

# THE IMPACT OF GREENWAYS *in the* TRIANGLE

*How the East Coast Greenway Benefits the Health and Economy of North Carolina's Triangle Region*

PREPARED BY:



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East Coast  
Greenway  
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**04** COVER LETTER

**05** EAST COAST MAP

**06** TRIANGLE MAP

**08** INTRODUCTION

**12** METHODS

**14** HEALTH + ENVIRONMENTAL BENEFITS

**18** ECONOMIC BENEFITS

**22** TRANSPORTATION + ACCESS BENEFITS

**26** SOURCES

BENEFITS



*Cover: The Reedy Creek Trail section of the East Coast Greenway (ECG) in Raleigh (by NCDOT/WalkBikeNC).  
This page: The White Oak Greenway section of the ECG, at Bond Park in Cary.*



# SMART INVESTMENTS IN A HEALTHY, SUSTAINABLE FUTURE

As a native of the Triangle who brought our headquarters here in 2011, it is with great pride that I share this impact report. The Triangle deserves the limelight as a national leader in the East Coast Greenway effort. And we want everyone to know that community leaders' smart investments in public infrastructure are making a tremendous positive impact improving local quality of life, public health, and the economy throughout central North Carolina.

As I bike and walk on the Greenway to work and after hours with my family, I see the miles of smiles that are the fruit of our labor. I see people of all ages and colors, on bikes and scooters, pushing strollers and pulling trailers, enjoying this linear park

made possible thanks to passionate volunteers, visionary elected leaders, generous supporters, and expert professionals in the public and private sectors.

The data throughout this report put together by Alta Planning + Design show that further investment in safe biking and walking infrastructure is warranted. Returns have been strong, yet we have a long way to go to become the healthy and sustainable region that is our exciting potential.

Many companies in the Triangle are supportive of greenway development. To make this report possible, Glaxo Smith Klein rose to the occasion. GSK has supported our Greenway development efforts in the past and

generously gave us the resources to look more deeply at our impact as we gear up for much more.

Thank you to everyone who has made connecting to the outdoors accessible to hundreds of thousands of people. Together we can make the Triangle a global model — helping to spur inspired investments throughout North Carolina, the Southeast, and beyond in the years ahead.

To a healthy & sustainable future,

*Dennis Markatos-Soriano  
Executive Director, East Coast  
Greenway Alliance*



The **EAST COAST GREENWAY** in the **TRIANGLE**

# East Coast Greenway

Connecting people to place  
from Maine to Florida

- SPINE ROUTE
- COMPLEMENTARY ROUTE
- FERRY OR TRANSIT

[greenway.org](http://greenway.org)

ORANGE COUNTY

TO OXFORD NC AND VIRGINIA

ELLERBE CREEK TRAIL

FALLS LAKE

DUKE UNIVERSITY

DURHAM

DOWNTOWN TRAIL

NCCU

DURHAM COUNTY

CHAPEL HILL

RESEARCH TRIANGLE PARK

AMERICAN TOBACCO TRAIL



RDU

UMSTEAD STATE PARK TRAIL

MORRISVILLE

LAKE CRABTREE PARK

UMSTEAD STATE PARK

REEDY CREEK T

BLACK CREEK GREENWAY

CARY

WHITE OAK GREENWAY

BLUE SECTIONS = IN DEVELOPMENT

APEX

WAKE COUNTY

CHATHAM COUNTY

HOLLY SPRINGS

## The EAST COAST GREENWAY in the TRIANGLE

connects communities in four counties, serving as a nearly 70-mile trail “spine” that links to many other trail systems throughout the region.<sup>1</sup> It provides residents and visitors a **fun and healthy way to explore** parks, downtowns, college campuses, museums, shopping, restaurants, breweries, and historic sites. It also serves as an **active transportation corridor**, getting people to work and to transit connections from their own neighborhoods. With the trail nearly completely connected, residents of the Triangle are already experiencing improvements in their quality of life, including many health-, environmental-, economic-, and transportation-related benefits.

THE TRIANGLE REGION GAINS THE FOLLOWING FROM THE EAST COAST GREENWAY:



**11,225,000**

ESTIMATED MILES  
BIKED PER YEAR



**7,407,000**

ESTIMATED MILES  
WALKED PER YEAR



**3,592,000**

HOURS OF PHYSICAL  
ACTIVITY PER YEAR



**800**

TEMPORARY AND  
PERMANENT JOBS



**\$1.5M**

IN HEALTH AND  
ENVIRONMENTAL  
BENEFITS PER YEAR



**\$87M**

IN ECONOMIC  
BENEFITS PER  
YEAR



**\$1.8M**

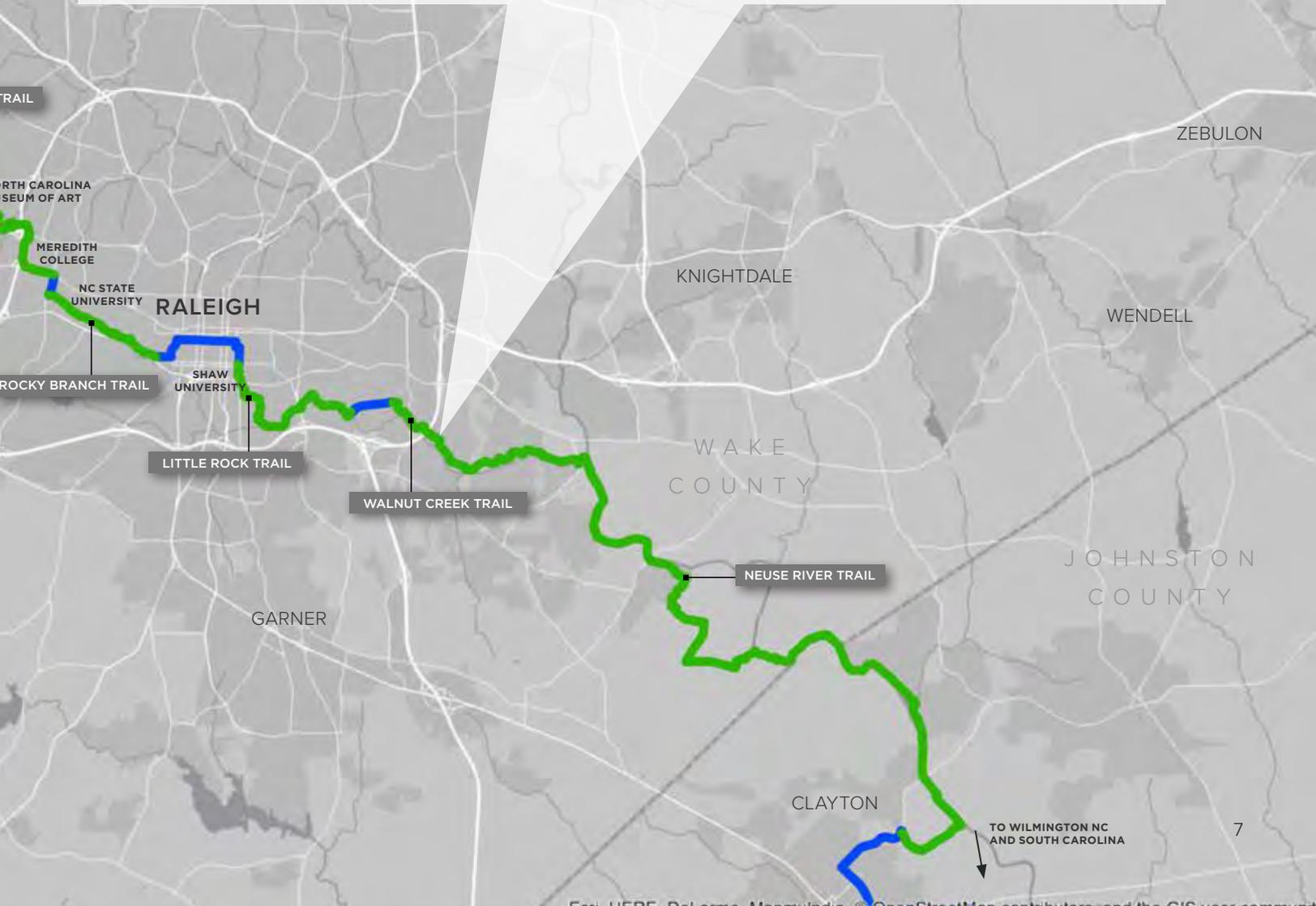
IN TRANSPORTATION  
AND ACCESS  
BENEFITS PER YEAR



**\$164M**

IN ONE-TIME  
PROPERTY  
BENEFITS

OVER  
**\$90 MILLION** IN TOTAL  
BENEFITS  
PER YEAR



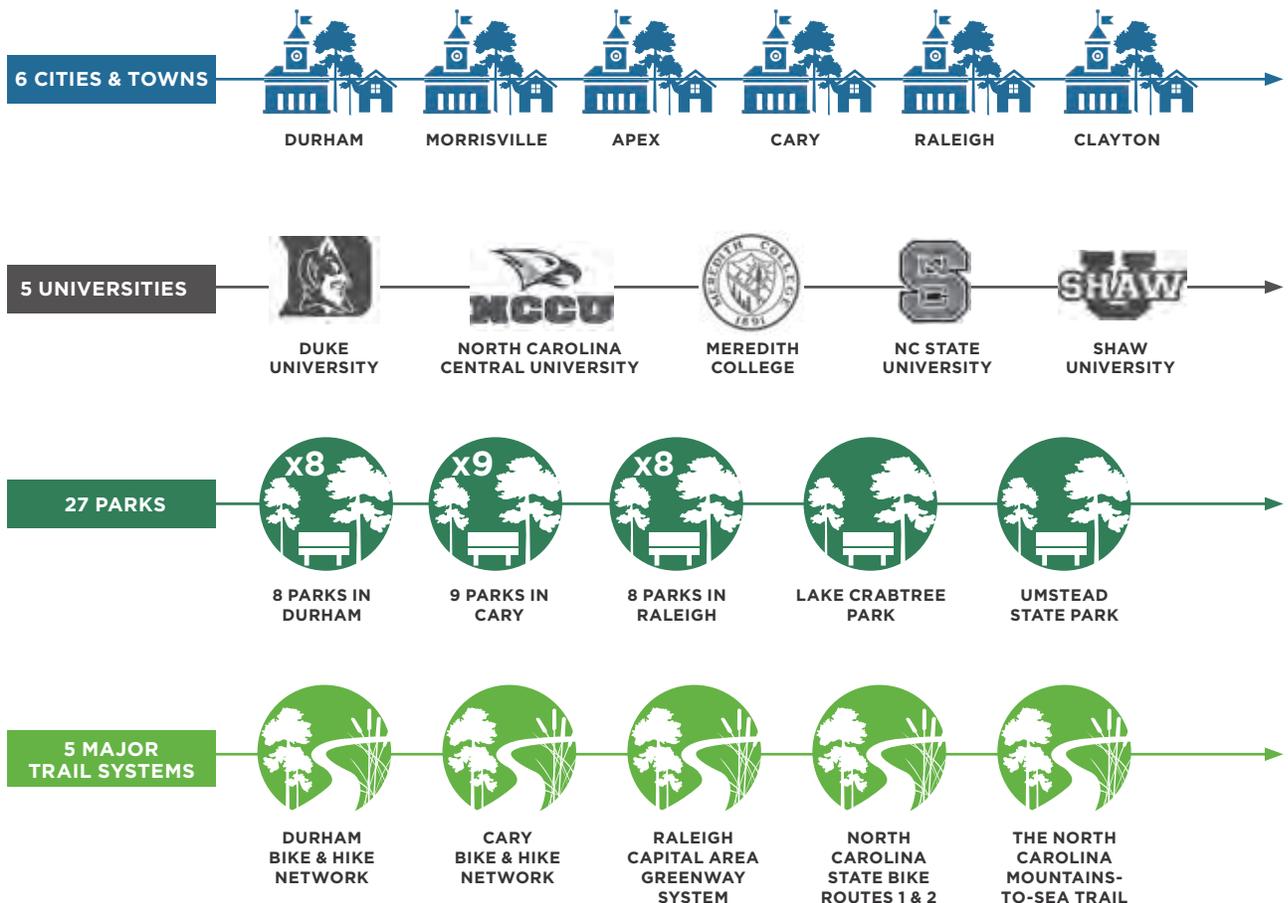
## INTRODUCTION

This report contains an analysis of the estimated quantified benefits resulting from implementation of the East Coast Greenway (ECG) in the Research Triangle region of North Carolina. The analysis estimates the number of bicycle and pedestrian trips that take place near the trail

alignment, approximates the corresponding reduction in vehicle trips and vehicle miles travelled (VMT), and assesses the potential health-, environmental-, economic-, and transportation-related benefits. In total, it is estimated that this section of the ECG generates \$90,323,000 in annual health, environmental, economic, and transportation benefits.

For the purpose of this report, the ECG in the Triangle starts at the Ellerbee Creek Trail north of Downtown Durham and ends nearly 70 miles later along the Neuse River Trail in the Town of Clayton.

### What Does It Connect?





*The Black Creek Greenway section of the ECG, at Bond Park in Cary.*

## Background & Context: How the Triangle Region Compares

The Research Triangle of North Carolina (Raleigh- Durham- Chapel Hill) has been one of the fastest-growing metropolitan areas in the country. Its population increased seven-fold between 1970 (317,563) and 2014 (2,132,523).<sup>2</sup> The area has experienced a corresponding economic boom, thanks largely to the three renowned universities at each corner of the Triangle: NC State University in Raleigh, Duke University in Durham, and the University of North Carolina at Chapel Hill. The many research institutions and high-tech firms in the area have attracted highly-educated professionals from all over the world, so that the Triangle currently has the highest ratio of doctorates per capita in the United States.

