



Western North Carolina Outdoor Recreation Participation Survey





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Executive Summary

The Western North Carolina Outdoor Recreation Participation Survey, initiated in January 2023, aimed to establish a baseline for data collection supporting economic impact and benefit-cost analyses within the Building Outdoor Communities (BOC) program. Focusing on participants in outdoor recreation activities across 25 Western North Carolina (WNC) counties and the Qualla Boundary, the survey drew respondents from key states of origin for overnight visitors to WNC, including Georgia, North Carolina, South Carolina, Tennessee, and Virginia.

The sample comprised of 5,462 respondents from the five origin states, with 1,786 outdoor recreation participants, averaging four trips to the region over the last 12 months. Buncombe and Watauga Counties attracted 44% of all trips, with other notable destinations including Cherokee, Alleghany, Ashe, Avery, Henderson, and Jackson. Predominant activities on these trips included day hiking, nature viewing, and scenic driving.

Two-thirds of recent trips were overnight, with an average stay of 2.5 nights and an average travel party size of three. Hotel or motel accommodations constituted nearly 40% of overnight stays. Average spending per trip totaled \$479, with lodging, restaurant meals, travel, and entertainment accounting for 75% of expenditures. A substantial 94% of respondents expressed satisfaction with the quality of their outdoor recreation experience.

Visitation to recreation sites exhibited a negative correlation with travel costs and a positive correlation with income. So, as the cost of traveling to these recreational sites increases, the number of visits to these sites tends to decrease; however, as respondents' income goes up, they are more likely to take more trips. The direct injection of visitor spending into the regional economy creates over \$3.4 billion in regional economic activity (or gross regional product). When taking into consideration the multiplier effect, the visits to the region generate economic output of \$4.9 billion, equivalent to creating almost 48,000 full-time employment positions across various sectors in the regional economy and \$1.48 billion in labor income that otherwise would not have occurred. Finally, the total economic activity associated with recreation spending in the region generates \$197.5 million in regional-level tax revenues. Beyond direct spending, the economic benefit [to the travel party] was estimated at \$212 per trip, translating to a daily benefit of \$25 per person. This economic benefit represents the amount of money that the trip is worth to the recreationist, over and above what they had to spend to take the trip.

In summary, the Western North Carolina Outdoor Recreation Participation Survey offers a comprehensive analysis of outdoor recreation in the region, providing a foundation for understanding its economic significance and informing future research and decision-making processes.



WESTERN NORTH CAROLINA OUTDOOR RECREATION PARTICIPATION SURVEY

The total economic output from outdoor recreation visitor spending is

\$4.9 BILLION



which is equivalent to creating approximately

48,000 FULL-TIME JOBS

\$1.48 BILLION

in labor income

\$197.5 MILLION

in county-level tax revenue across the region

POPULAR ACTIVITIES

- DAY HIKING (50%)
- NATURE VIEWING (46%)
- FISHING (36%)
- CAR CAMPING (22%)
- MOUNTAIN BIKING (16%)

2/3 of recent trips were overnight, averaging a stay of **2.5 NIGHTS**



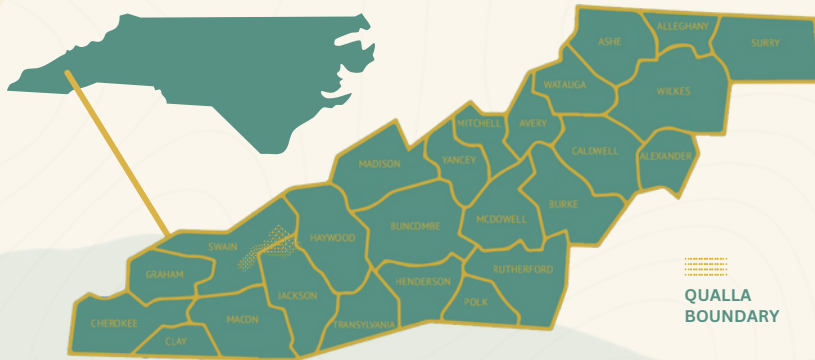
AVERAGE TRAVEL PARTY SIZE

\$479 : average spending per trip



94%

of respondents were satisfied with their outdoor recreation experience



The study focused on participants in outdoor recreation activities across **25 WESTERN NORTH CAROLINA COUNTIES & THE QUALLA BOUNDARY**

The Western North Carolina Outdoor Recreation Participation Survey, conducted in 2023, gathered data from 5,462 respondents in North Carolina and four neighboring states. Specifically, 1,786 respondents engaged in outdoor recreation across 25 WNC counties or the Qualla Boundary. This data supports regional and county-specific estimates for economic impact and benefit-cost analyses within the Building Outdoor Communities (BOC) program. The survey serves as a comprehensive analysis of outdoor recreation in the region, providing insights into its economic significance and guiding future research and decision-making efforts.



