



# The Economic Impact of Completing Six Key Links of the Carolina Thread Trail

*A Quantitative Analysis of Trail User Surveys & Business Data*

15TH ANNUAL TRAIL FORUM

December 1, 2022

# Overview



Motivation for the Research



Methodology



Economic Impacts



Physical Health Benefits



Environmental Benefits

# Motivation for the Research

- Tourism and recreation studies
- Extensive impacts of outdoor recreation
- How does the Carolina Thread Trail impact the region's economy?

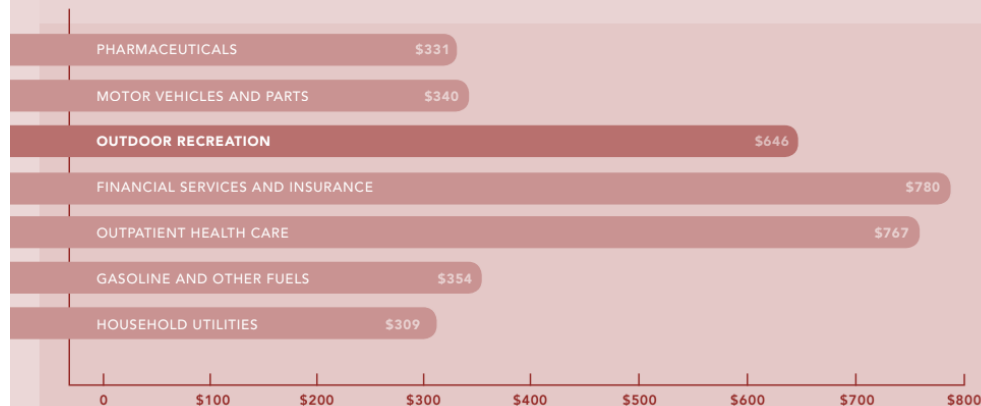
NEWS RELEASE

National Park Visitation Tops 327 Million in 2019

Visitation in 2019 surpassed 2018 by more than 9 million recreation visits, a 2.9 percent increase

## An Overlooked Economic Giant

Annual Consumer Spending, in Billions



Source: Outdoor Industry Association

Outdoor recreation generates:

**\$11.8 billion in North Carolina**

**DRIVER OF JOB CREATION**

Outdoor recreation accounts for:

**130,000 jobs in North Carolina** **2.7%** of all employees in the state

Outdoor recreation generates:

**\$7.1 billion in South Carolina**

**DRIVER OF JOB CREATION**

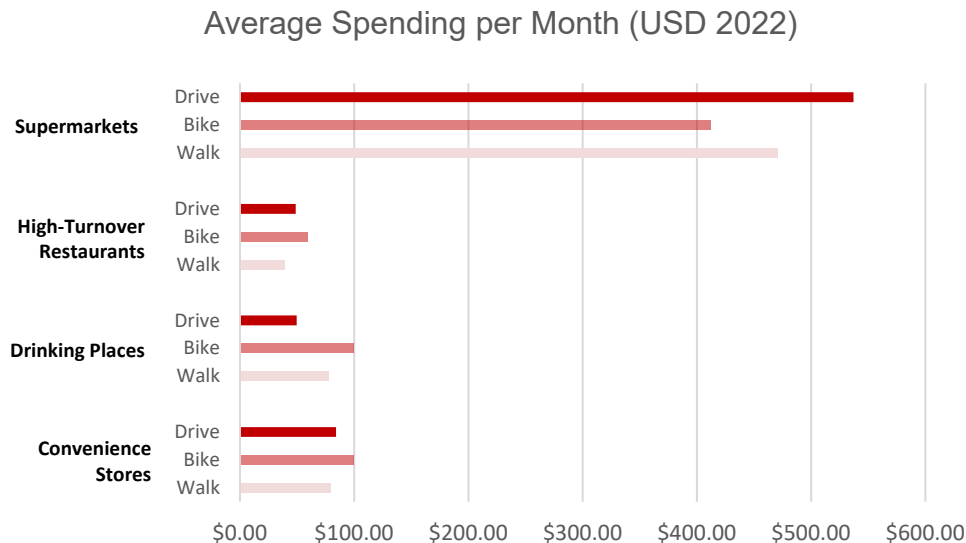
Outdoor recreation accounts for:

**79,000 jobs in South Carolina** **3.5%** of all employees in the state

Source: Outdoor Recreation Roundtable

# Motivation for the Research

- Portland State University retail expenditure and mode choice study
- Repeat spending behavior initiated by active transportation



\*Expenditures adjusted from 2013 to 2022 dollars using the BLS CPI Calculator.

Source: Portland State University, 2013

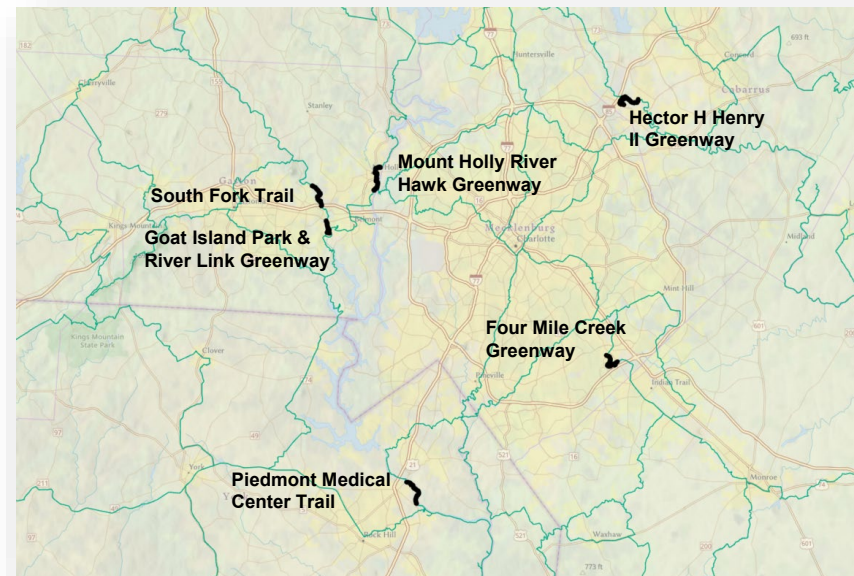
# Motivation for the Research



# Study Corridors

## Six newly completed trail segments

- Four Mile Creek Greenway | **Matthews, NC**
- Piedmont Medical Center Trail | **Rock Hill, SC**
- Hector H. Henry II Greenway | **Concord, NC**
- South Fork Trail | **McAdenville, NC**
- Mount Holly River Hawk Greenway | **Mount Holly, NC**
- Goat Island Park & River Link Greenways | **Cramerton, NC**



# Research Methodology



**Economic impacts  
facilitated by trail use**



**Physical activity  
supported by trail use**

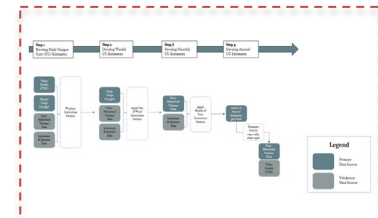
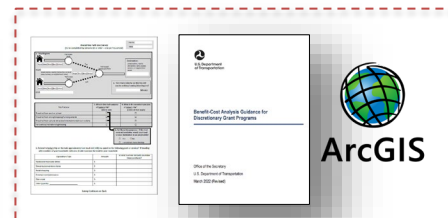
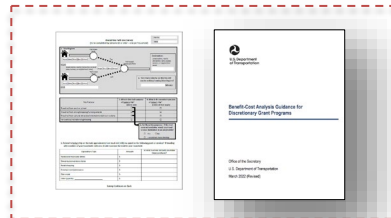
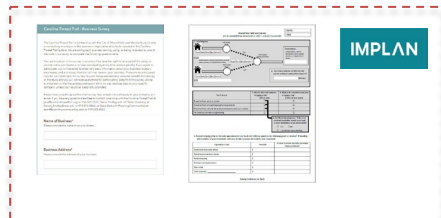


**Environmental benefits**

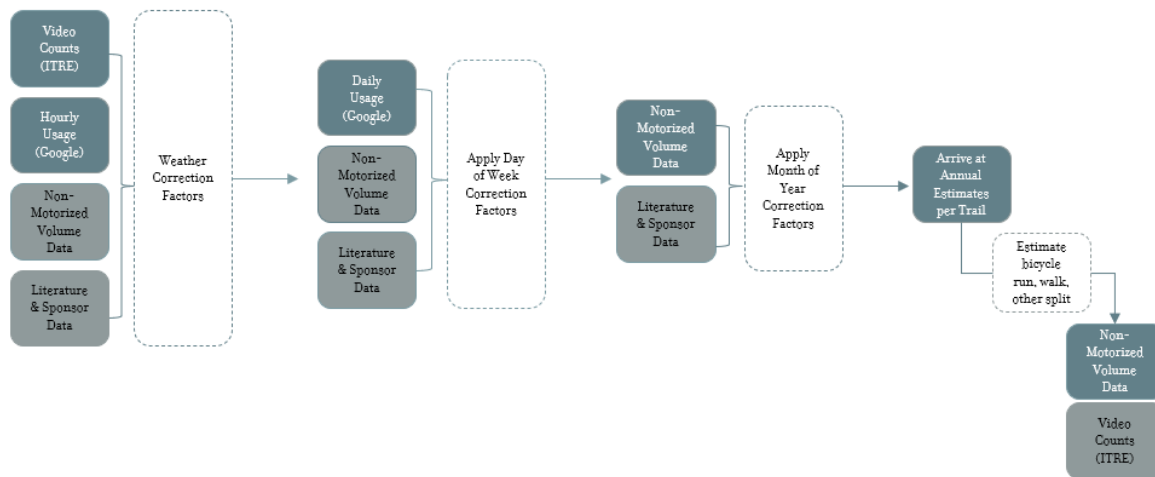
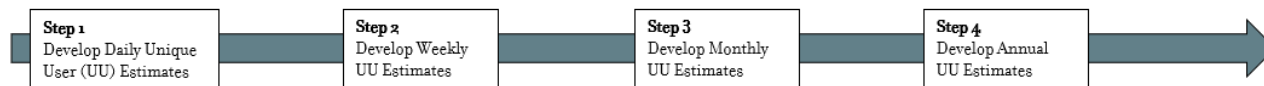
- > Land preservation
- > Reduced vehicular emissions



