

A person wearing a helmet and cycling gear is riding a mountain bike on a dirt trail through a dense forest. The trail is covered in fallen leaves, and the surrounding trees are lush with green foliage. The scene is captured from a low angle, looking up at the rider.

# Economic Impact of Mountain Biking in the Nantahala and Pisgah National Forests

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Study funded by Outdoor Alliance





# Executive Summary of Study

The Nantahala and Pisgah National Forests are an important American mountain biking destination.

Mountain bikers visit the Nantahala and Pisgah National Forests an estimated 435,000 times per year, with approximately 60% of those visits by residents of western North Carolina.

Using data from an online survey of outdoor recreation enthusiasts to conduct an economic impact analysis, the research team finds:

1. Mountain biking visitors spend an estimated **\$30.2 million** per year in and around the Nantahala and Pisgah National Forests.
2. Mountain biker tourism supports the presence of **366 full-time jobs** and **\$9 million in job income**.
3. Western North Carolina residents also spend an additional **\$18 million** as a result of mountain biking in the Nantahala and Pisgah National Forests.



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# Meet Your Research Team

**DR. JAMES N. MAPLES** is an assistant professor of sociology at Eastern Kentucky University, where he examines the political economy of renewable tourism. His research interests include the economic impact of outdoor recreation, economic development and social change in rural areas, and applied survey design. In his free time, he is conducting an oral history of rock climbing in Kentucky's Red River Gorge.



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**DR. MICHAEL J. BRADLEY** is an associate professor and director of graduate studies in the Department of Recreation and Park Administration at Eastern Kentucky University. His professional and academic interests include human dimensions of natural resource and wildlife management as well as sustainable recreation practices as it relates to outdoor recreation.



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## CONTACT INFORMATION FOR FUTURE STUDIES

Our research team regularly conducts economic impact studies, surveys, assessments, interpretation studies, and other kinds of community-driven studies. If you or your organization is interested in conducting a study, please contact lead researchers Dr. James Maples or Dr. Michael Bradley (emails above) for further information.

# Methodological Notes

## BACKGROUND

The Nantahala and Pisgah National Forests (NPNF) are the combination of two national forests in western North Carolina. NPNF collectively covers over one million acres and is an important outdoor recreation area in the region.

NPNF includes a high concentration of mountain biking opportunities, attracting an estimated 435,000 visits by mountain bikers annually. This figure comes from conversations with IMBA and is based on the NPNF 2010 mountain biking visitation estimate plus a ten percent increase in visitation. However, the economic impact of mountain bikers has not been examined in the NPNF to date.

## STUDY PURPOSE

Working alongside Outdoor Alliance and the International Mountain Bicycling Association, the research team conducted an online survey to collect data on mountain biking expenditures in the NPNF with the goal of estimating mountain bikers' annual economic impact in the NPNF.

## DATA COLLECTION

The researchers collected data using an online survey hosted through Qualtrics. The study population was persons who have ridden mountain bikes in the NPNF in 2017. The survey was open from June 28 through July 10. In all, 797 mountain bikers responded to the survey. The research team dropped 237 total cases (189 cases that completed less than 1/3 of the survey, seven cases that mountain biked outside the six mountain biking study areas, and 41 cases with abnormally high expenditures that would skew and inflate mean expenditures). This left 163 mountain bikers who lived in western North Carolina (local residents) and 397 mountain bikers who lived outside western North Carolina (visitors) in the study. As the exact number of unique mountain bikers who mountain bike in the NPNF is unknown, this is best treated as a convenience sample.

## ANALYSIS

The research team calculated mean expenditures across thirteen categories such as lodging or restaurant expenditures. The research team utilized IMPLAN to generate economic impact estimates based on an estimated 435,000 mountain biking visits per year to the NPNF. This figure is based on the NPNF 2010 mountain biking visitation estimate plus a ten percent increase in visitation. The research team is using an estimate of 60% of those visits are from persons who reside in western North Carolina. Stata 14 was used to generate additional respondent demographic tables.

# Study Region

This study focuses on six study regions that generally overlap with existing NPNF districts: Grandfather, Appalachian, Pisgah, Cheoah, Tusquitee, and Nantahala. The research team created each study area in collaboration with leadership from International Bicycling Association and Southern Off-Road Bicycle Association.

