



White Paper 2:15

Economic Potential of South Knoxville's Urban Wilderness

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June 2015

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This research was sponsored by the Oak Ridge National Laboratory. Findings and opinions conveyed herein are those of the author(s) only and do not necessarily represent an official position of the Howard H. Baker Jr. Center for Public Policy, the University of Tennessee, the US Department of Energy or Oak Ridge National Laboratory.

The Urban Wilderness trail system in South Knoxville is a valuable natural asset that generates local spending and tax revenues, supports jobs, helps Knoxville attract and retain a highly skilled workforce and helps enhance resident's quality of life. For purposes of policy, planning, and local pride, it is important for residents to understand the nature of these benefits. Quantifying these values is challenging but necessary in order to determine the impact of public and private activities that may enhance or diminish this asset.

This report provides estimates of the potential economic impact of the trail system on a three county region: Knox, Anderson, and Grainger Counties. Using existing studies of other trail systems in the United States, the study identifies three potential future growth scenarios for the trail system. Each scenario implies a different level of bike-related trail use and visitor expenditure. These estimates of trail use and expenditure at other trail areas are combined with characteristics of the local population and economy to provide forecasts of the economic impact potential of the trail system in terms of direct spending, indirect/induced spending, and sales tax revenues. While useful, these estimates do not consider many other benefits of the trail system including employment impacts, job recruitment, trail proximity impacts on property values, and overall quality of life.

South Knoxville's Urban Wilderness

South Knoxville's Urban Wilderness is home to 42 miles of trail including the 12.5 mile South Loop. The trail system encompasses the Forks of the River Wildlife Management Area (FRWMA), municipal parks (Marie Myers, William Hastie Natural Area, Ijams Nature Center), private land, and small portion of city street/sideway and paved city greenway. The terrain varies from rolling farmland in FRWMA, mature forest in Marie Myers, wildflowers, off-camber rock and sinkholes in Hastie Natural Area, and abandoned quarry in Ijams Nature Center.

This impressive urban trail system is made possible by access provided by city, county, state, non-profit and private landowners with easements held by the Legacy Parks Foundation. The Appalachian Mountain Bike Club (AMBC) maintains the trails with the help of funding from Legacy Parks and the city of Knoxville. A formal agreement with the Tennessee Wildlife Resource Agency (TWRA), AMBC, and Legacy Parks guides trail construction and maintenance on state lands.

The extent, variety, and proximity to downtown make the Urban Wilderness unmatched in the United States (see Table 1). Few cities outside the Rocky Mountain region have trail systems or bike parks within 10 miles of downtown with as many trail miles as the Urban Wilderness. This proximity to retail, entertainment, and lodging implies a greater potential economic impact compared to most other trail systems situated in rural areas. The economic potential for a trail system near Knoxville will grow as the city's population and household income increase. While this study does not explicitly address the health benefits of the Urban Wilderness, Tennessee's relative inaccessibility to parks coupled with a relatively inactive adult population, makes the recreation opportunities provided by this trail system a potentially valuable asset for improving the health outcomes of state residents.

Table 1. Urban Trail Systems

	Trail Characteristics		City characteristics*				State characteristics†	
	Miles of Trail	Distance to downtown	Population (2010)	Median age (2013)	Median household income (2013)	% biking or walking to work**	% population that live within half mile of park	% adults reporting no leisure-time physical activity
Urban Wilderness (Knoxville)	42	2.2	178,874	34.1	\$33,595	3.5	17.5	35.1
James River Park (Richmond)	11	10	204,214	32.6	\$40,496	6.2	31	25
Highbridge (Manhattan)	3	5.4	1,585,873	36.5	\$69,659	11.7	51.6	26.3
Theodore Wirth (Minneapolis)	4	6	382,578	31.6	\$49,885	11.5	60.3	21.9
I-5 Colonnade (Seattle)	1	2.7	608,660	36.1	\$65,277	13	49.3	22
* U.S. Census								
** HUD State of the Cities Data System 2010 http://socds.huduser.org/quickcity/quickcity.html								
† Centers for Disease Control and Prevention. State Indicator Report on Physical Activity, 2014.								

Potential Bicycle-related Trail Use and Expenditures

Economic impacts of trail systems can be approximated based on 1) number of trail user days and 2) the percentage of non-local users. A user day is a single trail use experience and is the unit of measure for trail use. A single individual may experience multiple user days in a single year. The user days may be generated by either local users or non-local users who require an over-night trip to experience the trail system. Non-local daily expenditures are generally higher than local expenditures owing to the need to purchase lodging and the possibility of additional expenditures at restaurant and entertainment venues in the area. These two pieces of information provide a good approximation of total spending attributable to the trail system.