The MADE X MTNS (Made By Mountains) Partnership is working to expand the outdoor industry and economy across North Carolina's Appalachian region and catalyze rural development by building vibrant outdoor communities, growing outdoor businesses, and amplifying outdoor culture. For more information, visit madexmtns.com or @madexmtns

Introduction

The Western North Carolina Outdoor Recreation Participation Survey was designed to collect baseline data to support the economic impact and benefit-cost analysis as described in the Building Outdoor Communities (BOC) program. Survey development began in January 2023. A draft survey questionnaire was developed on the Qualtrics Platform and shared with BOC participants for comments and suggestions. The revised questionnaire was distributed to the Dynata Consumer Panel from February 21 to 24, 2023.

The survey targeted those who participate in outdoor recreation activities in 25 western North Carolina (WNC) counties and the Qualla Boundary. Respondents are from 5 of the top 6 states of origin for overnight visitors to WNC in 2019, according to Visit North Carolina (2021): Georgia (11%), North Carolina (31%), South Carolina (12.5%), Tennessee (5.8%), and Virginia (6.1%). Visitors from these states represented 66% of all overnight visitors to WNC in 2021.

In this report, we first describe the sample demographics and compare these to the population of the five states. We then determine the factors that affect outdoor recreation participation. With this sample of recreation participants, we determine the number of trips and characteristics of those trips. Next, we describe the characteristics of the most recent trip taken by the recreation participants. With these data, we estimate the economic benefits, over and above spending, of the trips and the regional economic impacts of the trips.

Technical details of our analysis are provided in Appendix A. In Appendix B, we extend the results described in this report for the region to the individual counties and the Qualla Boundary.

Demographics

The sample is 5,462 respondents from the five origin states. This includes 1,786 Dynata panelists who eventually qualified for the study. We first asked survey respondents to report the state that they lived in, and the survey ended for those who answered a state other than above. Fifty-seven percent of the sample lives in North Carolina and 12% lives in the WNC study region. Then, we asked five demographic questions: age, gender, race, education, and income. An important concern with survey research is the extent to which the sample is representative of the population. We compared these data to statistics provided by the US Census Bureau. A data summary for the variables included in the preamble to the survey is presented in Table 1. These variables are constructed to match statistics provided by the US Census Bureau (e.g., respondents aged 65+ instead of average age).

Variable	GA	NC	SC	TN	VA
Age 65+ (%)	20	17	22	24	24
Female (%)	63	62	66	66	68
White (%)	62	70	76	86	67
High School/ GED (%)	97	96	96	95	97
College (%)	38	34	38	31	41
Income (\$1000)	71	64	68	64	73
Sample size	942	2491	880	481	667

We observe that the proportion of respondents identifying as female is greater in the survey sample than in the overall population of each state. Among the remaining 25 comparisons, 14 variables deviate from representing the population accurately. Specifically, the sample exhibits fewer respondents aged 65 and over compared to North Carolina and Virginia populations. Additionally, the number of white respondents surpasses the population figures in South Carolina and Tennessee. The prevalence of high school graduates exceeds the state populations in all instances except North Carolina. In contrast, the number of college graduates is higher than the general population in South Carolina. Notably, income levels in the sample are higher than the population in all states except for Virginia, where the sample reflects lower income.

While several variables are not representative, the pattern is inconsistent across each state. Also, the distance between the sample and the population variables is only large for the gender variable. Considering this, we develop weights for the gender variable and use these in the remainder of the study. Weighted data will make our results more representative of the sample population.

We employed several standard practices to improve data quality. We removed those respondents with inconsistent answers to similar demographic questions answered at the beginning and end of the survey. For example, a respondent is removed if they say their age was between 18 and 24 years at the start of the survey but stated that their birth year makes them much older. We removed respondents who provided zip codes that were inconsistent with their state of residence. Respondents who did not answer key questions are also removed from the sample.

Outdoor Recreation Participation

The final question in the first section of the survey was the screener variable that led to the final sample. We asked respondents if they participated in any outdoor recreation activities from a list provided in any of the 25 WNC counties or the Qualla Boundary from January to December 2022. The participation rate is the percentage of the sample that has taken at least one outdoor recreation trip to the study region to at least one of the 26 recreation sites (counties and the Qualla Boundary). Recreation participation is measured as equal to 1 if the respondent participated in outdoor recreation in the study region in 2022. Thirty-three percent of the sample, 1,786 respondents, participated in outdoor recreation in the WNC study region.