## REGION ONE: GRANDFATHER

The Grandfather study region includes the following common mountain biking areas: Boone Fork, Old Fort, Wilson Creek, and Woods Mountain. The research team built the region’s economic model around zip codes in Boone, Blowing Rock, Lenoir, Marion, Morganton, and Old Fort as these are the most common areas where mountain bikers would spend funds while visiting this region. **Table 1A** includes recent economic indicators for the Grandfather region.

**Table 1A**

<b>Economic Indicator Summary of Grandfather Region, 2015</b>	
<i>Indicator</i>	<i>Value</i>
Gross Regional Product	\$6,889,387,355
Total Personal Income	\$6,092,022,704
Total Employment	100,962
Number of Industries	295
Land Area (square miles)	1,174
Population	192,884
Total Households	77,638

## REGION TWO: APPALACHIAN

The Appalachian study region includes mountain biking areas Big Ivy and Hot Springs. The research team built this region’s economic model around Asheville and Hot Springs. **Table 1B** includes recent economic indicators for the Appalachian region.

**Table 1B**

<b>Economic Indicator Summary of Appalachian Region, 2015</b>	
<i>Indicator</i>	<i>Value</i>
Gross Regional Product	\$8,735,386,680
Total Personal Income	\$6,434,926,924
Total Employment	132,945
Number of Industries	284
Land Area (square miles)	331
Population	158,635
Total Households	68,767

## REGION THREE: PISGAH

The Pisgah study region includes mountain biking at Bent Creek, 276 Corridor, Upper Davidson River / Bracken Mountain, North Mills River, and Turkey Pen. The economic model for this region is built around Asheville, Hendersonville, and Brevard. **Table 1C** includes recent economic indicators for the Pisgah region.

**Table 1C**

<b>Economic Indicator Summary of Pisgah Region, 2015</b>	
<i>Indicator</i>	<i>Value</i>
Gross Regional Product	\$10,906,128,637
Total Personal Income	\$9,512,284,736
Total Employment	170,173
Number of Industries	324
Land Area (square miles)	527
Population	243,916
Total Households	104,858

# Study Region, Continued

## REGION FOUR: CHEOAH

The Cheoah study region includes the following common mountain biking areas at Tsali and Santeelah. The research team built the region's economic model around Robbinsville and Bryson City as these are the most common areas where mountain bikers would spend funds while visiting this region. **Table 1D** includes recent economic indicators for the Cheoah region.

**Table 1D**

<b>Economic Indicator Summary of Cheoah Region, 2015</b>	
<i>Indicator</i>	<i>Value</i>
Gross Regional Product	\$441,571,837
Total Personal Income	\$461,197,520
Total Employment	7,740
Number of Industries	145
Land Area (square miles)	531
Population	15,307
Total Households	6,430

## REGION FIVE: TUSQUITEE

The Tusquitee study region includes mountain biking areas Hanging Dog, Jackrabbit, and Ramsey Bluff. The research team built this region's economic model around Murphy and Andrews. **Table 1E** includes recent economic indicators for the Tusquitee region.

**Table 1E**

<b>Economic Indicator Summary of Tusquitee Region, 2015</b>	
<i>Indicator</i>	<i>Value</i>
Gross Regional Product	\$647,918,656
Total Personal Income	\$710,236,384
Total Employment	12,226
Number of Industries	165
Land Area (square miles)	409
Population	23,964
Total Households	10,209

## REGION SIX: NANTAHALA

The Nantahala study region includes mountain biking at Panthertown Valley. The economic model for this region is built around Brevard and Cashiers. **Table 1F** includes recent economic indicators for the Nantahala region.

**Table 1F**

<b>Economic Indicator Summary of Nantahala Region, 2015</b>	
<i>Indicator</i>	<i>Value</i>
Gross Regional Product	\$696,273,557
Total Personal Income	\$723,744,216
Total Employment	13,747
Number of Industries	191
Land Area (square miles)	179
Population	21,370
Total Households	9,338

# Economic Impact Categories

This separated by visitors and residents in the analysis. These figures account for group size and represent individual expenditures for each visit. The figures are presented as a mean, or average, value.