Unfortunately, use and expenditure estimates for the Urban Wilderness have not yet been collected. Instead, this study utilizes economic impacts studies already completed in another location and/or context. Eight existing studies of the economic impact other trails systems in the United States are collected from Headwaters Economics Trail Benefits Library¹. These studies are grouped into three different trail system types: local amenity, regional destination, national destination. Local amenity trail areas are located near major metropolitan areas and are characterized by a large number of mostly local users. Regional destinations tend to be located in more rural areas, attract relatively fewer users but attract a larger percentage of non-local users. National destinations attract more users than regional destinations and a larger percentage of non-local users. These results are presented in Table 2.

¹ <http://headwaterseconomics.org/trail>

Table 2. Trail System Types Based on Average Bicycle-related Use and Expenditures

Type of Area	Examples	Annual Bicycle User Days	% Local	% Nonlocal	Local user daily expenditure	Nonlocal user daily expenditure
Local amenity (large number of local users)	Washington & Old Dominion (Virginia) ² ; Research Triangle Area (North Carolina) ³ ; Greater Allegheny Passage (Maryland, Pennsylvania) ⁴	1,253,677	83	17	\$20.30	\$90.67
Regional destination (small number of mostly nonlocal users)	Virginia Creeper Trail (Virginia) ⁵ ; Chequamegon Area (Wisconsin) ⁶ ; Sea to Sky (British Columbia) ⁷	69,112	32	69	\$22.81	\$121.97
National destination (medium number of mostly nonlocal users)	Slickrock (Utah) ⁸ ; Jackson Hole (Wyoming) ⁹	190,608	23	78	\$5.17	\$138.50

Total annual bicycle-related expenditures associated with the Urban Wilderness under potential use scenarios are presented in Table 3. Within the local amenity trail system type, average bicycle user days per capita are 0.31. In other words, each resident of cities with local amenity trail systems makes 0.31 annual trips to the trail system. This average user day per capita measure is then applied to the 2010 Knox County population (852,715) to provide an estimate of bicycle-related trail use in the Urban Wilderness if the area were to remain a local amenity: 260,070. This measure of trail use is then multiplied by the daily spending per typical user of a local amenity trail area (\$32.03) to produce total annual bicycle-related expenditures attributable to the Urban Wilderness if it were to remain a local amenity: \$8.3 million. Based on other trail use areas, annual bicycle user days would increase by 69,112 and these additional users would spend \$90.74 per user day if the Urban Wilderness were to expand to a regional destination. As a regional destination, the Urban Wilderness would generate \$14.6 million in total annual expenditures. If the Urban Wilderness were to grow to a national destination, bicycle user days would increase by an additional 190,608 and typical daily user expenditures would increase to \$108.50. As a national destination, the Urban Wilderness would generate \$29 million in total annual expenditures.

² Bowker, J. M., et al. "The Washington & Old Dominion Trail: An Assessment of User Demographics, Preferences, and Economics." Virginia Department of Conservation (2004).

³ Naber, Michael David. Integrating trail condition assessment with recreation demand modeling of mountain bikers in the research triangle, North Carolina. ProQuest, 2008.

⁴ Campos Inc. 2009. The Greater Allegheny Passage Economic Impact Study (2007-2008)

⁵ Bowker, J. Michael, John C. Bergstrom, and Joshua Gill. "Estimating the economic value and impacts of recreational trails: a case study of the Virginia Creeper Rail Trail." *Tourism Economics* 13.2 (2007): 241-260.

⁶ Sumathi, N. and D. Berard. 1997. Mountain Biking in the Chequamegon Area of Northern Wisconsin and Implications for Regional Development. Center for Community Economic Development, University of Wisconsin Cooperative Extension

⁷ Western Canada Mountain Bike Tourism Association. 2007. Sea to Sky Mountain Biking Economic Impact Study.

⁸ Fix, P. and J. Loomis. 1997. "The Economic Benefits of Mountain Biking at One of Its Meccas: An Application of the Travel Cost Method to Mountain Biking in Moab, Utah." *Journal of Leisure Research* 29(3): 342.

⁹ Kaliszewski, N. 2011. Jackson Hole Trail Project Economic Impact Study (Unpublished Master's Thesis). University of Wyoming. Laramie, Wyoming.