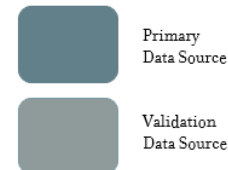
**Impacts annualized  
using unique trail user  
estimation**



# Annual Trail Visit Extrapolation

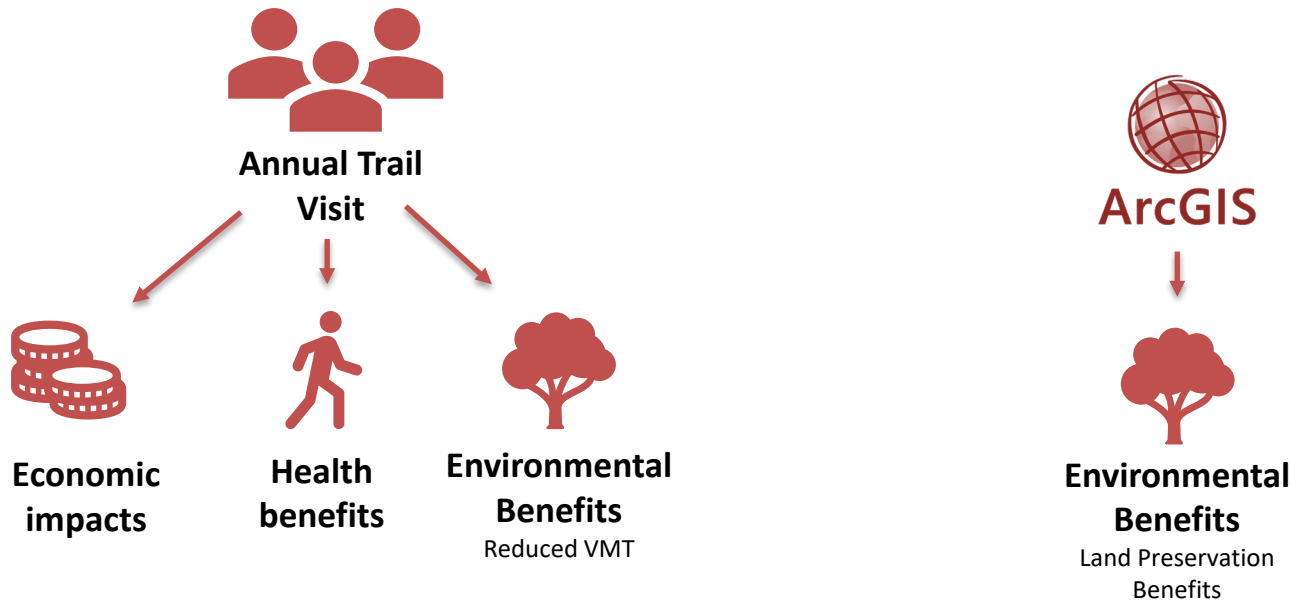


## Legend

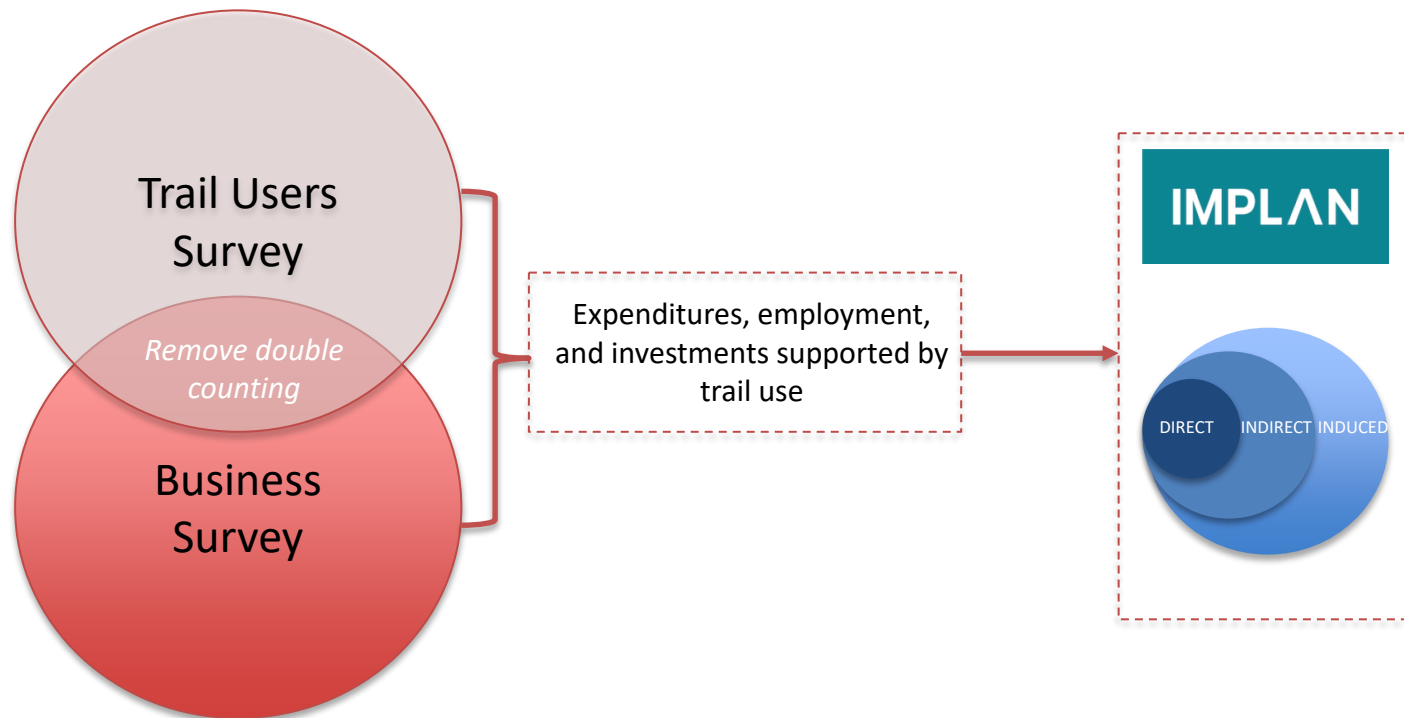


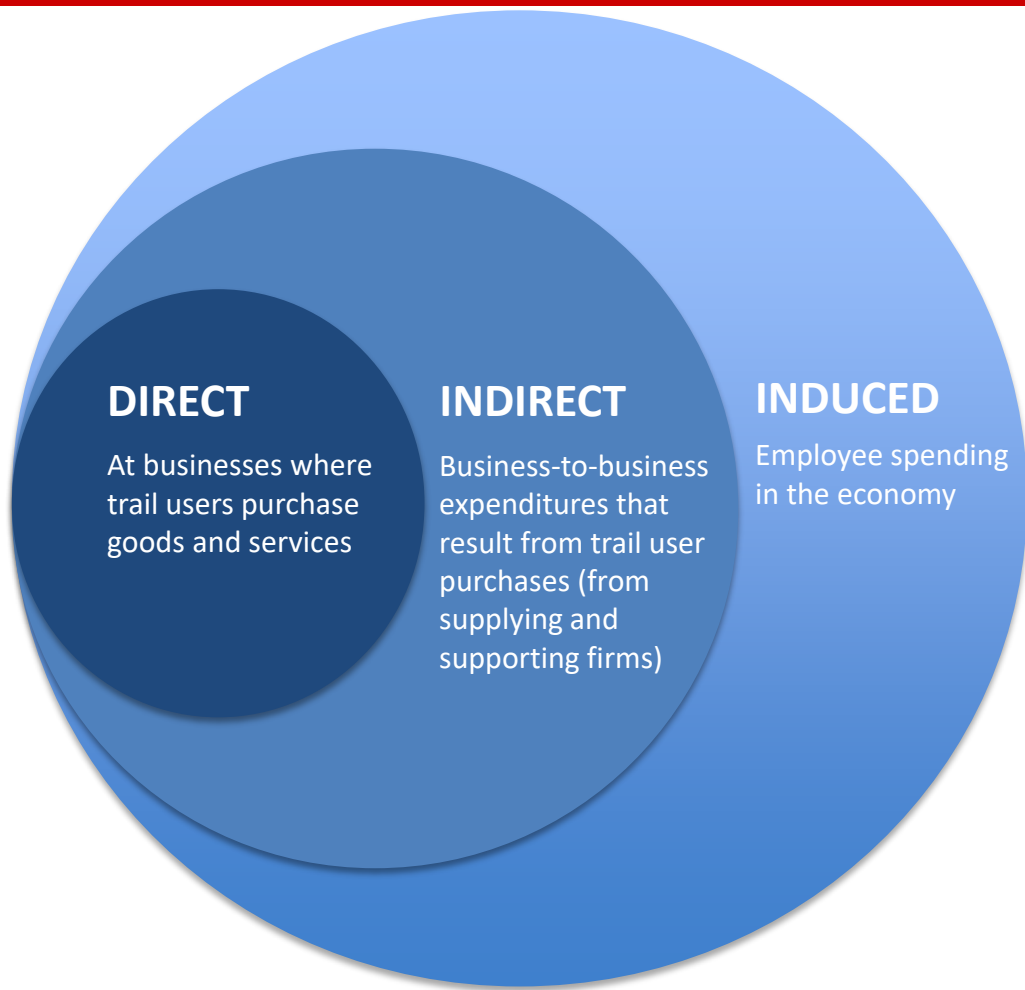


# Annual Trail Count Implementation



# Economic Impacts - Approach





## Input / Output Modeling

- Direct effects
- Indirect effects
- Induced effects
- Multipliers

*"People often pair walks and bike rides on the trail with visits to the farmers' market all year long."* – Community Farmers' Market Staff Member

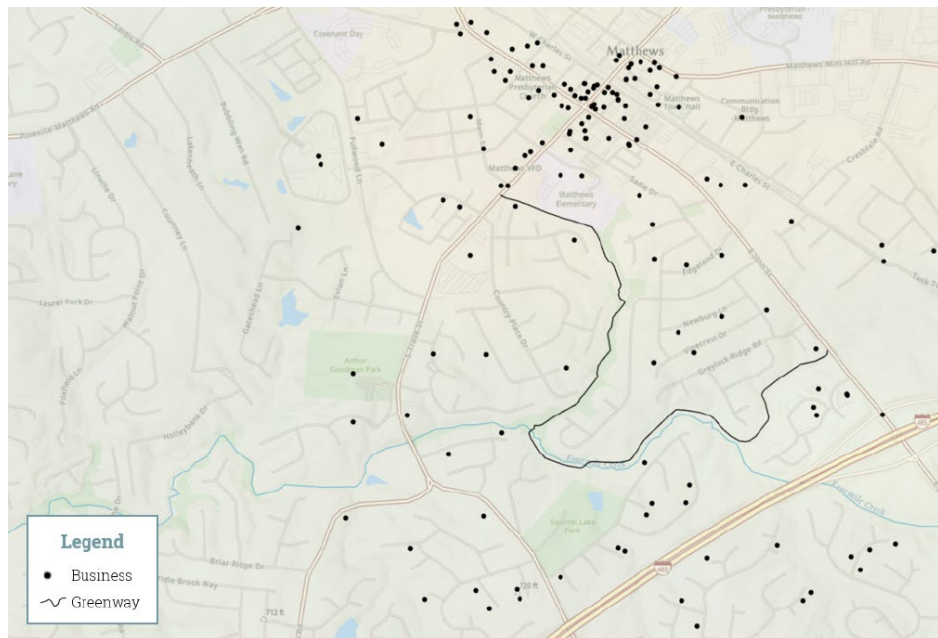
## Four Mile Creek Greenway

### Adjacent Land Use Context

- Residential
- Park / Recreational

### Recreational Uses

- Walking
- Running
- Biking



**345** Businesses within Half a Mile of the Trail



Boardwalk and trail entrance at East John Street.  
Source: ITRE, 2022



Cyclists at the Trade Street entrance.  
Source: ITRE, 2022

## Four Mile Creek Greenway

Types of Business Visited by Trail Users

Business Type	Number of Businesses within 0.5 miles	Purchase Probability per Trail Visit	Average Expenditure per Business Type
Retail	32	2.2%	\$48.90
Food, Beverage, Dining	19	5.0%	\$38.70
Grocery & Convenience Stores	2	7.7%	\$69.10
Other	292	0.5%	\$15.00

### Jobs



**26**

17, 5, 4

### Wages



**\$1.06M**

\$0.63M, \$0.22M, \$0.21M

### Output



**\$3.10M**

\$1.67M, \$0.74M, \$0.69M

### Tax \$



**\$399K**

\$243K, \$72K, \$84K

DIRECT, INDIRECT, INDUCED

*“Nestled right on the banks of the Catawba River, the newest gem in the Charlotte Running Co. fleet sits right on the greenway, and has 5 plus miles of running trails right out the front door!”*

– Featured in the “Our Story” web page of Charlotte Running Company

## Piedmont Medical Center Trail

### Adjacent Land Use Context

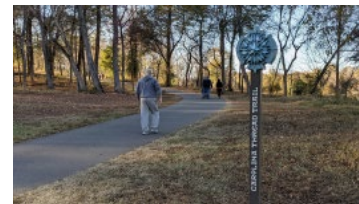
