

Appendix B

Economic Impact Analysis Detail

Economic and Fiscal Impact Model Methodology

Economic Impact Model

The methodology and input-output model used in this economic impact analysis are considered standard for estimating such expenditure impacts, and the results are typically recognized as reasonable and plausible effects based on the assumptions (including data) used to generate the impacts. In general, one can say that any economic activity can be described in terms of the total output generated from every dollar of direct expenditures. If an industry in a given region sells \$1 million of its goods, there is a direct infusion of \$1 million into the region. These are referred to as direct expenditures.

However, the economic impact on the region does not stop with that initial direct expenditure. Regional suppliers to that industry have also been called upon to increase their production to meet the needs of the industry to produce the \$1 million in goods sold. Further, suppliers of these same suppliers must also increase production to meet their increased needs as well. These are referred

to as indirect expenditures. In addition, these direct and indirect expenditures require workers, and these workers must be paid for their labor. These wages and salaries will, in turn, be spent in part on goods and services produced locally, engendering another round of impacts. These are referred to as induced expenditures.

Direct expenditures are fed into a model constructed by Econsult Corporation and based on data provided by the US Department of Commerce's Bureau of Economic Analysis through its Regional Input-Output Modeling System (RIMS II). The model then produces a calculation of the total expenditure effect on the regional economy. This total effect includes the initial direct expenditure effect, as well as the ripple effects described (the indirect and induced expenditure effects).

Part of the total expenditure effect is actually the increase in total wages and salaries (usually referred to as earnings), which the model can separate from the expenditure estimates. Direct payroll estimates are fed into the "household" industry of the input-output model. Impacts of this industry are estimated using the personal consumption expenditure breakdown of the national input-output table and are adjusted to account for regional consumption spending and leakages from personal taxes and savings. The direct, indirect,



Contents:

Economic and Fiscal Impact Model Methodology

Recent Studies on the Property Value Impact of Trails, Parks, and Other Green Space

Additional Detail on Estimated Tourism Impacts

Additional Detail on Estimates of New Recreational Activity

Partial Bibliography of Sources Connecting Access to Recreational Amenities to Health Benefits

Additional Detail on Health Care Cost Reduction Impacts

Additional Detail on the Value of Ecological Services Partial

Bibliography of Sources Discussing the Value of Ecological Services

and induced earnings represent a component of the total economic impact attributable to wages and salaries. Finally, the model calculates the total expenditures affecting the various industries and translates this into an estimate of the total labor (or jobs) required to produce this output.¹

In short, the input-output model estimates the total economic activity in a region that can be attributed to the direct demand for the goods or services of various industries. This type of approach is used to estimate the total economic activity attributable to the expenditures associated with various types of spending in the region.

Glossary of Terms for Input-Output Models²

Multiplier Effect: The notion that initial outlays have a ripple effect on a local economy, to the extent that direct expenditures lead to indirect and induced expenditures.

Economic Impacts: Total expenditures, employment, and earnings generated.

Direct Expenditures: Initial outlays usually associated with the project or activity being modeled; examples: one-time upfront construction and related expenditures associated with a new or renovated facility, and annual expenditures associated with ongoing facility maintenance and operating activity.

Direct Employment: The full time equivalent jobs associated with the direct expenditures.

Direct Earnings: The salaries and wages earned by employees and contractors as part of the direct expenditures.

Indirect Expenditures: Indirect and induced outlays resulting from the direct expenditures; examples:

vendors increasing production to meet new demand associated with the direct expenditures, and workers spending direct earnings on various purchases within the local economy.

Indirect Employment: The full time equivalent jobs associated with the indirect expenditures.

Indirect Earnings: The salaries and wages earned by employees and contractors as part of the indirect expenditures.

Total Expenditures: The sum total of direct expenditures and indirect expenditures.

Total Employment: The sum total of direct employment and indirect employment.

Total Earnings: The sum total of direct earnings and indirect earnings.

