formation is relatively small (93 jobs created); however the indirect and induced impacts lead to an additional 64 jobs as more people spend more money visiting local restaurants and shops.

Operations Impact

The estimated economic impact above is generated from the construction of the trail and is short term. As discussed previously, there will also be an annually recurring impact of the trail when visitors start using the trail. Ideally, estimates of the number of visitors using a trail are based on information collected from a survey of potential trail users. However in the absence of such data, the number of visitors in other trail studies is reviewed. Table 8 lists five trails and the number of annual visitors (actual in some cases and estimates in other cases). In the last column of the table, the average annual visitors per million is calculated using data on state population. [2]

Table 8: Evidence on the Number of Visitors in Trail Studies

Trails	Annual Visitors	States (Year)[2]	Population (million)	Annual Visitors per million
Pike2Bike[1]	100,000	PA (2014)	12.79	7,818.61
Silver Comet	2,000,000	GA (2013)	9.99	200,200.20
Swamp Rabbit Trail	501,236	SC (2013)	4.77	105,080.92
Virginia Creeper Trail	130,172	VA (2004)	7.47	17,425.97
Washington and Old Dominion	1,707,353	VA (2004)	7.47	228,561.31

1. Scenario 2 with mid-level investment; 2. Population used from the year of the study

[2] The state population is used since data on it is readily available whereas data on local population in the vicinity areas of each trail is not available. Furthermore, people from different parts of the state typically visit the trail.

As seen in Table 8, the annual number of visitors per million varies significantly between trail studies. The Silver Comet and the Washington and Old Dominion Trail studies estimate very high volume of visitors (more than 200,000 per million of state population) whereas the Pike2Bike study estimates less than 8,000 visitors per million of state population. The average of the values is equal to 111,817.40. Using Georgia's estimated population in 2016 to be about 10.17 million, it is estimated that the annual visitors will be about 1,137,182.96.

Most of the trail studies assume that visitors spend about $13 per day on food, drinks, snacks, gas and other soft goods. For instance, the Pike2Bike Trail survey study estimates that visitors are assumed to spend about $13 per day, the Rails to Trails Conservancy reported that visitors of Ohio's Little Miami Scenic Trail spend an average of $13.54 per visit just on food/beverage and transportation to the trail and the Heritage Rail Trail Study reports $13.26 per visitor. Suppose each visitor spends on average about $13, and there are 1,137,182.96 visitors per year, then that will result in $14,783,378.45 of spending annually in the economy. This level of spending will boost the local economy and help small businesses such as bicycle rental shops, coffee shops and ice-cream trucks.

VIII. RECOMMENDATIONS

This report estimates the economic impact of the project on the local economy by constructing a social accounting matrix. A unique feature of the study was that the entire analysis was conducted using county level data. The economic impact estimates are based on assumptions noted in the report. In order to generate further estimates more data on the construction and maintenance of the trail is required. Information from surveys of potential users of the trail in the local regions will lend support to the findings of this report. The analysis concludes that investment in the Firefly Trail project will generate economic benefits to the local economy in multiple ways; a summary of the main findings is provided below:

- The construction of the project will lead to a one-time increase in total output by $32 million. Thus, every dollar spent will lead to a multiplier effect by generating $1.33 in economic impact.
- This will include a direct impact of $24 million, an indirect impact of $5 million due to the purchases of goods and services made towards construction of the trail and an induced impact of about $3 million due to the spending undertaken on restaurants, shops, and so on.
- The total value added in production will be around $11 million. This indicates the net worth of goods and services produced because of the construction activity.
- The construction of the trail will create 158 additional jobs, mostly in construction, real estate, and wholesale trade. Household incomes are expected to rise by $6.9 million.
- Construction activities will generate tax revenue of about $50,000 at the county level, $800,000 at the state level and $1.26 million at the federal level.
- Assuming an annual turnout of about 1.13 million visitors to the trail, total output will increase by $14.7 million per year when the trail is operational.

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