- Commercial
- Residential
- Industrial
- Park / Recreational

### Recreational Uses

- Walking
- Running
- Biking
- Paddling



Rollerbladers and woman walking on the trail.  
Source: ITRE, 2022



Pedestrians on Piedmont Medical Center Trail.  
Source: ITRE, 2022

**57** Businesses within Half a Mile of the Trail

# Piedmont Medical Center Trail

Types of Business Visited by Trail Users

Business Type	Number of Businesses within 0.5 miles	Purchase Probability per Trail Visit	Average Expenditure per Business Type
Retail	10	1.2%	\$48.90
Food, Beverage, Dining	5	17.6%	\$38.70
Grocery & Convenience Stores	1	1.6%	\$69.10
Other	41	0.5%	\$15.00

## Jobs



**57**

34, 12, 12

## Wages



**\$2.85M**

\$1.73M, \$0.55M, \$0.57M

## Output



**\$7.88M**

\$4.25M, \$1.79M, \$01.84M

## Tax \$



**\$972K**

\$575K, \$173K, \$224K

DIRECT, INDIRECT, INDUCED

*“Hendrick Honda opens their gate to the trail and we can walk on it while we wait. It’s one of the reasons why I like to go there.” – Carolina Thread Trail Survey Respondent*

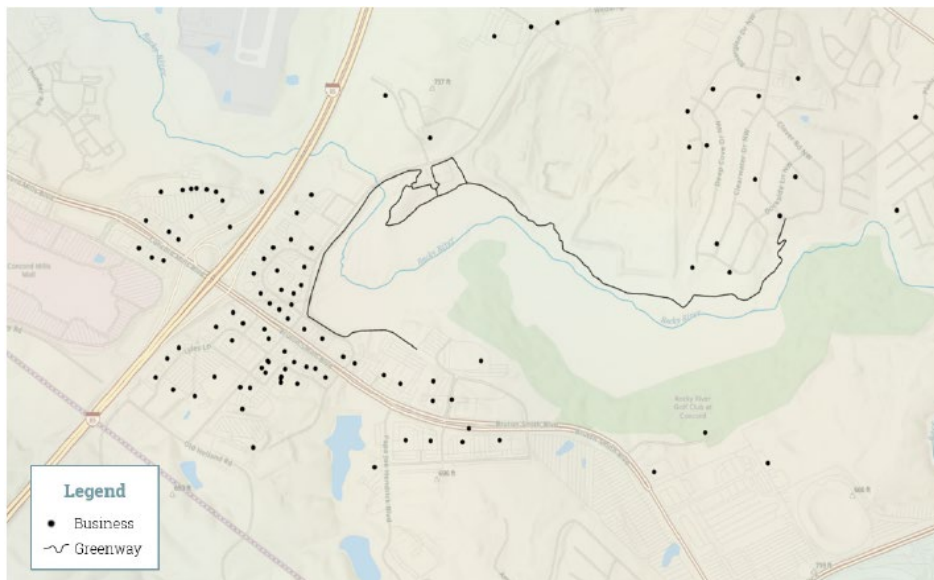
## Hector H. Henry II Greenway

### Adjacent Land Use Context

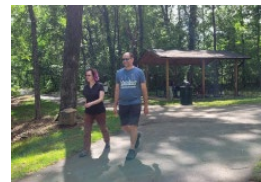
- Commercial
- Park / Recreational

### Recreational Uses

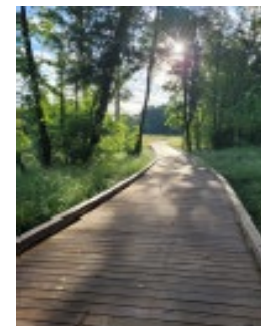
- Walking
- Running
- Biking



**141** Businesses within Half a Mile of the Trail



Pedestrians at Hector H Henry II Greenway.  
Source: Planning Communities, 2022



Boardwalk the greenway's trailhead.  
Source: Planning Communities, 2022



# Hector H. Henry II Greenway

Types of Business Visited by Trail Users

Business Type	Number of Businesses within 0.5 miles	Purchase Probability per Trail Visit	Average Expenditure per Business Type
Food, Beverage, Dining	42	1.6%	\$38.70
Retail	30	1.8%	\$48.90
Grocery & Convenience Stores	4	0.8%	\$69.10
Other	65	1.6%	\$15.00