Accompanying this stunning population and economic growth, there has been increasing public support for shared-use greenways. In numerous surveys conducted in the Triangle, investment in greenway expansion and improvement has consistently topped the ranking of citizen preferences for government expenditures.<sup>3</sup> The widespread support for greenway trails has also been reflected in voter approval of virtually all bond referenda to fund more greenway trails. City governments and the two metropolitan planning organizations in the area (CAMPO and DCHC MPO) have also dedicated increasing amounts of their capital budgets for greenway trails. The NC Department of Transportation has contributed to funding, often derived from federal funds for pedestrian/ bicycling projects.

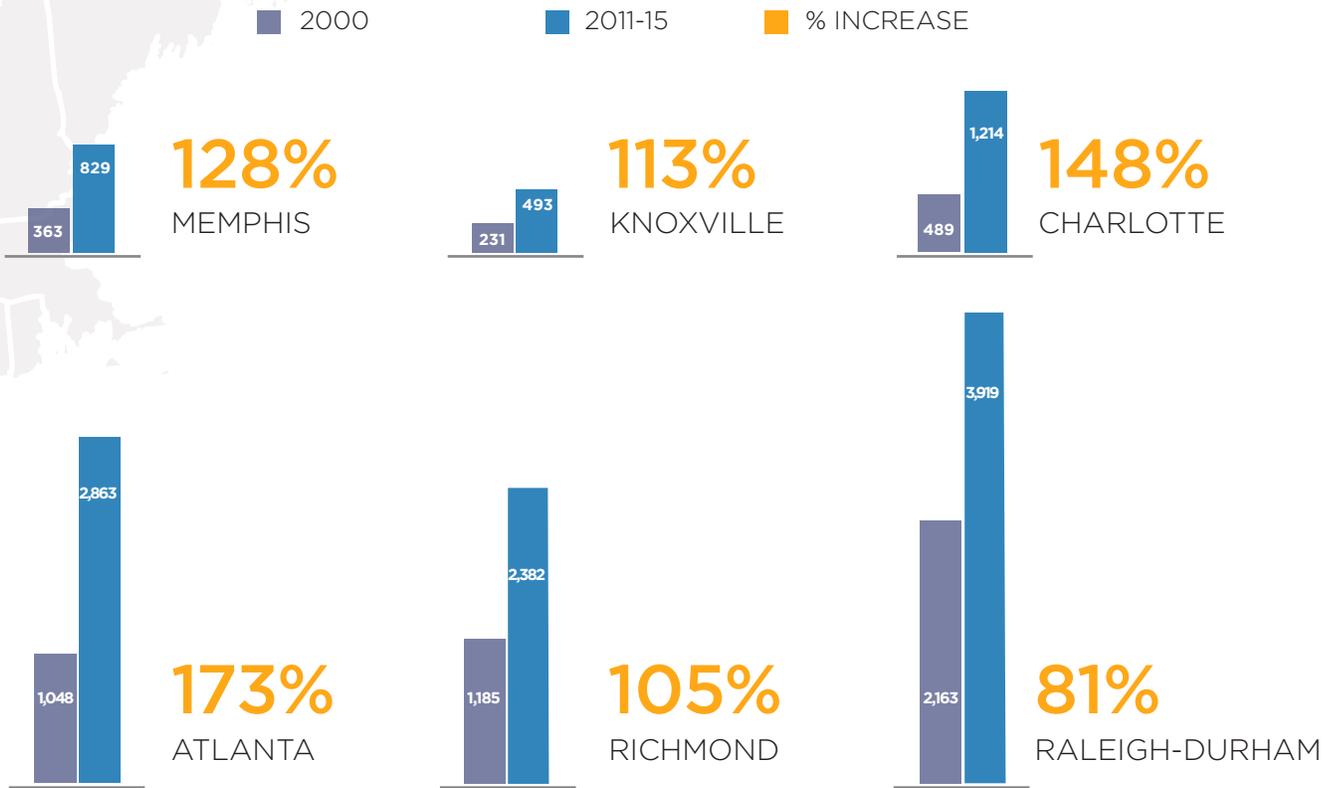


*Text and information on this page and the opposite page is adapted from, "Booming Greenway Trails in North Carolina's Research Triangle", by John Pucher, Professor Emeritus, Rutgers University.*



## NUMBER OF BICYCLE COMMUTERS IN THE SOUTHEAST U.S.

Sources: 2000 US Census and American Community Survey, 2017 US Census Bureau; collected by John Pucher.



The result of increased funding and staffing for greenway planning and construction is one of the largest greenway networks in the country. The cities of Raleigh, Cary, and Durham have the most greenways, but virtually every community in the Triangle has one or more greenways, and all of them have ambitious plans for future growth.