**Table 2A** lists the mean expenditures per visit by mountain bikers visiting western North Carolina. On average, expenditures are highest in the Pisgah study region, which includes Asheville as part of its study area. The mean values for the Appalachian and Tusquitee regions should be interpreted with caution due to low response rates.

**Table 2A**

<b>Mean Expenditures Per Visit By Visitor Mountain Bikers</b>						
<i>Sector</i>	Grandfather	Appalachian	Pisgah	Cheoah	Tusquitee	Nantahala
Lodging	\$28.08	\$50.00	\$64.62	\$48.50	\$36.23	\$57.08
Food & Drink at Restaurants	\$28.14	\$31.67	\$55.14	\$42.84	\$23.33	\$50.45
Food & Drink at Grocery Stores	\$16.86	\$10.00	\$27.32	\$29.13	\$14.93	\$19.26
Food & Drink at Gas Stations	\$5.33	\$10.00	\$7.34	\$8.85	\$10.92	\$9.40
Gasoline	\$20.69	\$21.67	\$27.06	\$27.71	\$23.37	\$23.17
Retail Purchases, Mtn Biking Gear	\$1.89	\$8.33	\$26.68	\$10.27	\$5.66	\$7.32
Other Retail Purchases, Excluding Food	\$7.53	\$0	\$11.57	\$14.02	\$7.68	\$10.86
Rental Gear	\$5.33	\$0	\$4.56	\$4.11	\$1.21	\$1.06
Mtn Biking Personal Guides	\$2.83	\$0	\$1.19	\$4.37	\$0	\$0.04
Personal Services	\$0	\$0	\$3.00	\$1.98	\$5.26	\$0
Rental Vehicles	\$0	\$0	\$1.19	\$0	\$0	\$0
Airplane Tickets	\$0	\$0	\$0.85	\$0	\$0	\$0
Taxi / Public Transport	\$0.17	\$0	\$0.69	\$0	\$0	\$0.21

# Economic Impact Categories, Continued

Likewise, **Table 2B** lists the mean expenditures per visit by mountain bikers who reside in western North Carolina. Again, Pisgah has the highest expenditures in general compared to the other study areas in this study. No expenditures are listed for the Appalachian and Tusquitee regions due to insufficient response rates.

**Table 2B**

<b>Mean Expenditures Per Visit By Resident Mountain Bikers</b>				
<i>Sector</i>	<b>Grandfather</b>	<b>Pisgah</b>	<b>Cheoah</b>	<b>Nantahala</b>
Lodging	\$2.77	\$17.83	\$3.13	\$4.29
Food & Drink at Restaurants	\$18.48	\$22.68	\$15.56	\$11.79
Food & Drink at Grocery Stores	\$11.98	\$20.98	\$5.83	\$8.10
Food & Drink at Gas Stations	\$1.43	\$3.86	\$3.33	\$0.95
Gasoline	\$14.02	\$20.44	\$14.93	\$15.71
Retail Purchases, Mtn Biking Gear	\$26.43	\$24.63	\$12.08	\$0
Other Retail Purchases, Excluding Food	\$2.23	\$6.49	\$0.42	\$0
Rental Gear	\$0	\$2.30	\$3.33	\$0
Mtn Biking Personal Guides	\$0	\$1.48	\$0	\$0
Personal Services	\$0	\$0	\$0	\$0
Rental Vehicles	\$0.18	\$0	\$0	\$0
Airplane Tickets	\$0	\$0	\$0	\$0
Taxi / Public Transport	\$0	\$0.11	\$0	\$0



# Economic Impact Modeling

## REGION ONE: GRANDFATHER

**Table 3A** details the economic impact of visitor mountain bikers in the Grandfather region. Here, visiting mountain bikers spend an estimated \$4 million annually. This estimate correlates with supporting 39 full-time jobs and over \$874,000 in labor income across the direct, indirect, and induced impact levels. Most of these jobs are projected to be in restaurants, personal services, lodging, and retail sales. Visiting mountain bikers support \$3 million in business revenues (output) and over \$1.5 million to the study area's gross regional product (value added).