## Jobs



**16**

10, 3, 3

## Wages



**\$870K**

\$550K, \$150K, \$170K

## Output



**\$2.23M**

\$1.16M, \$0.51M, \$0.56M

## Tax \$



**\$292K**

\$176K, \$48K, \$68K

DIRECT, INDIRECT, INDUCED

*“It’s pretty obvious that we wouldn’t even be here if the trail weren’t here. The only reason we have our business here is because of the trail.”*

– Catawba Riverkeeper Executive Director, John Searby

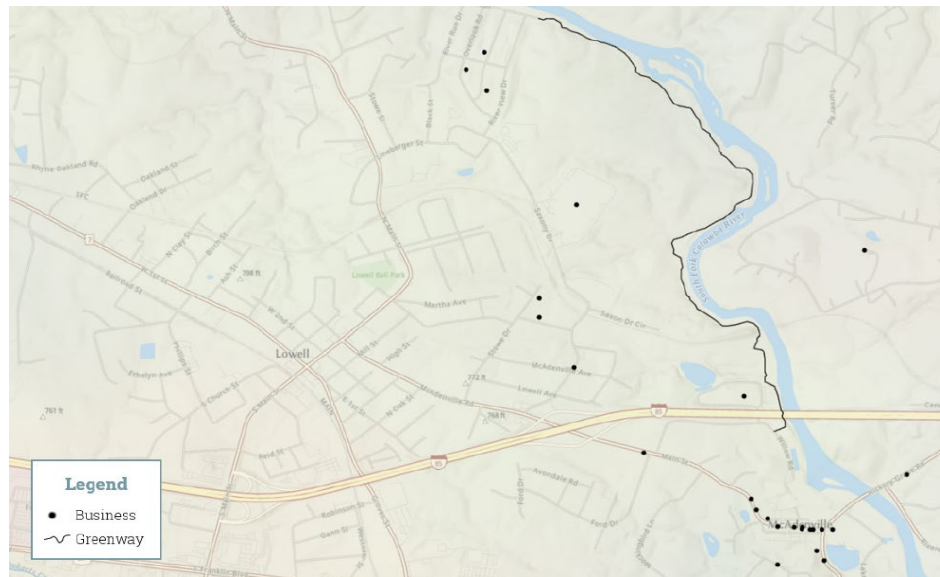
## South Fork Trail

### Adjacent Land Use Context

- Residential
- Park / Recreational

### Recreational Uses

- Walking
- Running
- Hiking
- Mountain Biking
- Paddling



**35** Businesses within Half a Mile of the Trail



Group of runners at South Fork Trail.  
Source: Courtesy of Catawba Riverkeeper, 2022



Paddler at the Catawba River put-in at South Fork Trail.  
Source: Courtesy of Catawba Riverkeeper, 2022

# South Fork Trail

Types of Business Visited by Trail Users

Business Type	Number of Businesses within 0.5 miles	Purchase Probability per Trail Visit	Average Expenditure per Business Type
Food, Beverage, Dining	3	10.5%	\$38.70
Retail	2	6.4%	\$48.90
Other	30	1.9%	\$15.00

## Jobs



22

12, 5, 5

## Wages



\$1.2M

\$680K, \$280K, \$240K

## Output



\$3.17M

\$1.62M, \$0.77M, \$0.78M

## Tax \$



\$467K

\$287K, \$85K, \$95K

DIRECT, INDIRECT, INDUCED

*"Our business model is built on the expectation that greenway and blueway activities will be accessible to our guests. We imagine a Mount Holly with families biking, friends paddling the creek and folks from all over the region enjoying our food and beverage while enjoying the city's beautiful outdoor spaces."*

– Scott Blackwood, Owner, Firehawk Brewpub

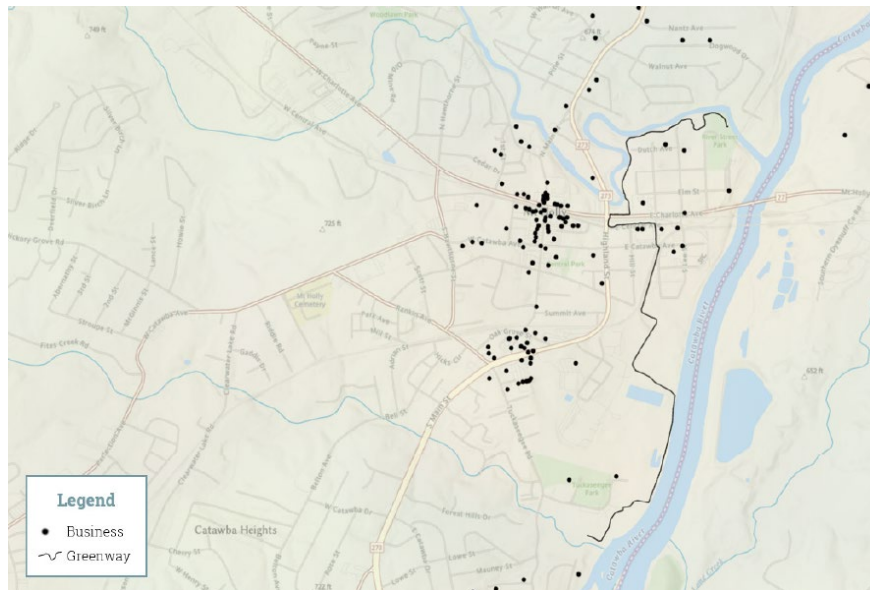
## Mount Holly River Hawk Greenway

### Adjacent Land Use Context

- Residential
- Commercial
- Industrial
- Park / Recreational

### Recreational Uses

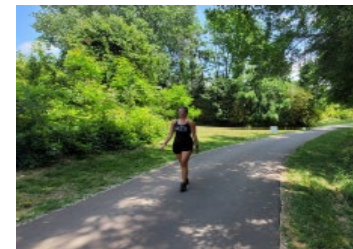
- Walking
- Running
- Biking
- Hiking
- Mountain Biking
- Paddling



**206** Businesses within Half a Mile of the Trail



Paddlers and boaters on the Catawba River near the Mount Holly River Hawk Greenway. Source: ITRE, 2022



Pedestrian walking at Mount Holly River Hawk Greenway. Source: ITRE, 2022

# Mount Holly River Hawk Greenway

Types of Business Visited by Trail Users

Business Type	Number of Businesses within 0.5 miles	Purchase Probability per Trail Visit	Average Expenditure per Business Type
Retail	17	1.6%	\$48.90
Food, Beverage, Dining	14	3.7%	\$38.70
Grocery & Convenience Stores	4	3.7%	\$69.10
Other	171	1.2%	\$15.00

## Jobs



**39**

24, 7, 8

## Wages



**\$2.17M**

\$1.40M, \$0.34M, \$0.43M

## Output



**\$5.36M**

\$2.78M, \$1.18M, \$1.40M

## Tax \$



**\$670K**

\$386K, \$114K, \$170K

DIRECT, INDIRECT, INDUCED

*"Depending on the time of year, up to half of our sales could come from people using the greenway." – Floyd & Blackies Staff Member*

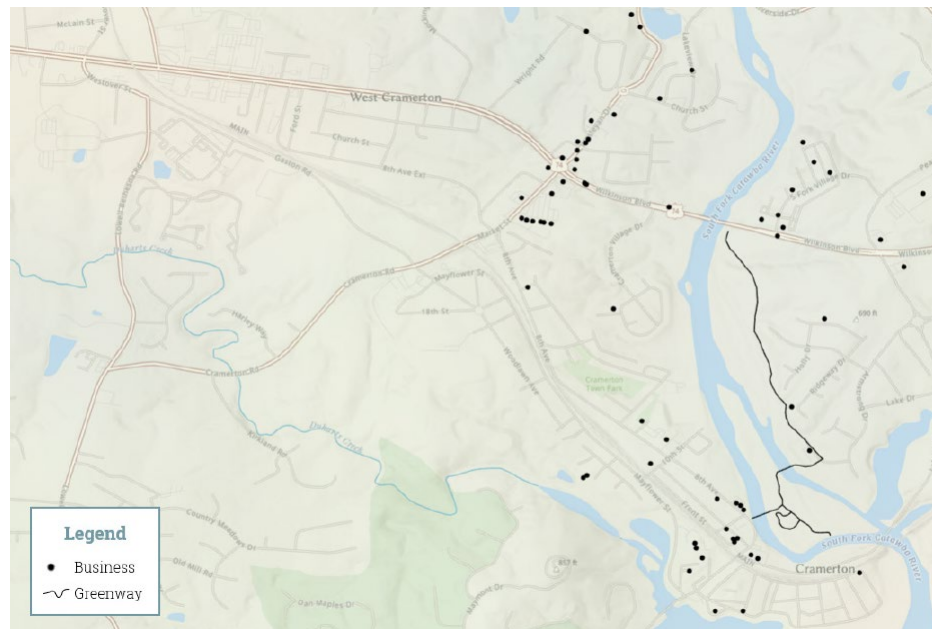
## Goat Island Park & River Link Greenways