Table 3. Potential Future Scenarios for Urban Wilderness Trail System

	Annual Bicycle User Days	Total Annual Expenditures
Local amenity	260,070	\$8,329,474
Grows to regional destination	329,183	\$14,600,442
Grows to national destination	450,678	\$29,010,442

Summary of Economic Impacts

Translating bicycle-related expenditures into total economic impacts through multiplier analysis requires the use of Regional Input-Output Modeling System (RIMS II) multipliers. The most recent regional multipliers for Knox, Anderson, and Grainger Counties were used for this analysis. The appendix details the model used to generate economic impacts.

Table 4 summarizes the total economic impacts of the Urban Wilderness on a three county region (Knox, Anderson, and Grainger Counties). As a result of expenditures generated by the presence of the Urban Wilderness, output (measured by GDP) increased by \$14.7 million. This output is created in three ways: (1) direct effects, (2) indirect effects, and (3) multiplier effects. As trail visitors spend money at restaurants, hotels, gas stations, bike shops, and entertainment venues, gross output is increased directly. In addition, output is generated indirectly when these businesses purchase goods and services from manufacturers, service providers, and vendors in Knox, Anderson, and Grainger Counties. In turn, these firms hire workers, earn profits and generate income. The multiplier process results in the creation of income and employment as workers spend their incomes in the region and as other firms generate sales, earn profits, and hire new employees. The direct, indirect, and multiplier effects are aggregated to yield total output impacts of the Urban Wilderness on the three county region. Spending generated by the Urban Wilderness also generates \$241,498 in state and local sales tax revenue.

If the Urban Wilderness grows to a regional destination, output would increase by \$25.8 million with state and local sales tax revenue growing to \$423,313. The Urban Wilderness as a national destination for bicycle tourism would generate \$51.2 million in total output with \$841,104 in state and local sales tax revenue.

Table 4. Summary of Economic Benefits

Impact	Trail Use Type	Direct	Indirect & Multiplier	Total
	Local amenity	\$8,329,474	\$6,371,215	\$14,700,689
Output (GDP)	Regional destination	\$14,600,442	\$11,167,878	\$25,768,321
	National destination	\$29,010,442	\$22,190,087	\$51,200,529
State & Local Sales Tax Revenue	Local amenity			\$241,498
	Regional destination			\$423,313
	National destination			\$841,104

Important Considerations

This study provides the first indication of the economic impact of Knoxville’s Urban Wilderness. The study highlights two types of economic impact created by spending attributable to the presence of the Urban Wilderness trail system: 1) increases in GDP in Knox, Anderson, and Grainger Counties and 2) state and local sales tax revenues. However, there are a number of important factors to consider when interpreting these estimates.

First, this study does not consider impacts to personal income and employment due to limited data. It also does not consider potential impacts to property values generated from proximity to Urban Wilderness trails and cor-

responding impacts to property tax revenues. It also does not consider a multitude of other potential non-market benefits of the Urban Wilderness. For example, the recreation opportunities provided by the Urban Wilderness improve health outcomes for state residents and prevent health-related expenditures by state residents and agencies. The presence of such natural amenities may also help attract and retain workers to the region. There are also a number of non-use benefits of the Urban Wilderness. Residents may value the presence of the Urban Wilderness as a “gift” that can be passed on to future generations - a bequest value. Since converting the Urban Wilderness to other uses such as homes, roads, and shopping centers is largely irreversible, residents may also value the option to visit the Urban Wilderness in the future even though they do not currently use the Urban Wilderness. These additional non-market values are more difficult to measure but can be substantial. For example, while typical daily user spending at a national mountain bike destination like Slickrock in Utah is \$108, the inclusion of these non-market benefits has been shown to increase the economic value of a Slickrock trip to \$205¹⁰. These additional values suggest that the total economic impact of the Urban Wilderness may be much larger than the numbers presented in this study.

Second, the trail use and expenditure estimates presented in Table 3 assume that Knoxville is similar to other cities and towns with a nearby trail system. However, a relatively small percentage of Knoxville’s population participates in leisure-time physical activity or commutes to work via bicycle or walking. These factors suggest that the trail use estimates used in this study may overestimate Urban Wilderness trail use. However, Tennessee is also characterized by low accessibility to parks. To the extent that lack of leisure-time physical activity is attributable to lack of parks and greenspace, Urban Wilderness trail use may be more closely aligned with the use numbers in this study. In terms of trail use expenditures, Knoxville has a lower median household income than many other areas with trail systems suggesting local users of the Urban Wilderness will spend less on average than local users to other trail systems. The ability to attract non-local users will likely counteract this effect on trail use expenditures. Also, the proximity of the Urban Wilderness to the downtown commercial district suggests trail use expenditures will be larger than other areas which tend to be located in more rural areas with fewer opportunities to inject money into the local economy.