The increase in recreational cycling on greenways has helped generate more on-road cycling as well, and growing public support for more on-road cycling facilities. In 2000, there were less than 10 miles of on-road bike lanes in the Triangle, but by 2017, total center-line mileage of bike lanes had grown to more than 100 miles, mostly in Durham, Chapel Hill-Carrboro, Cary, and Raleigh.<sup>4</sup>

Given the polycentric, decentralized nature of the Research Triangle, it is crucial to provide regional connections between the greenway networks of individual cities. The most important of these connecting routes is the East Coast Greenway (ECG), which connects the Triangle Region to the rest of the East Coast via the 3,000-mile ECG route that runs from Maine to Florida. Of all metropolitan areas the ECG route runs through, the Triangle has the most complete stretch (95%) of off-road, shared-use trails.

Triangle greenways are typically paved trail corridors of protected greenspace, running along rivers, creeks, and lakes. They were developed as part of flood management plans, but equally

important, they preserve green space adjacent to waterways and tributaries, protect aquatic and edge habitats, and prevent development of ecologically sensitive lands. The greenways provide a series of linear parks throughout each city, providing recreational opportunities for residents and visitors. Many greenways include playing fields, picnic areas, boating facilities, fishing spots, bird watching, nature trails, outdoor sculpture, and community centers.

With widespread public support, it seems certain that the Research Triangle will continue to have one of the most extensive and best-integrated greenway systems in the country, supplemented by a growing network of on-road cycling facilities.

## METHODS

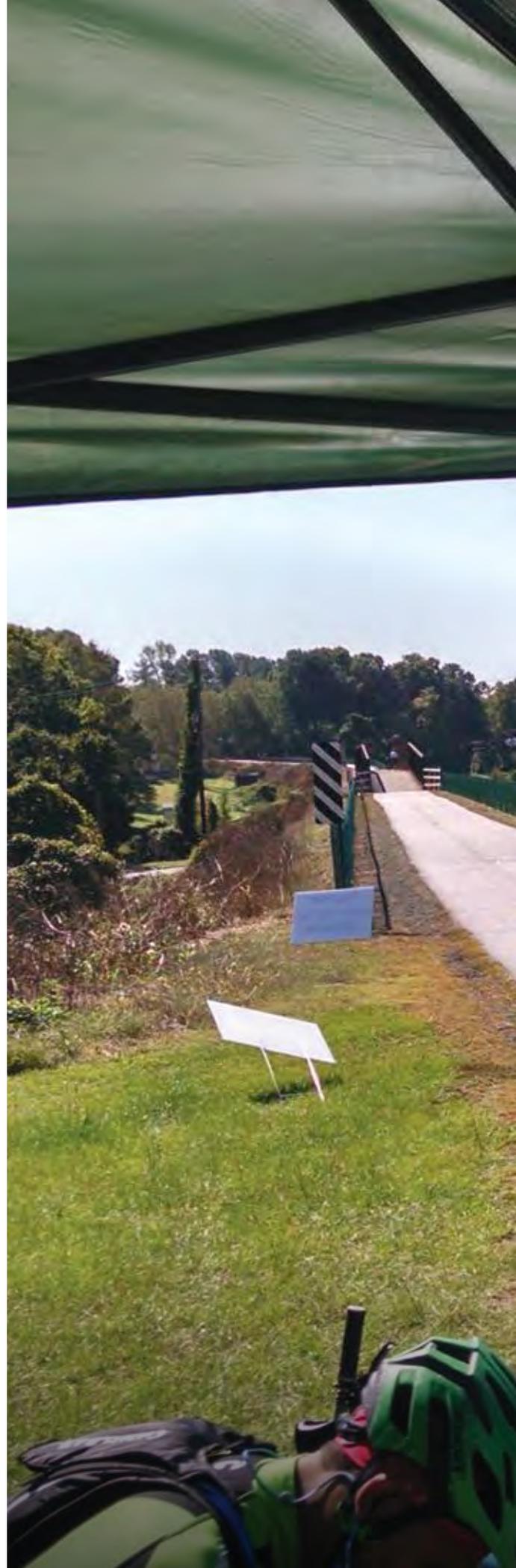
This impact analysis utilizes a standard methodology for calculating health-, environmental-, economic-, and transportation-related benefits. All projections are based on trail usage estimates from *Evaluating the Economic Impact of Shared Use Paths in North Carolina (2016)*, by the Institute for Transportation Research and Education (ITRE).<sup>5</sup> ITRE's estimates are then extrapolated through the use of various multipliers derived from national studies and quantified in terms of monetary value where appropriate.

### How the Impacts Are Calculated

A series of over 50 factors developed from various studies around the U.S. and peer-reviewed journal articles were used to convert the estimated number of bicycle and walking trips into dollar figures.