### Adjacent Land Use Context

- Residential
- Commercial
- Park / Recreational

### Recreational Uses

- Walking
- Running
- Biking
- Paddling



**81** Businesses within Half a Mile of the Trail



People walking at pedestrian bridge entrance to the Goat Island Park & Greenway. Source: ITRE, 2022



Couple walking at the River Link Greenway. Source: ITRE, 2022



## Goat Island Park & River Link Greenways

Types of Business Visited by Trail Users

Business Type	Number of Businesses within 0.5 miles	Purchase Probability per Trail Visit	Average Expenditure per Business Type
Food, Beverage, Dining	5	25.4%	\$38.70
Grocery & Convenience Stores	5	4.5%	\$69.10
Retail	18	1.8%	\$48.90
Other	53	0.9%	\$15.00

### Jobs



29

17, 6, 6

### Wages



\$1.62M

\$1.03M, \$0.27M, \$0.32M

### Output



\$4.07M

\$2.08M, \$0.94M, \$1.05M

### Tax \$







\$511K

\$295K, \$88K, \$128K

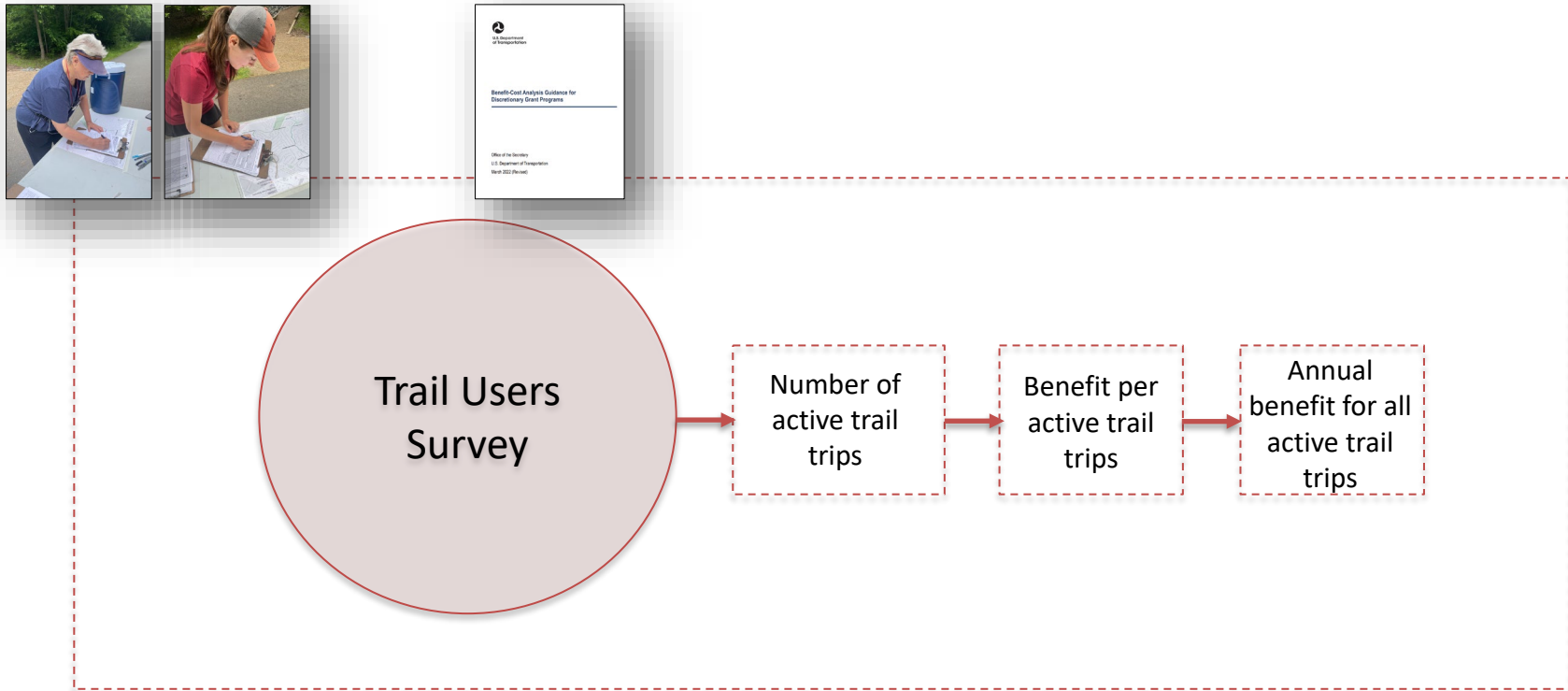
DIRECT, INDIRECT, INDUCED

# Annual Economic Impacts Facilitated

		Total Impact of All Six Study Trails	Average Impact per Trail Mile	Impact Range Across All Six Study Trails
	EMPLOYMENT	190 jobs	15 jobs	16-58 jobs
	LABOR INCOME	\$9.7 million	\$770 thousand	\$0.9-\$2.9 million
	ECONOMIC OUTPUT	\$25.8 million	\$2.1 million	\$2.2-\$7.9 million
	TAX REVENUE	\$3.3 million	\$262 thousand	\$0.3-\$1.0 million



# Physical Health Benefits - Approach

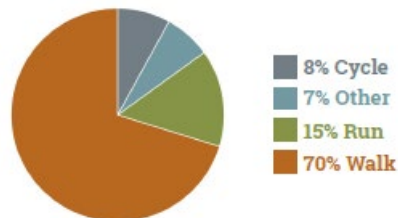


# Physical Activity

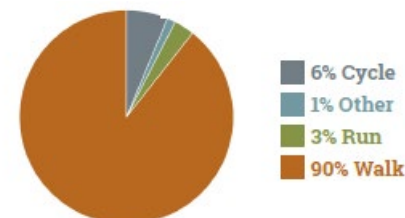
## Physical Activity Split

- Relatively similar activity patterns among trails
- Higher levels of running and cycling on Four Mile Creek Greenway & Piedmont Medical Center Trail
- Higher levels of walking on South Fork Trail and Hector H. Henry II Greenway
- Higher levels of other activities on the Four Mile Creek Greenway, the Mount Holly River Hawk Greenway and the Goat Island Park & River Link Greenways

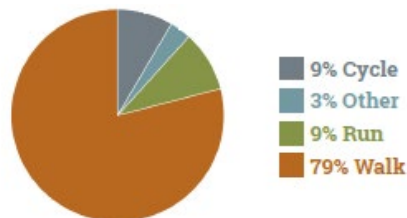
### Four Mile Creek Greenway Activity Split



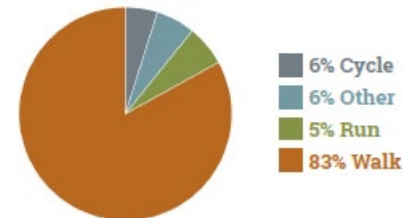
### South Fork Trail Activity Split



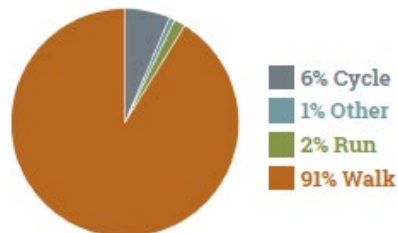
### Piedmont Medical Center Trail Activity Split



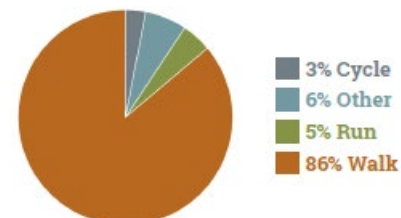
### Mount Holly River Hawk Greenway Activity Split