Recent Studies on the Property Value Impact of Trails, Parks, and Other Green Space

AMENITY BEING ANALYZED	ESTIMATED EFFECT	SOURCE
Public greenbelt in Boulder CO	3.75 percent increase in mean house prices resulting from preservation of open space.	"A Dynamic Approach to Estimating Hedonic Prices for Environmental Goods: An Application to Open Space Purchase," Riddel (2001).
Protected open space larger than 5 acres in Philadelphia	Homes within a quarter mile of sites have a 7 percent premium in value, declining to 0 percent within 1 mile	"Quantifying the Economic Value of Protected Open Space in Southeastern Pennsylvania," Econsult Corporation (August 2010).
Various trailways across the US	Apex, NC: The Shepard's Vineyard housing development added \$5,000 to the price of 40 homes adjacent to the regional greenway, and those homes were still the first to sell.; Salem, OR: land adjacent to a greenbelt was found to be worth about \$1,200 an acre more than land only 1000 feet away.; Seattle, WA: Homes bordering the 12-mile Burke-Gilman trail sold for 6 percent more than other houses of comparable size.; Brown County, WI: Lots adjacent to the Mountain Bay Trail sold faster for an average of 9 percent more than similar property not located next to the trail.; Dayton, OH: Five percent of the selling price of homes near the Cox Arboretum and park was attributable to the proximity of that open space.	"The Economic Benefits of Parks and Open Space," The Trust for Public Land (2005) and "Economic Benefits of Trails and Greenways," The Rails-to-Trails Conservancy (2005).
Catawba Regional Trail in NC	Being located within a quarter mile of the trail conferred a 4 percent increase.	"The Economic Impact of the Catawba Regional Trail," Campbell and Monroe (2004).
Pennypack Park in Philadelphia	In the vicinity of Philadelphia's 1,300-acre Pennypack Park, property values correlate significantly with proximity to the park. In 1974, the park accounted for 33 percent of the value of land 40 feet away from the park, nine percent when located 1,000 feet away, and 4.2 percent at a distance of 2,500 feet.	"The Effect of a Large Urban Park on Real Estate Value," American Institute of Planning Journal (July 1974).
Carolina Thread Trail in NC	An aggregate property value impact of \$1.7 billion for the 305,000 houses located within a quarter-mile of the trail; being located within a quarter-mile of the trail conferred a 4 percent increase.	"The Potential Economic Impacts of the Proposed Carolina Thread Trail," Econsult Corporation (2007).
Abandoned or vacant industrial sites that were converted to green space in Philadelphia	Prior to conversion, homes within 1/4 mile of an abandoned or vacant site were valued at 19.7 percent less than comparable homes that were not within a quarter mile of an abandoned or vacant site. As a result of the announcement of conversion but prior to conversion, house prices near future converted sites had an appreciation rate that was 0.70 percent per year higher than the citywide average. Immediately following conversion to green space, homes within a 1/4 mile increased in value by 7.2 percent on average, relative to comparable homes that were not proximate to such sites. In the years following conversion, homes within a 1/4 mile of the site experienced an additional annual appreciation rate of 5.2 percent per year, relative to comparable homes that are not near such sites.	"Valuing the Conversion of Urban Green Space," Econsult Corporation (June 2010). (For Pennsylvania Horticultural Society.)

Source: Various, Econsult Corporation (2011)

Additional Detail on Estimated Tourism Impacts of Implementation of the Ecusta Rail Trail

Table B.1 – Estimated Employment Supported by Tourism to Henderson and Transylvania Counties

	DOMESTIC TOURISM EXPENDITURES	NUMBER OF VISITORS	JOBS SUPPORTED
North Carolina	\$17 Billion	36.8 Million	185,500
Henderson	\$203 Million		
Transylvania	\$72 Million		
Henderson + Transylvania	\$275 Million		

Source: North Carolina Division of Tourism (2011)

Table B.2 – Estimated Outside Users per Mile per Year for Illustrative Trails throughout the US