### Limitations of the Analysis

The primary purpose of the analysis is to enable a more informed policy discussion on whether and how best to invest in an expanded East Coast Greenway in the state of North Carolina. Even with extensive primary and secondary research incorporated into the impact analysis model, it is impossible to accurately predict the exact impacts of various factors. Accordingly, all estimated benefit values are rounded and should be considered order of magnitude estimates, rather than exact amounts.



*“Greenways highlight the best we have to offer as a vibrant, growing community. Supporting economic development, promoting active lifestyles, providing transportation options, allowing a connection with nature and giving us the opportunity to connect with our neighbors. We love our greenways as a representation of the active, loving, caring community we are.”*

**- Sig Hutchinson, Chair, Wake County Board of Commissioners**



*A trail count station along the American Tobacco Trail section of the ECG, as part of a statewide and multi-year study by ITRE.*



# HEALTH + ENVIRONMENTAL BENEFITS

The implementation of a well-designed, connected trail system in the Research Triangle region encourages a shift from energy-intensive modes of transportation such as cars and trucks to active modes of transportation such as bicycling and walking. While many of the active living-related benefits of a trail network are difficult to quantify – such as improved mental health, educational growth, connection to nature, and sense of place<sup>6,7</sup> – a growing body of literature links parks and trails to increased physical activity, decreased healthcare costs, and improved air quality.<sup>8,9,10</sup>

The ECG dramatically shapes the ability of residents in the Triangle to get out and live more active, healthy lifestyles. It helps to generate an estimated 11.2 million

miles of bicycling per year and an estimated 7.4 million miles of walking and jogging per year, spurring over 3.5 million new hours of physical activity per year and removing over 1.1 million pounds of pollutants from the atmosphere per year.

This boost to wellness is estimated to save over \$1.4 million in healthcare-related costs per year. In addition, studies show that increased physical activity helps seniors stay mentally fit,<sup>11</sup> reduces the risk of coronary heart disease, and even decreases the amount of insulin needed by people with Type I diabetes.<sup>12</sup> When combined with a healthy diet, increased physical activity has been shown to reverse the course of Type II diabetes.<sup>13</sup>

The benefits of the greenway to environmental health and protection have not been quantified as part of this report but can be the subject of future study. Examples of such environmental benefits include reductions in vehicle emissions, water regulation, carbon sequestration, carbon storage, waste treatment, wildlife protection, and protecting people and property from flood damage.<sup>14,15</sup> Anecdotally, we also know that by connecting people to nature, the East Coast Greenway inspires appreciation and better stewardship of the environment while also improving our mental, physical, and spiritual health.

*“Greenways throughout Wake County are truly for everyone. I use the greenways almost every single day, and I see every conceivable age group, as many women as men, lots of different uses, every conceivable ethnicity and racial group, every income group. It is probably THE most important recreational/exercise/sports resource in Wake County.”*

**- John Pucher, national leader on research for walking, bicycling, and urban transport, and resident of Raleigh.**

*The American Tobacco Trail's portion of the East Coast Greenway serves as a healthy way to enjoy the outdoors*

# The East Coast the Triangle

WHY IT MATTERS



**26%**

OF ADULTS IN NORTH CAROLINA  
HAVE NOT EXERCISED IN THE  
LAST MONTH<sup>16</sup>



NORTH CAROLINA RANKS

**32/50** STATES

FOR CORE DETERMINANTS  
OF HEALTH<sup>17</sup>



*The White Oak  
Greenway section  
of the East Coast  
Greenway, at Bond  
Park in Cary.*



# ast Greenway in results in:

**11,225,000**  
MILES BIKED PER YEAR



THAT'S THE EQUIVALENT OF 23 ROUND TRIPS TO THE MOON

**7,407,000**  
MILES WALKED PER YEAR



THAT'S THE EQUIVALENT OF 14,726 TRIPS ACROSS NORTH CAROLINA

**\$1,457,000**  
ANNUAL HEALTHCARE COST SAVINGS



THAT'S THE EQUIVALENT OF 29 THOUSAND HOURS WITH A PERSONAL TRAINER (AT ~ \$50/HOUR)

**3,592,000**  
ANNUAL HOURS OF PHYSICAL ACTIVITY



**1,141,000** FEWER POUNDS OF CO2 EMISSIONS PER YEAR





## ECONOMIC BENEFITS

Economic benefits associated with the Research Triangle sections of the East Coast Greenway fall into four categories: direct trail user spending, induced spending, one-time property value increases, and short-term job creation from construction spending.

An analysis of current trail user spending patterns in the ITRE study can be used as a baseline for estimating trail user spending across the ECG in the Triangle, which comes to approximately \$27,284,000 per year.