### Hector H. Henry Greenway Activity Split



### Goat Island Park & River Link Greenways Activity Split



# Physical Health Benefits | Across all six study trails...



**558K**

Trail Visits



**441K**

Walk Visits

2.8 visits / week

56 min / visit | 158 min / week



**51K**

Run Visits

3.5 visits / week

43 min / visit | 157 min / week



**\$3.9M**

Annual Health Care Savings

Benefit of \$7 per trail visit



**38K**

Bike Visits

2.4 visits / week

52 min / visit | 126 min / week



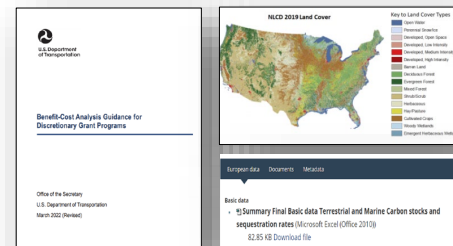
**28K**

Other Exercise Visits

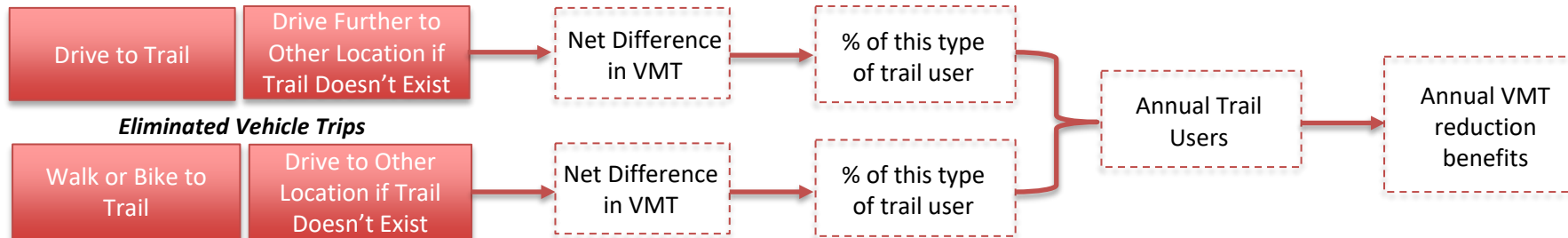
1.3 visits / week

48 min / visit | 62 min / week

### ***Land Preservation Benefits***

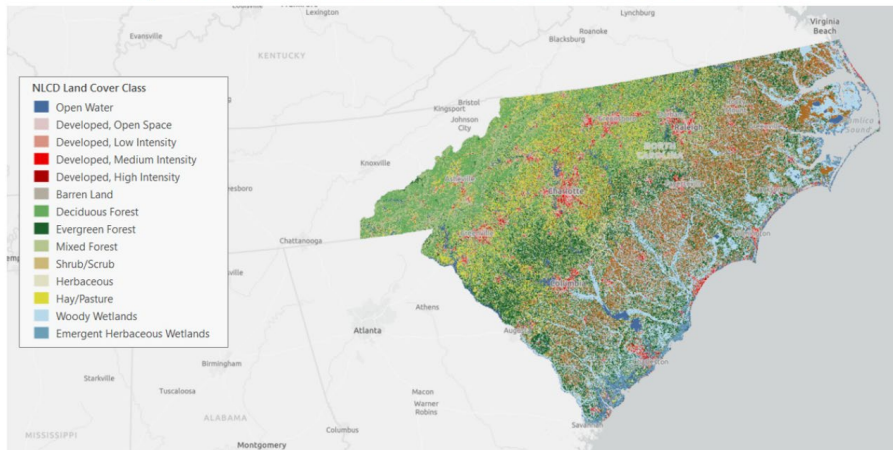


### ***Reduced Miles Traveled***



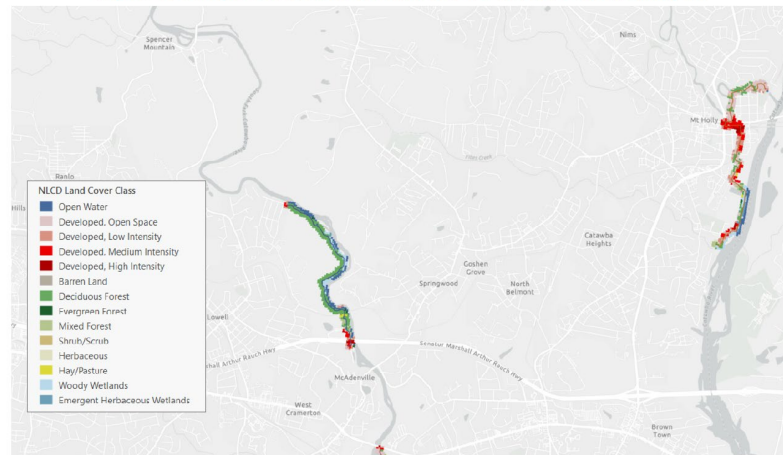
# Land Preservation Benefits

Figure 1: North Carolina and South Carolina Land Cover Classes



Data from the National Land Cover Database. Source: Multi-Resolution Land Characteristics Consortium, 2019

Figure 2: Sample Extraction of Land Cover Data for Carbon Analysis



GIS analysis of data from the National Land Cover Database. Source: Multi-Resolution Land Characteristics Consortium, 2019

# Land Preservation Benefits

## Land cover designations

- Multi-Resolution Land Characteristics Consortium's (MRLC) National Land Cover Database

## Carbon Stock and Sequestration Rates

- European Environmental Agency's
- (EEA) terrestrial and marine carbon stocks and sequestration rates data tables

**Carbon stock** (also known as carbon storage) is the absolute quantity of carbon held in a habitat pool at any specified time.

**Carbon sequestration** is the annual rate at which carbon is extracted from the air and stored within a habitat pool.

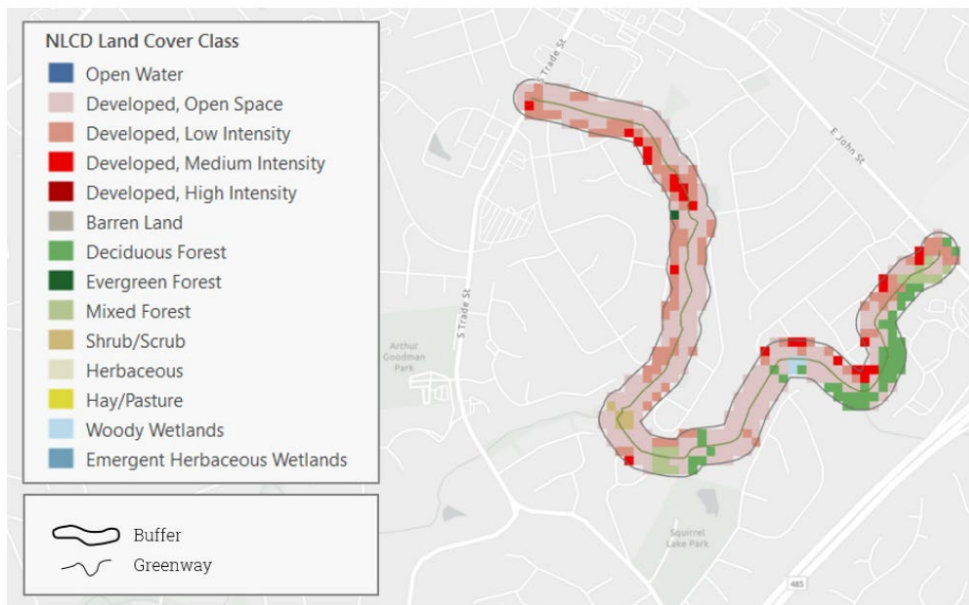
Land Cover Classifications, Carbon Stock Values, and Annual Sequestration Rates

Class\Value	Classification	Carbon Stock	Carbon Sequestration
		Mg C per Hectare	Mg C per Hectare
11	Open Water	20.0	0.15
21	Developed, Open Space	10.0	0.01
22	Developed, Low Intensity	10.0	-0.01
23	Developed, Medium Intensity	10.0	-0.02
24	Developed High Intensity	10.0	-0.02
31	Barren Land (Rock/Sand/Clay)	24.0	1.00
41	Deciduous Forest	138.5	3.60
42	Evergreen Forest	92.4	2.40
43	Mixed Forest	115.5	3.00
52	Shrub/Scrub	33.5	1.10
71	Grassland/Herbaceous	61.3	1.20
81	Pasture/Hay	80.1	1.40
82	Cultivated Crops	99.0	1.80
90	Woody Wetlands	154.5	1.60
95	Emergent Herbaceous Wetlands	115.9	1.20

Source: ITRE analysis of National Land Cover Database (2019) and the European Environmental Agency's carbon stocks and sequestration rates database (2022).

# Four Mile Creek Greenway

## Land Cover Designations within the Footprint of the Trail



## Carbon Stock and Sequestration Benefits Facilitated by the Trail

Trail Name	Trail Linear Miles	Trail Footprint in Acres <sup>1</sup>	Carbon Stock (metric tons) <sup>2</sup>	Annual Carbon Sequestered (metric tons) <sup>3</sup>	Carbon Stored or Sequestered (metric tons)	Annual Land Preservation Benefit of the Trail
Four Mile Creek Greenway	2.0	24.2	1,700.0	30.3	1,730.3	\$91,700

## Land Preservation Benefits per Acre Supported by the Trail

Land Area Evaluated	Raster Cells Evaluated	Land Preservation Benefit per Acre	Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater)
Four Mile Creek Greenway Footprint	441	\$3,785	1.1
City of Charlotte	898,080	\$3,530	

<sup>1</sup>For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

<sup>2</sup>The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

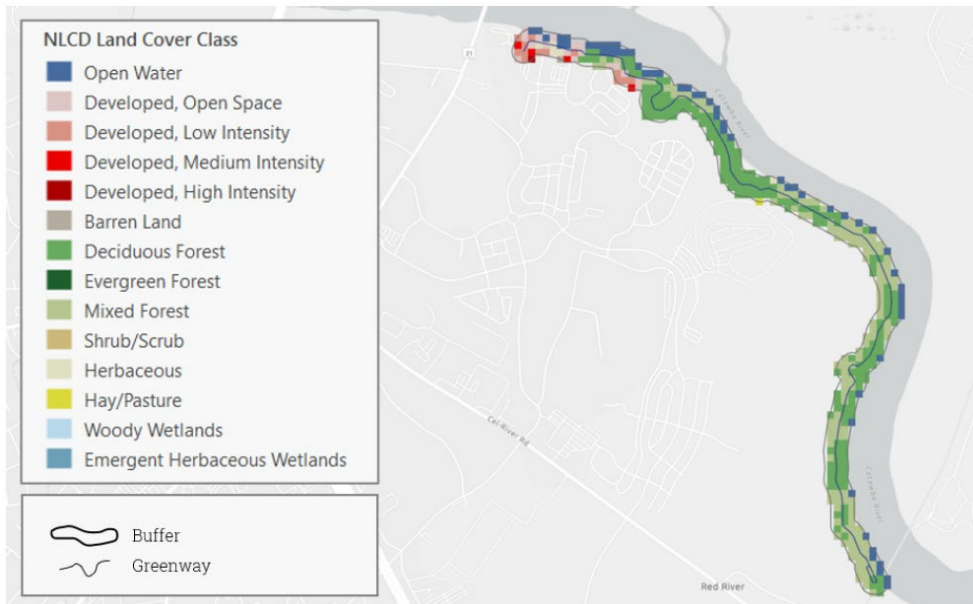
<sup>3</sup>The annual rate at which the carbon is stored is referred to as the carbon sequestration rate