Table 3A

Economic Impact Summary of Grandfather Region				
<i>Impact Type</i>	<b>Full-time Jobs Supported</b>	<b>Labor Income</b>	<b>Value Added</b>	<b>Output</b>
Direct	31	\$635,732	\$1,139,115	\$2,167,944
Indirect	4	\$112,441	\$206,645	\$469,241
Induced	4	\$126,040	\$237,267	\$455,441
<b>Total Effect</b>	39	\$874,212	\$1,583,027	\$3,092,626
<i>Estimates based on estimated annual visits of 34,800 and annual expenditures of \$4 million.</i>				

## REGION TWO: APPALACHIAN

**Table 3B** details the economic impact of visitor mountain bikers in the Appalachian region. In this region, visiting mountain bikers spend an estimated \$2.2 million each year. This supports the presence of 2 full-time jobs and a half million dollars in labor income. Jobs linked to mountain biking expenditures here are projected to be in restaurants, personal services and lodging. Mountain bikers also help generate an estimated \$1.9 million in business revenues and one million dollars in the gross regional product.

Table 3B

Economic Impact Summary of Appalachian Region				
<i>Impact Type</i>	<b>Full-time Jobs Supported</b>	<b>Labor Income</b>	<b>Value Added</b>	<b>Output</b>
Direct	16	\$408,317	\$777,131	\$1,329,105
Indirect	2	\$85,944	\$149,844	\$308,913
Induced	2	\$81,805	\$147,492	\$267,806
<b>Total Effect</b>	20	\$576,066	\$1,074,467	\$1,905,824
<i>Estimates based on estimated annual visits of 17,400 and annual expenditures of \$2.2 million.</i>				

# Economic Impact Modeling, Continued

## REGION THREE: PISGAH

**Table 3C** details the economic impact of visiting mountain bikers in the Pisgah region. In this region, visiting mountain bikers spend an estimated \$14 million dollars. This supports an estimated 198 jobs and \$5 million in job income. Here, job growth is almost entirely based in restaurants, lodging, and retail. In the Pisgah region, mountain bikers help create an estimated \$12 million in business revenues and contribute \$9 million to the gross regional product.

Table 3C

Economic Impact Summary of Pisgah Region				
<i>Impact Type</i>	<i>Full-time Jobs Supported</i>	<i>Labor Income</i>	<i>Value Added</i>	<i>Output</i>
Direct	161	\$3,846,925	\$6,907,493	\$7,934,726
Indirect	15	\$498,783	\$885,287	\$1,841,208
Induced	22	\$804,140	\$1,446,711	\$2,637,528
<b><i>Total Effect</i></b>	198	\$5,149,847	\$9,239,491	\$12,413,462
<i>Estimates based on estimated annual visits of 60,900 and annual expenditures of \$14 million.</i>				

## REGION FOUR: CHEOAH

**Table 3D** details the economic impact of visitor mountain bikers in the Pisgah region. In this region, visiting mountain bikers spend an estimated \$3.2 million dollars. This supports an estimated 35 jobs and \$804,000 in job income. These jobs are projected to be in restaurants, lodging, and grocers. Here, mountain bikers help create an estimated \$2.2 million in business revenues and contribute \$1.4 million to the gross regional product.

Table 3D

Economic Impact Summary of Cheoah Region				
<i>Impact Type</i>	<i>Full-time Jobs Supported</i>	<i>Labor Income</i>	<i>Value Added</i>	<i>Output</i>
Direct	30	\$666,048	\$1,170,218	\$1,704,812
Indirect	2	\$70,878	\$127,784	\$305,400
Induced	2	\$67,710	\$145,447	\$274,592
<b><i>Total Effect</i></b>	34	\$804,636	\$1,443,449	\$2,284,803
<i>Estimates based on estimated annual visits of 17,400 and annual expenditures of \$3.2 million.</i>				

# Economic Impact Modeling, Continued

## REGION FIVE: TUSQUITEE

**Table 3E** details the economic impact of visitor mountain bikers in the Tusquitee region. In this region, visiting mountain bikers spend an estimated \$2.2 million dollars. This supports an estimated 19 jobs and \$434,000 in job income. Here, job growth is almost entirely based in restaurants and lodging. Mountain bikers help create an estimated \$1.4 million in business revenues and contribute \$755,000 to the gross regional product in this area.