The spending from trail users circulates through various industries in the regional economy. This process, known as the “multiplier effect,” can

be estimated using the Bureau of Economic Analyses Regional Input-Output Modeling application (RIMS II). In total, it is estimated that spending from trail users induces an additional \$59,726,000 in annual spending in the region.

The same amenities that draw tourists to the area also appeal to residents looking to buy new homes or open new businesses. Property value studies of similar trail systems show that nearby property owners have a minimum increase of 4 percent in the value of their properties when located near a greenway trail.<sup>18, 19, 20, 21</sup> If the Research Triangle sections of the East Coast Greenway increased property values of adjacent residential units by 4 percent, homeowners would have experienced a \$163,657,928 one-time benefit from the ECG.

Lastly, with 68.2 miles of existing trails in the Research Triangle sections of the ECG, and assuming average capital costs of \$1,100,000 per mile of trail, the total cost of the existing trail network can be estimated at approximately \$74,998,000. The U.S. Department of Transportation estimates that for every \$98,000 in transportation-related construction spending, there is one short-term job created (short-term defined as lasting for one year).<sup>22</sup> Applying this value to the existing trail network would result in the creation of approximately 800 short-term jobs.



*“Building our network of trails is an essential investment that enables the Research Triangle Park to remain globally competitive by allowing us to attract the type of workers that companies want with amenities professional workers demand.”*

**- Liz Rooks, Former Executive Vice President of the Research Triangle Foundation**

*Trails are considered an essential investment to the Research Triangle Foundation.*

# The East Coast the Triangle re

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## HOW IT'S CALCULATED

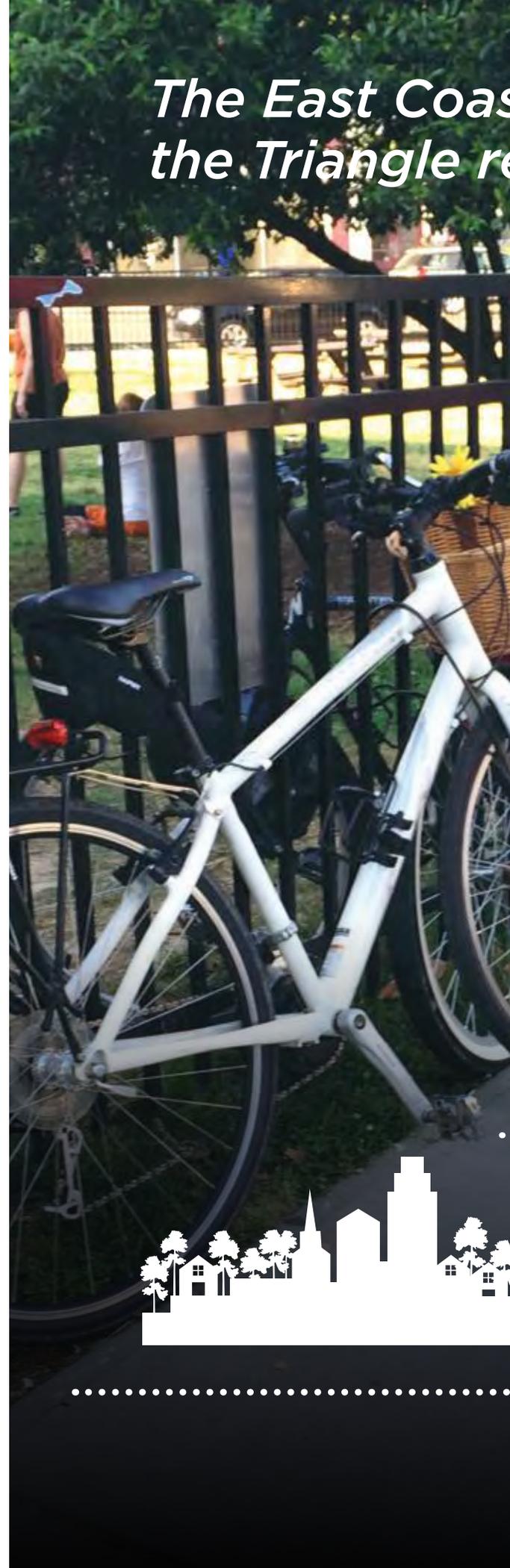
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The estimated one-time property value benefit of \$164M is one of the largest benefits stated in this report, and like all estimates, it has its limitations. Still, it is based on observations made in supporting studies, and it is calculated using comprehensive data that is specific to the region and the ECG trail alignment.