Source: ITRE Analysis, 2022



# Piedmont Medical Center Trail

## Land Cover Designations within the Footprint of the Trail



## Carbon Stock and Sequestration Benefits Facilitated by the Trail

Trail Name	Trail Linear Miles	Trail Footprint in Acres <sup>1</sup>	Carbon Stock (metric tons) <sup>2</sup>	Annual Carbon Sequestered (metric tons) <sup>3</sup>	Carbon Stored or Sequestered (metric tons)	Annual Land Preservation Benefit of the Trail
Piedmont Medical Center Trail	2.5	30.3	7,677.3	193.6	7,871.0	\$417,000

## Land Preservation Benefits per Acre Supported by the Trail

Land Area Evaluated	Raster Cells Evaluated	Land Preservation Benefit per Acre	Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater)
Piedmont Medical Center Trail	414	\$13,770	3.9
City of Charlotte	898,080	\$3,530	

<sup>1</sup>For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

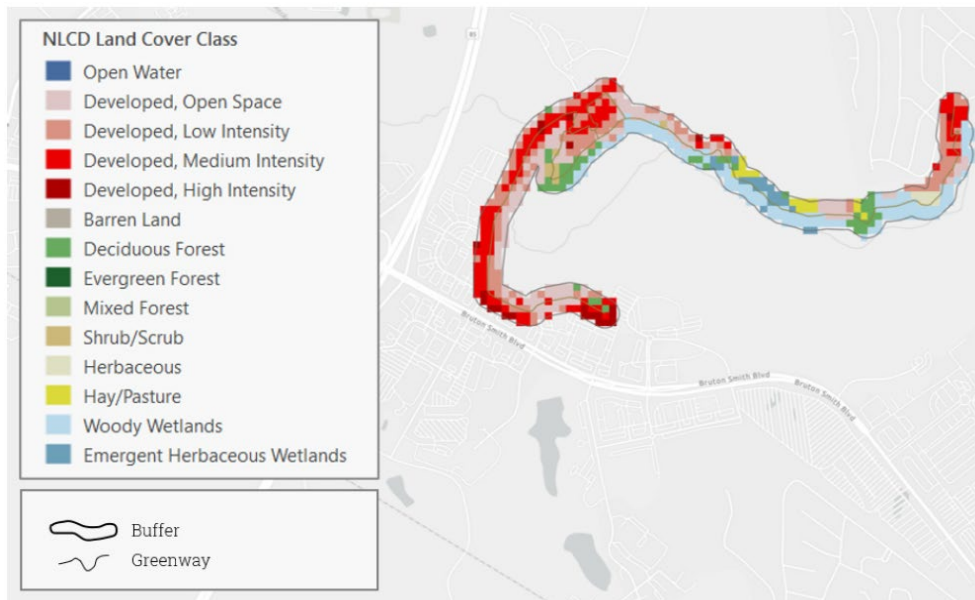
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# Hector H. Henry II Greenway

## Land Cover Designations within the Footprint of the Trail



## Carbon Stock and Sequestration Benefits Facilitated by the Trail

Trail Name	Trail Linear Miles	Trail Footprint in Acres <sup>1</sup>	Carbon Stock (metric tons) <sup>2</sup>	Annual Carbon Sequestered (metric tons) <sup>3</sup>	Carbon Stored or Sequestered (metric tons)	Annual Land Preservation Benefit of the Trail
Hector H. Henry II Greenway	2.6	31.5	4,327.6	54.5	4,382.1	\$232,000

## Land Preservation Benefits per Acre Supported by the Trail

Land Area Evaluated	Raster Cells Evaluated	Land Preservation Benefit per Acre	Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater)
Hector H. Henry II Greenway Footprint	584	\$7,370	2.1
City of Charlotte	898,080	\$3,530	

<sup>1</sup>For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

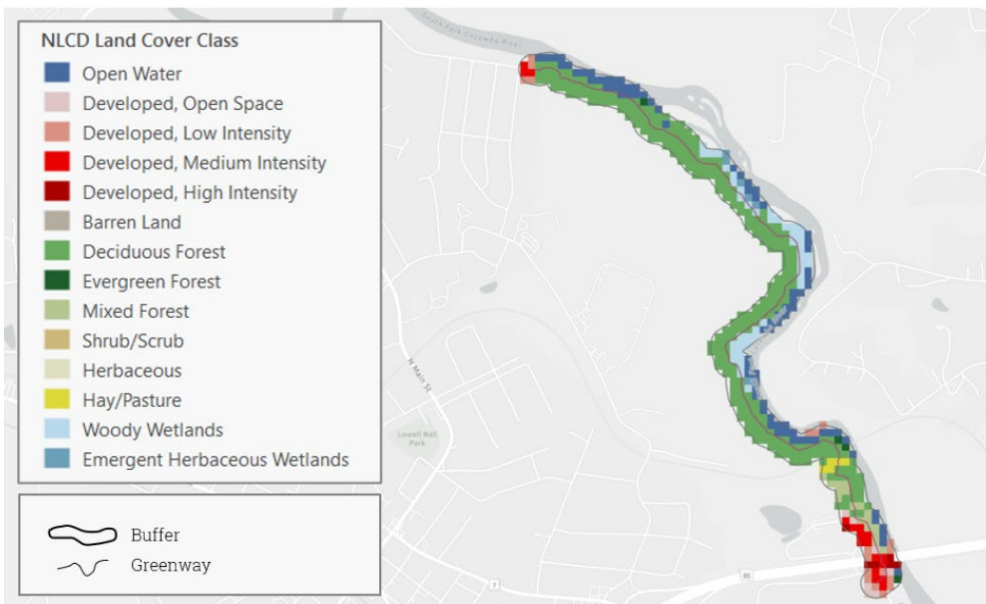
<sup>2</sup>The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

<sup>3</sup>The annual rate at which the carbon is stored is referred to as the carbon sequestration rate

Source: ITRE Analysis, 2022

# South Fork Trail

## Land Cover Designations within the Footprint of the Trail



## Carbon Stock and Sequestration Benefits Facilitated by the Trail

Trail Name	Trail Linear Miles	Trail Footprint in Acres <sup>1</sup>	Carbon Stock (metric tons) <sup>2</sup>	Annual Carbon Sequestered (metric tons) <sup>3</sup>	Carbon Stored or Sequestered (metric tons)	Annual Land Preservation Benefit of the Trail
South Fork Trail	2.0	24.2	6,205.7	140.0	6,345.7	\$336,000

## Land Preservation Benefits per Acre Supported by the Trail

Land Area Evaluated	Raster Cells Evaluated	Land Preservation Benefit per Acre	Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater)
South Fork Trail Footprint	460	\$13,870	3.9
City of Charlotte	898,080	\$3,530	

<sup>1</sup>For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

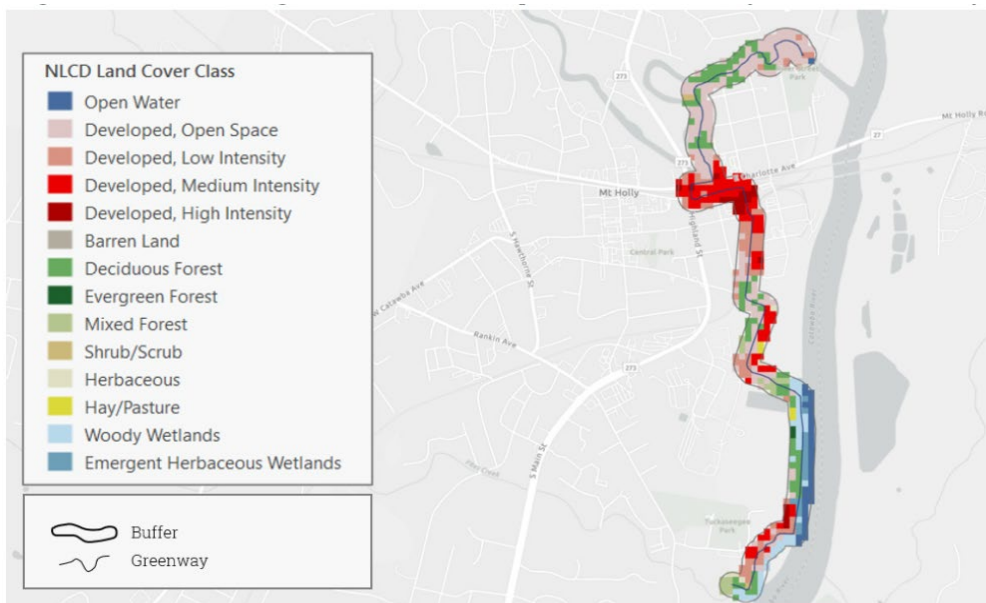
<sup>2</sup>The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