NAME	STATE	LENGTH (MI)	ESTIMATED OUTSIDE USERS PER YEAR	ESTIMATED OUTSIDE USERS/ MILE/ YEAR	SOURCE
Virginia Creeper	Virginia	33.4	50,339	1,507	The University of Georgia
New River Trail	Virginia	39	66,331	1,701	The University of Georgia
Little Miami Scenic Trail	Ohio	72	150,000	2,083	OH/KY/IN Regional COG
Catawba	North Carolina	150	62,000	143 ³	Campbell & Munroe
The Great Allegheny Passage	Maryland-Pennsylvania	141	500,000	3,546	Treadly.net

Source: various, Econsult Corporation (2011)

Table B.3 – Estimated Increase in Spending Resulting from Implementation of Ecusta Rail Trail

USERS PER MILE PER YEAR	ESTIMATED # OF USERS	ESTIMATED AVERAGE SPENDING PER VISIT	INCREASE IN TOURISM SPENDING
1,000	20,300	\$58.25	\$1.2 Million

Source: North Carolina Division of Tourism (2011), Econsult Corporation (2011), Campbell and Munroe (2004)

Table B.4 – Estimated Economic Impact from Increase in Tourism Spending Resulting from Implementation of Ecusta Rail Trail

Direct Expenditures	\$1.2 Million
Indirect Expenditures	\$0.3 Million
Induced Expenditures	\$0.4 Million
Total Expenditures	\$1.9 Million
Total Jobs	27

Source: North Carolina Division of Tourism (2011), Econsult Corporation (2011)

Additional Detail on Estimates of the Amount and Value of New Recreational Activity Resulting from Implementation of the Ecusta Rail Trail

Table B.5 Current Base of Recreational Users and Uses in Henderson and Transylvania Counties, by Activity Type

ACTIVITY	% OF POPULATION THAT PARTICIPATES	HENDERSON – WITHIN ¼-MILE	HENDERSON – NOT WITHIN ¼-MILE	TRANSYLVANIA – WITHIN ¼-MILE	TRANSYLVANIA – NOT WITHIN ¼-MILE	TOTAL RECREATIONAL USES
Population		5,651	101,089	977	32,113	139,830
Walk for Pleasure	84%	4,753	85,015	822	27,007	117,597
View/Photograph Natural Scenery	67%	3,758	67,224	650	21,355	92,987
Day Hiking	47%	2,645	47,309	457	15,029	65,440
Bicycling	31%	1,752	31,337	303	9,955	43,347
Backpacking	13%	757	13,546	131	4,303	18,737
Mountain Biking	13%	718	12,838	124	4,078	17,758
Horseback Riding	11%	650	11,626	112	3,693	16,082
Total Users (Select Activities)		15,073	269,604	2,606	85,646	372,928

ACTIVITY	AVERAGE # USES PER YEAR PER USER	HENDERSON – WITHIN ¼-MILE	HENDERSON – NOT WITHIN ¼-MILE	TRANSYLVANIA – WITHIN ¼-MILE	TRANSYLVANIA – NOT WITHIN ¼-MILE	TOTAL RECREATIONAL USES
Walk for Pleasure	100	475,289	8,501,545	82,165	2,700,704	11,759,703
View/Photograph Natural Scenery	50	187,912	3,361,193	32,485	1,067,758	4,649,348
Day Hiking	25	66,122	1,182,736	11,431	375,722	1,636,011
Bicycling	25	43,799	783,436	7,572	248,876	1,083,683
Backpacking	25	18,932	338,647	3,273	107,579	468,431
Mountain Biking	25	17,943	320,956	3,102	101,959	443,960
Horseback Riding	25	16,249	290,649	2,809	92,331	402,039
Total Uses (Select Activities)		827,236	14,796,853	143,007	4,700,548	20,467,644

Source: North Carolina Division of Parks and Recreation (2009), Econsult Corporation (2011)

Table B.6 – Estimated Amount and Value of Increase Resulting from Implementation of the Ecusta Rail Trail