The calculation assumes trails and greenways, on average, are associated with a four percent increase in property value for residential properties within 0.25 miles of the trail network. This assumption is based on studies that have demonstrated a range of increases in property values, from 2% up to 20%. For example, a 2007 study from Asabere and Huffman analyzed 10,000 home sales and found that trails, greenbelts/greenways, and trails with greenbelts/greenways were associated with roughly 2, 4, and 5 percent price premiums, respectively.<sup>18, 19, 20, 21</sup>

For this report, residential buildings and properties within 0.25 miles of the ECG alignment were researched using county GIS parcel data for Durham, Wake, Chatham, and Johnston counties. The grand total value of these properties according to the county data is \$4,091,448,197. If the Research Triangle's sections of the nearly complete ECG increased property values of adjacent residential units by four percent, then homeowners would have experienced a \$163,657,928 one-time benefit from the East Coast Greenway

*Bikes mean business in  
Downtown Durham, where  
the East Coast Greenway runs  
through the heart of of the city.*



st Greenway in  
results in:



**800**

SHORT-TERM JOBS AS  
THE TRAIL WAS BUILT



**\$27,284,000**

IN ESTIMATED TOTAL USER  
SPENDING PER YEAR



**\$59,726,000**

IN ESTIMATED INDUCED  
SPENDING PER YEAR



**\$163,657,928**

IN ESTIMATED ONE-TIME PROPERTY VALUE INCREASE  
ASSOCIATED WITH PROXIMITY TO THE GREENWAY



## TRANSPORTATION + ACCESS BENEFITS

On average, in North Carolina, 193 bicyclists and pedestrians are killed each year being struck by an automobile.<sup>23</sup> These collisions and fatalities disproportionately affect low-income populations. An analysis of 22,000 collisions in America found that pedestrian fatality rates in low-income portions of metro areas are approximately twice that of more affluent neighborhoods.<sup>24</sup>

Fortunately, one study showed that a pedestrian's risk of being in a collision declines 34 percent if walking and bicycling double in their community.<sup>25</sup> Additionally, American cities with higher per capita bicycling rates tend to have much lower traffic fatality rates for all road users than other

cities, and per capita collisions between people driving, walking, and bicycling decline as walking and bicycling increases.<sup>26</sup>

**The ECG makes walking and bicycling in the Triangle easy and fun, which in turn helps reduce the overall number of pedestrian and bicyclist injuries and deaths.**

Utilizing the same calculations for estimated annual bicycle and walk trips and reduction in annual vehicle miles traveled (VMT) used in the health and environmental components, transportation-related cost savings can be calculated. By multiplying the amount of VMT reduced by established multipliers for traffic congestion, vehicle collisions,

road maintenance, and vehicle operating costs, monetary values can be assigned to the transportation-related benefits.

In total, Triangle area residents are estimated to save \$702,000 per year in collision-related costs due to the ECG, with 1.4 million fewer miles driven in a car each year. This is estimated to save residents over \$1,107,000 in congestion, roadway maintenance, and household vehicle operation costs per year.

*“The greenway is one aspect of living in Raleigh that has increased my standard of living significantly. Please keep expanding, because I love to bike, but not on the road!”*

- PUBLIC COMMENT, WAKE COUNTY GREENWAY SYSTEM PLAN, 2016



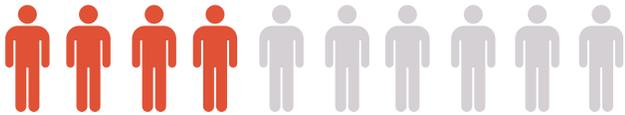
*Raleigh's Rocky Branch Trail section of the East Coast Greenway, near NC State University.*

WHY IT MATTERS



AVERAGE NUMBER OF BICYCLISTS AND PEDESTRIANS **KILLED** EACH YEAR IN NORTH CAROLINA

[169 PEDESTRIANS AND 24 BICYCLISTS]<sup>27</sup>



60%

SHARED USE PATHS (LIKE THE ECG) **REDUCE INJURY RATES** FOR CYCLISTS, PEDESTRIANS, AND OTHER NONMOTORIZED MODES BY 60% COMPARED WITH ON STREET FACILITIES<sup>28</sup>



\$8,220

AVERAGE COST OF OPERATING A CAR PER YEAR<sup>29</sup>



\$308

AVERAGE COST OF OPERATING A BIKE PER YEAR<sup>30</sup>



\$98,000

IN REDUCED CONGESTION-RELATED COSTS PER YEAR



East Coast Greenway heading to Downtown Durham.

# The East Coast Greenway in the Triangle results in:



**1,402,000**

FEWER MILES TRAVELLED BY  
AUTOMOBILES PER YEAR



**\$799,000**

IN REDUCED HOUSEHOLD  
VEHICLE OPERATION  
COSTS PER YEAR



**\$702,000**

IN REDUCED  
COLLISION-RELATED  
COSTS PER YEAR

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*American Tobacco Trail section  
of the East Coast Greenway.*

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SEPTEMBER 2017