<sup>3</sup>The annual rate at which the carbon is stored is referred to as the carbon sequestration rate

Source: ITRE Analysis, 2022

# Mount Holly River Hawk Greenway

## Land Cover Designations within the Footprint of the Trail



## Carbon Stock and Sequestration Benefits Facilitated by the Trail

Trail Name	Trail Linear Miles	Trail Footprint in Acres <sup>1</sup>	Carbon Stock (metric tons) <sup>2</sup>	Annual Carbon Sequestered (metric tons) <sup>3</sup>	Carbon Stored or Sequestered (metric tons)	Annual Land Preservation Benefit of the Trail
Mount Holly River Hawk Greenway	2.4	29.1	3,480.2	60.8	3,541.0	\$188,000

## Land Preservation Benefits per Acre Supported by the Trail

Land Area Evaluated	Raster Cells Evaluated	Land Preservation Benefit per Acre	Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater)
Mount Holly River Hawk Greenway Footprint	636	\$6,450	1.8
City of Charlotte	898,080	\$3,530	

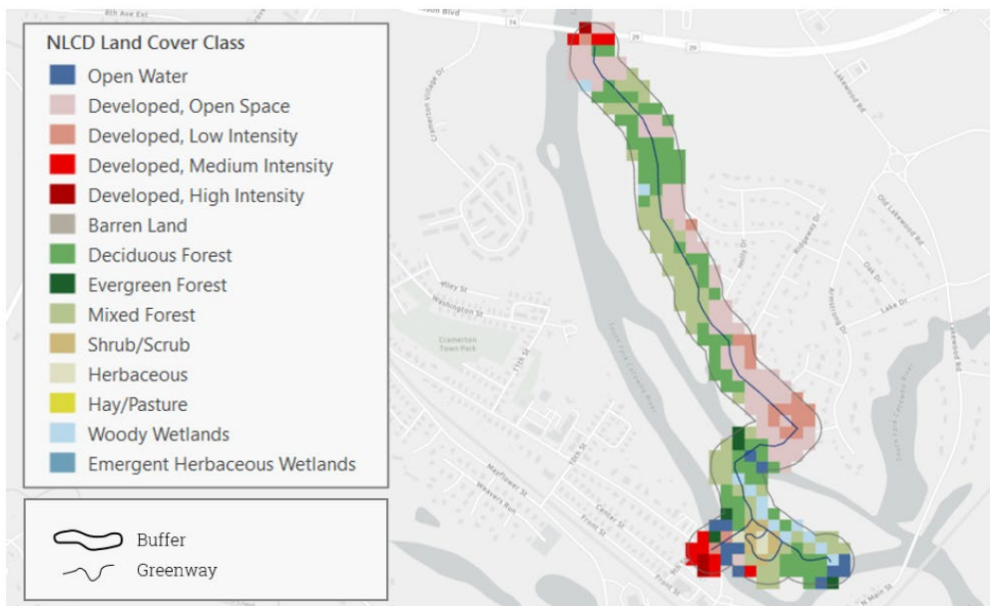
<sup>1</sup>For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

<sup>2</sup>The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

<sup>3</sup>The annual rate at which the carbon is stored is referred to as the carbon sequestration rate

# Goat Island Park & River Link Greenways

## Land Cover Designations within the Footprint of the Trails



## Carbon Stock and Sequestration Benefits Facilitated by the Trails

Trail Name	Trail Linear Miles	Trail Footprint in Acres <sup>1</sup>	Carbon Stock (metric tons) <sup>2</sup>	Annual Carbon Sequestered (metric tons) <sup>3</sup>	Carbon Stored or Sequestered (metric tons)	Annual Land Preservation Benefit of the Trail
Goat Island Park & River Link Greenway	1.5	18.2	3,461.6	80.3	3,541.9	\$188,000

## Land Preservation Benefits per Acre Supported by the Trails

Land Area Evaluated	Raster Cells Evaluated	Land Preservation Benefit per Acre	Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater)
Goat Island Park & River Link Greenway Footprint	276	\$10,320	2.9
City of Charlotte	898,080	\$3,530	

<sup>1</sup>For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

<sup>2</sup>The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

<sup>3</sup>The annual rate at which the carbon is stored is referred to as the carbon sequestration rate

# Vehicle Miles Traveled Reduction Benefits

Across all six study trails...

**Eliminated Car Trips.** Car trips were deemed to be eliminated if survey respondents who used active transportation to get to the trail said they would drive to their destination, or a similar destination, if the trail did not exist.

**Reduced Distance Car Trips.** Car trips were deemed to be made at a reduced distance if survey respondents who used vehicular transportation to get to the trail said they would drive to a similar destination (often requiring a further distance of travel) if the trail did not exist. Based on survey response data it was estimated that vehicle trips to a similar destination would be approximately 20 percent farther.



**1.57M**

Vehicle Miles Eliminated



**\$90K**

Emissions Cost-Savings



**104K**








Eliminated Car Trips



**227K**

Reduced-Mileage Car Trips

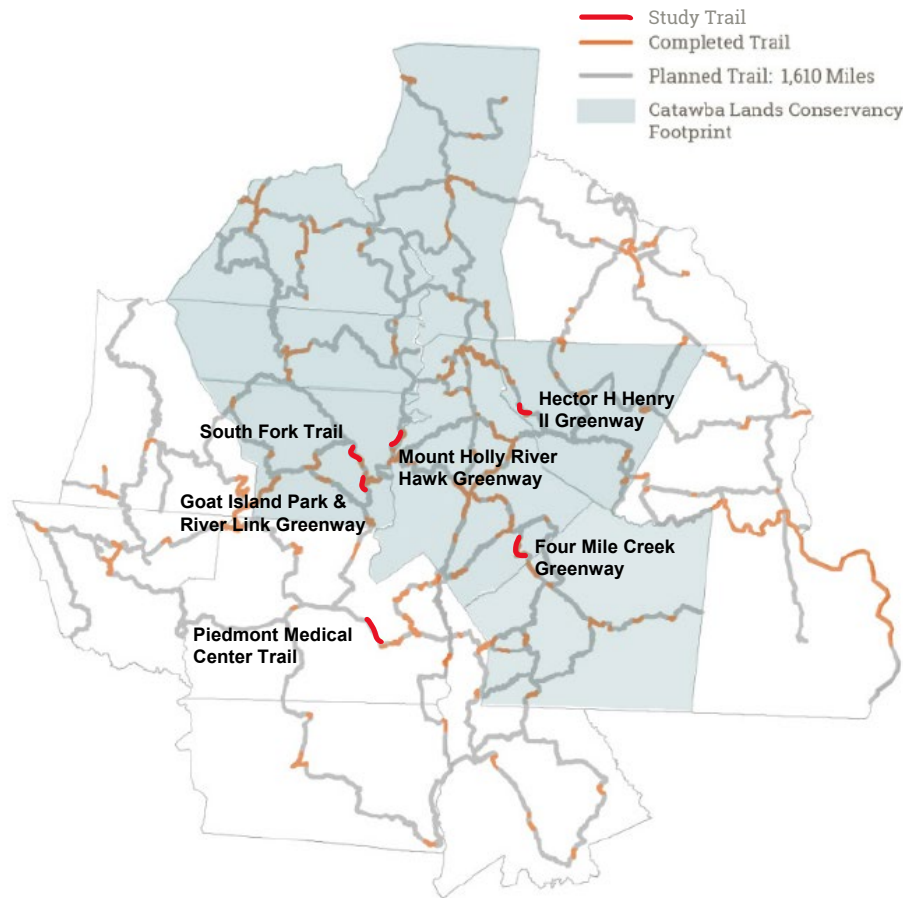
# Annual Economic, Health, and Environmental Impacts Facilitated

		Total Impact of All Six Study Trails	Average Impact per Trail Mile	Impact Range Across All Six Study Trails
	EMPLOYMENT	190 jobs	15 jobs	16-58 jobs
	LABOR INCOME	\$9.7 million	\$770 thousand	\$0.9-\$2.9 million
	ECONOMIC OUTPUT	\$25.8 million	\$2.1 million	\$2.2-\$7.9 million
	TAX REVENUE	\$3.3 million	\$262 thousand	\$0.3-\$1.0 million
	HEALTHCARE SAVINGS	\$3.9 million	\$310 thousand	\$0.1-\$1.4 million
	VEHICLE EMISSIONS REDUCTION BENEFIT	\$90 thousand	\$7 thousand	\$2.8-\$32.2 thousand
	CARBON STORAGE & SEQUESTRATION BENEFIT	\$1.45 million	\$115 thousand	\$92.7-\$417.2 thousand

# Conclusions

## One Percent of Trail Network Supports...

- 550,000 annual trail visits
- 190 total jobs
- \$3.9 million in health care savings
- 27,400 metric tons carbon stored or sequestered through land preservation
- \$1.5 million in environmental benefits



# Questions?

## **CAROLINA THREAD TRAIL**

### **Catawba Lands Conservancy**

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Bret Baronak, Carolina Thread Trail Director  
Bart Landess, Executive Director

### **Mecklenburg County Park and Recreation Department**

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### **City of Mount Holly**

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