**Table 3E**

Economic Impact Summary of Tusquitee Region				
<i>Impact Type</i>	<b>Full-time Jobs Supported</b>	<b>Labor Income</b>	<b>Value Added</b>	<b>Output</b>
Direct	16	\$332,851	\$560,918	\$1,076,820
Indirect	2	\$51,445	\$95,197	\$221,922
Induced	1	\$50,440	\$99,154	\$187,243
<b>Total Effect</b>	19	\$434,737	\$755,269	\$1,485,984
<i>Estimates based on estimated annual visits of 17,400 and annual expenditures of \$2.2 million.</i>				

## REGION SIX: NANTAHALA

**Table 3F** details the economic impact of visitor mountain bikers in the Nantahala region. In this region, visiting mountain bikers spend an estimated \$4.6 million dollars. This supports an estimated 55 jobs and \$1.2 million in job income. Here, job growth is almost entirely based in restaurants and lodging. In the Nantahala region, mountain bikers help create an estimated \$3.6 million in business revenues and contribute \$2.3 million to the gross regional product.

**Table 3F**

Economic Impact Summary of Nantahala Region				
<i>Impact Type</i>	<b>Full-time Jobs Supported</b>	<b>Labor Income</b>	<b>Value Added</b>	<b>Output</b>
Direct	45	\$965,487	\$1,892,905	\$2,638,686
Indirect	5	\$122,119	\$211,021	\$490,136
Induced	5	\$148,860	\$290,282	\$561,449
<b>Total Effect</b>	55	\$1,236,466	\$2,394,208	\$3,690,271
<i>Estimates based on estimated annual visits of 26,100 and annual expenditures of \$4.6 million.</i>				

# Economic Impact Modeling, Continued

## TAX GENERATION

**Table 4** lists estimated taxation created by visitor mountain biker expenditures across five common areas. In state taxes, mountain bikers help create over a million dollars in production taxes and over \$200,000 in household taxes. At the Federal level, visiting mountain biker expenditures generate one million dollars in employee compensation taxes, a half million in household taxes, and nearly a half million in corporate taxes.

**Table 4**

<b>Annual Estimated Taxation Generated by Visitor Mountain Bikers</b>					
<i>Region</i>	<b>State Production Taxes</b>	<b>State Household Taxes</b>	<b>Federal Employee Comp. Taxes</b>	<b>Federal Household Taxes</b>	<b>Federal Corporate Taxes</b>
Grandfather	\$151,833	\$22,329	\$92,492	\$52,680	\$40,822
Appalachia	\$90,635	\$11,906	\$66,739	\$28,575	\$33,783
Pisgah	\$763,771	\$117,191	\$603,746	\$282,303	\$280,253
Cheoah	\$136,778	\$20,602	\$94,190	\$51,099	\$41,781
Tusquitee	\$77,833	\$9,653	\$47,006	\$21,665	\$18,130
Nantahala	\$247,152	\$29,881	\$166,732	\$80,421	\$52,096
<b>Totals</b>	\$1,468,002	\$211,562	\$1,070,905	\$516,743	\$466,865

## EXPENDITURES OF MOUNTAIN BIKERS WHO LIVE IN WESTERN NORTH CAROLINA

**Table 5** includes estimates of local residents and their funds spent mountain biking in the NPNF. It is important not to mistake local residents who spend money while mountain biking as economic impact as these funds are already present in the study area and are redirected from other potential expenditures in the study region. However, these amounts are worth noting. Additionally, 97% of local residents who completed the survey

**Table 5**

<b>Annual Estimated Mountain Biking Expenditures by Western North Carolina Residents</b>	
<i>Region</i>	<b>Annual Redirected Expenditures Estimate</b>
Grandfather	\$4,046,022.00
Pisgah	\$11,035,993.50
Cheoah	\$1,527,111.00
Nantahala	\$1,605,150.00
<i>Estimates based on estimated annual visits and mean expenditures for each region (see Table 2B).</i>	



# Demographics

**Table 6** describes the demographics of all mountain biker respondents in this study. Note that these statistics also include persons who may have been excluded from the economic impact study. The sample was 82% male. Over 70% of the sample made \$50,000 or more in individual annual income. A notable 34% of the sample had more than a four year college degree. Over one in five respondents owned their own businesses, with 23% of those businesses being in outdoor recreation. Almost one in five described their job as being in the outdoor recreation industry. The most common age category was between 36 and 50. Although not listed on Table 6, the sample was largely white and non-Latino/Hispanic.