ACTIVITY	HENDERSON – WITHIN 1/4-MILE	HENDERSON – NOT WITHIN 1/4-MILE	TRANSYLVANIA – WITHIN 1/4-MILE	TRANSYLVANIA – NOT WITHIN 1/4-MILE	TOTAL RECREATIONAL USES
Estimated Increase in Uses	25%	5%	25%	5%	
Walk for Pleasure	118,822	425,077	20,541	135,035	699,476
View/Photograph Natural Scenery	46,978	168,060	8,121	53,388	276,547
Day Hiking	16,531	59,137	2,858	18,786	97,311
Bicycling	10,950	39,172	1,893	12,444	64,458
Backpacking	4,733	16,932	818	5,379	27,863
Mountain Biking	4,486	16,048	775	5,098	26,407
Horseback Riding	4,062	14,532	702	4,617	23,914
Total Increase in Uses	206,809	739,843	35,752	235,027	1,217,431

TOTAL INCREASE IN UNIT DAY VALUES	UNIT DAY VALUE	HENDERSON – WITHIN 1/4-MILE	HENDERSON – NOT WITHIN 1/4-MILE	TRANSYLVANIA – WITHIN 1/4-MILE	TRANSYLVANIA – NOT WITHIN 1/4-MILE	TOTAL RECREATIONAL USES
Walk for Pleasure	\$1.47	\$174,669	\$624,864	\$30,196	\$198,502	\$1,028,230
View/Photograph Natural Scenery	\$1.32	\$62,011	\$221,839	\$10,720	\$70,472	\$365,042
Day Hiking	\$3.16	\$52,237	\$186,872	\$9,030	\$59,364	\$307,503
Bicycling	\$3.16	\$34,601	\$123,783	\$5,982	\$39,322	\$203,688
Backpacking	\$1.47	\$6,958	\$24,891	\$1,203	\$7,907	\$40,958
Mountain Biking	\$3.16	\$14,175	\$50,711	\$2,451	\$16,109	\$83,446
Horseback Riding	\$6.99	\$28,395	\$101,582	\$4,909	\$32,270	\$167,156
Total Value of Increase in Uses		\$365,828	\$1,308,720	\$63,242	\$415,744	\$2,153,534

Source: North Carolina Division of Parks and Recreation (2009), Econsult Corporation (2011)

Partial Bibliography of Sources Connecting Access to Recreational Amenities to Increased Exercise, Improved Health Outcomes, and Reduced Health Care Costs

“Active Commuting and Cardiovascular Disease Risk,” *Archives of Internal Medicine* (2009).

“Cost Effectiveness of Community-Based Physical Activity Interventions,” *American Journal of Preventative Medicine* (2008).

“Does the Outdoor Environment Matter for Psychological Restoration Gained through Running?” *Psychology of Sports and Exercise* (2003); “Restorative Effects of Natural Environment Experiences,” *Environment & Behavior* (1991).

“Higher Direct Medical Costs Associated with Physical Inactivity,” *The Physician and Sportsmedicine* (2000).

“Leisure-time Physical Activity Levels and Changes in Relation to Risk of Hip Fracture in Men and Women,” *American Journal of Epidemiology* (2001).

“NCHS Data on Obesity,” *National Center for Health Statistics* (2009).

“Occupational, Leisure Time, and Commuting Physical Activity in Relation to Cardiovascular Mortality among Finnish Subjects with Hypertension,” *American Journal of Hypertension* (2007).

“Outdoor Recreation, Health, and Wellness: Understanding and Enhancing the Relationship,”

Resources for the Future (2009).

“Physical Inactivity Cost Calculator: How the Physical Inactivity Cost Calculator was Developed,” *College of Health and Human Performance* (2005).

“Reduced Risk of Myocardial Infarction Related to Active Commuting: Inflammatory and Haemostatic Effects Are Potential Major Mediating Mechanisms,” *European Journal of Cardiovascular Prevention and Rehabilitation* (2010).

“The Relative Influence of, and Interaction between, Environmental and Individual Determinants of Recreational Physical Activity in Sedentary Workers and Home Makers,” *University of Western Australia* (1998).