Third, the trail use and expenditure estimates used in this study correspond with general use. Additional economic impacts will be generated as the Urban Wilderness hosts competitive race events which can attract thousands of participants to the area. For example, a study of the economic impact of four mountain bike events in Oregon showed an average increase in trail-related expenditures of \$203,742 attributable to these special events.¹¹

Finally, without estimates of current trail use, it is difficult to determine if the Urban Wilderness is best classified as a local amenity or has already transitioned to a regional destination. Much of the growth in Urban Wilderness trail use will develop organically as mountain bikers and other trail users learn of the area. However, moving the Urban Wilderness from a local amenity to a regional and perhaps national destination will also require city, county and state level government investments to improve facilities, expand trail opportunities and promote the area.

Appendix

Indirect and multiplier effects are calculated using RIMS II multipliers. The new RIMS II output multiplier used in this analysis is specific to Knox, Anderson, and Grainger County and is calculated by the Bureau of Economic Analysis (BEA). This multiplier represents the most recent regional multiplier available. The multiplier

¹⁰ Fix, Peter, and John Loomis. "The economic benefits of mountain biking at one of its meccas: An application of the travel cost method to mountain biking in Moab, Utah." *Journal of Leisure Research* 29.3 (1997): 342.

¹¹ Hashimoto, Kadin, et al. "The Economic Impact of Mountain Bicycle Events in Oregon." (2013).

is calculated from industries of the North American Industry Classification System (NAICS). Output multipliers represent the total dollar change in output that occurs in all industries for each additional dollar of output delivered to final demand by industry. For example, the average output multiplier for all industries in 2013 is 2.12, while the average multiplier for 2008 was 2.19.

The main purpose of this study is to analyze the benefits of the Urban Wilderness in the Knox County region. The economic benefits accruing to the three county region are measured by the increase in production of goods and services as measured by Gross Domestic Product. The main fiscal benefit accounted for in this study is the additional sales tax revenue generated for state and local governments due to the increase in economic activity related to Urban Wilderness use.

The economic impact measures are further broken down into direct, indirect, and multiplier effects. Direct effects are those specifically associated with expenditures on lodging, food, entertainment, etc., incurred in the region during a visit to the Urban Wilderness. Indirect effects arise as businesses purchase raw materials, services, supplies, and other operating services that help support jobs in other regional businesses. For example, many trail-related expenditures accrue to restaurants and bicycle shops. The economic effects of the Urban Wilderness increase as the share of raw materials and other inputs acquired within the region increase. Only the portion of expenditures actually retained by vendor in Knox, Anderson, and Grainger County can be used in the calculation of the firm's indirect income benefit to the regional economy. For example, if bicycles are purchased from a bike shop in Knoxville but the bicycles were actually manufactured outside the region, only the mark-up of the bicycles above cost would be the source of new income in the region. State and local governments gain benefits resulting from the taxes on these sales, but this impact is counted separately. Therefore, the size of Urban Wilderness's indirect impact depends primarily on the dollar value of regionally purchased goods and services and whether these same goods and services are produced within the region or imported to the community.

Finally, multiplier effects are created as the additional income generated by the direct and indirect effects is spent and re-spent within the local economy. For example, part of the wages received by restaurant employees will be spent on retail sales. If employees shop in Knoxville, part of the sales receipt will be used to pay local employees of the retail establishments. These employees will, in turn, spend a portion of their income in Knox County on groceries, housing, clothing, etc., thereby adding to the amount of regional output directly attributed to the Urban Wilderness visits. It should be noted that during each of these subsequent rounds of spending, a portion of the income generated leaks out of the three-county regional economy through taxes, savings, and spending outside the region, thereby diminishing the increment to total regional income attributable to these firms.

Total economic impacts attributed to increased business activity are computed as the sum of the direct, indirect, and multiplier effects. The model used in this report was developed by the Howard H. Baker Jr. Center for Public Policy at the University of Tennessee and relies on RIMS II multipliers to calculate economic impacts noted above. Using trail use and expenditure estimates transferred from other trail systems, the model allows calculation of the output and sales tax revenue impacts accruing in Knox, Anderson, and Grainger County.