**Table 6**

<b>Demographics of Sample</b>			
<i>Variable Category</i>	<i>Variable</i>	<i># Of Cases</i>	<i>% Of Cases</i>
Sex	Male	90	16.7%
	Female	444	82.4%
	Other Sex	5	0.9%
Income	\$0 - \$19,999	18	3.5%
	\$20,000 - \$29,999	20	3.9%
	\$30,000 - \$49,999	104	20.3%
	\$50,000 - \$74,999	118	23.0%
	\$75,000 - \$99,999	84	16.4%
	Greater than \$99,999	168	32.8%
Education	Less than BA / BS	112	20.9%
	BA / BS	242	45.1%
	Greater than BA / BS	182	34.0%
Business owner?	Yes, I do.	123	23.3%
	No, I do not.	405	76.7%
Job in outdoor recreation?	Yes, it is.	98	18.4%
	No, it is not.	435	81.6%
Age	18 - 35	179	33.1%
	36 - 50	234	43.3%
	51 - 64	107	19.8%
	65 and up	20	3.7%
<i>Do Not Record or Not Sure responses are not reported or included in percentages.</i>			

## OMISSIONS & CONSIDERATIONS

During the research process, the research team identified minor issues that should be noted. First, as with all economic impact studies, the findings in this report must be treated as estimations. This economic impact study utilizes mean figures to estimate expenditures that may vary from year to year, visit to visit, and person to person.

Second, the estimates in this report are framed around generalized expenditure categories. For example, lodging is distributed among campgrounds, cabins, and motels, but the survey made no distinction. Similarly, restaurants include full service (formal dining) and limited service (fast food) restaurants, but the survey made no distinction. Although economic impact studies often use this approach to save room on the survey, it may, nonetheless, be useful for future research to be more specific in these areas.

## OMISSIONS & CONSIDERATIONS, CONTINUED

Third, this study does not take into account length of visit and how this may alter the economic impact of the mean expenditures per visit. On average, respondents in this sample indicated they spent an average of three nights per visit.

Fourth, this study uses data from an online survey to create economic impact measures. Online surveys are not as accurate as in-person field surveys. We advise conducting an in-person field study to validate the results of this preliminary study.

Fifth, the inclusion of taxes and fees paid in making purchases may inflate economic impact estimates. For example, renting a cabin for one night may cost \$100 plus \$30 in fees and taxes and be misreported as a \$130 lodging purchase in the survey.

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## STUDY TERMINOLOGY & ABBREVIATIONS

**NPNF:** Nantahala and Pisgah National Forests

**Visitor:** A person who has responded in the survey that they *are not* a resident of western North Carolina.

**Resident:** A person who has responded in the survey that they *are* a resident of western North Carolina.

## ECONOMIC IMPACT TERMINOLOGY

**Direct effect** is the economic impact created by the presence of the economic activity. For example, if a local restaurant sells \$1K in food, its direct effect would be \$1K.

**Indirect effect** is economic activity created when local businesses purchase goods and services from other local industries as a result of the direct effect.

**Induced effect** is the estimated local expenditures by local households and employees as a result of income created from the direct effect.

**Labor income impact** is measured by the estimated labor income created by the economic activity in the region. This is a conservative measure of economic impact.

**Value added** is a measure of the increase in the study region's gross domestic product. Gross domestic product is a measure of all goods and services produced in the study area and is treated as a measure of the size of the economy.

**Output** is a measure of the increase in business sales revenue in the study area as a result of the economic impact being studied. It includes business revenues as well as costs of doing business. It includes value added as part of its calculation.