“The Significance of Parks to Physical Activity and Public Health,” *American Journal of Preventive Medicine* (2005).

“Transport and health: en route to a healthier Australia,” *Medical Journal of Australia* (2000).

Additional Detail on Health Care Cost Reduction Impacts

Table B.8 – Estimated Health Care Cost Reduction Impact Resulting from Implementation of the Ecusta Rail Trail

	COST ESTIMATE PER EXERCISER			AGGREGATE COST REDUCTION (IN \$M)		
	LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
Direct Health Care Cost Reductions	\$308	\$475	\$642	\$0.5	\$0.8	\$1.1
Indirect Health Care Cost Reductions	\$924	\$1,425	\$1,926	\$1.5	\$2.4	\$3.2
Direct Worker's Compensation Cost Reductions	\$6	\$10	\$12	\$0.0	\$0.0	\$0.0
Indirect Worker's Compensation Cost Reductions	\$24	\$40	\$48	\$0.0	\$0.1	\$0.1
Lost Productivity Cost Reductions	\$1,630	\$1,918	\$2,112	\$2.7	\$3.2	\$3.5
Total Health Care Cost Reduction Impact				\$4.8	\$6.4	\$7.9

Additional Detail on the Value of Ecological Services Rendered by the Ecusta Rail Trail

Table B.9 – Estimated Value of Ecological Services Rendered by the Ecusta Rail Trail, Based on Different Levels of Assumed Impacts

ECOSYSTEM SERVICE	MIN	MEAN	MEDIAN	MAX
Water Regulation	\$21	\$21	\$21	\$21
Waste Treatment	\$454	\$454	\$454	\$454
Biological Control	\$124	\$124	\$124	\$124
Soil Formation	\$10	\$31	\$31	\$62
Pollination	\$134	\$134	\$134	\$134
Total	\$744	\$805	\$816	\$909

Source: Nowak et al (2006), Econsult Corporation (2011)

Table B.10 – Additional Detail on Value of Pollution Removal by Tree Cover

POLLUTANT	TONS PER YEAR	TOTAL VALUE
CO	0.00	\$3.5
NO2	0.01	\$106.2
O3	0.06	\$507.0
SO2	0.01	\$27.6
PM10	0.03	\$179.0
Total		\$823.4

Source: Nowak et al (2006), Econsult Corporation (2011)

Table B.11 – Additional Detail on Value of Carbon Storage and Sequestration by Tree Cover

	TONS	TOTAL VALUE
Carbon Sequestration	4 tons per year	\$81.7
Carbon Storage	120 total tons	\$2,476.8

Source: Nowak et al (2006), Econsult Corporation (2011)

Partial Bibliography of Sources Discussing the Value of Ecological Services Rendered by Trails, Parks, and Other Green Space

“Air Pollution Removal by Urban Trees and Shrubs in the United States,” *Urban Forestry and Greening* (2006).

“Assessing Urban Forest Effects and Values,” US Forest Service (2007).

“Heart Health among Adults (18+) in Southeastern Pennsylvania,” Public Health Management Corporation (February 1, 2010). See also: “Childhood Asthma in the United States: Urban Issues,” *Pediatric Pulmonology* (December 2001); “Patterns of Asthma Mortality in Philadelphia from 1969 to 1991,” *New England Journal of Medicine* (December 8, 1994); “2006 Asthma Rankings,” Asthma and Allergy Foundation of America.

“New York State Energy Plan, Vol. II: Issue Reports,” New York State Energy Office (1994).

“The Value of New Jersey’s Ecosystem Services and Natural Capital.” New Jersey Department of Environmental Protection, Division of Science, Research, and Technology. Report Number: SR04-075 (2006).

Notes

1. In the input-output model, the estimate of increased employment will always be in terms of the employment required for a given level of production, usually referred to as person-years of employment. As such, these estimates cannot be interpreted as specifying permanent jobs.
2. Source: Econsult Corporation (2009)
3. Projected to increase into the thousands within several years.