We estimate the factors that affect recreation participation using regression analysis (see Appendix A for details). Respondents who live in NC are 1.5 times more likely to participate in outdoor recreation in the study region. Those who live in the study region are 3.3 times more likely to participate. Respondents who are between the ages of 18 and 24, 25 and 44, and 45 and 64 are 3.4, 3.3, and 1.8 times more likely to participate, respectively, relative to respondents who are 65 years old and older. Female respondents are 1.4 times less likely to participate. White respondents are 1.4 times more likely to participate. Each 100 miles further away from the study region decreases participation by 5%. Each year of schooling increases participation by 2%. Each \$10,000 in income increases participation by 1%.

Outdoor Recreation Trips

If the respondent answered “yes” to the outdoor recreation participation question, they proceeded to the rest of the questionnaire. We asked respondents to report the number of trips that they took to each county and/or the Qualla Boundary in western North Carolina in the past 12 months for the primary purpose of outdoor recreation. We asked respondents who visited more than one county on a single trip to choose the county where they spent the most time. The survey was programmed so that the number of trips taken to each site added to the number of trips the respondent reported taking in the past 12 months.

The trips variable is the average number of trips taken to each recreation site by the sample who took at least one trip to the WNC study site. Respondents take more than one trip to each site. The total number of trips is 3,891 made by 1,786 survey respondents. The trips variable is “top-coded” at the 99th percentile to mitigate the problem of outliers in statistical analysis.

The average number of recreation trips taken to the study region in the past 12 months is 4.24. Visitors who originate from Georgia take 3.44 trips, North Carolinians take 4.88 trips, and those from South Carolina, Tennessee, and Virginia take 3.23, 4, and 3.22 trips, respectively.

Table 2. Trips taken to the study region

Origin	Sample size	Trips	StdDev	Min	Max
North Carolina	1020	4.88	6.95	1	45
Tennessee	121	4.00	6.43	1	45
Georgia	230	3.44	4.28	1	45
South Carolina	276	3.23	2.9	1	25
Virginia	139	3.22	3.18	1	20

Each respondent could report more than one recreation activity that they took on these trips, and the average number of activities is 4. The three most popular activities on these trips were day hiking, nature viewing, and scenic driving, with between 43% and 50% of the sample participating. Between 22% and 36% of the sample participated in fishing, swimming, and car camping. Between 10% and 19% of the respondents participated in nine other activities.

Table 3. Most popular recreation activities in the study region

Hiking (day)	50%
Nature viewing	46%
Scenic driving	43%
Fishing	36%
Swimming	24%
Camping (car)	22%
Boating (motorized)	19%
Camping (RV)	18%
Hiking (backpacking)	18%
Cycling (mountain)	16%
Cycling (road)	15%
Kayaking / canoeing / tubing / paddling / boarding	14%
Birding	13%
Climbing	11%
Trail running	10%

Less than 10% of the survey respondents participated in activities: hunting, horseback riding, motorcycling, snowboarding/skiing/tubing, whitewater rafting, off-highway vehicle trail riding, skateboarding, and scuba diving.

Most Recent Trip

To obtain more detailed data, we then asked respondents questions about their most recent trip. Two-thirds of the most recent trips were overnight trips. The average number of nights stayed on these overnight trips was 2.5. The average number of people in the travel party was 3.

Variable	Label	Mean	Std Dev	Min	Max
Overnight	=1 if stayed overnight	66%	0.47	0	1
Nights	number of nights stayed (n=1174)	2.46	1.38	1	8
Party	party size	3.17	1.50	1	7
Typical	=1 if the typical trip	83%	0.38	0	1

The most popular overnight stay mode, 39%, is a hotel or motel. Nineteen percent of overnight stays are in a camper, RV, trailer, or van. Eleven percent of overnight trips stay with friends and/or family, and 10% stay in a short-term rental house. Five percent or less of all overnight stays are in a condo or townhouse, a public campground, a private campground, a resort, or something else (“other”).

Mode	Percent
Hotel/motel	39.27%
Camper / RV / Trailer / Van	19.25%
Stay with friends and/or family	11.16%
Short-term rental house	10.48%
Private campground	5.28%
Public campground	4.51%
Condo/townhouse	4.43%
Resort	3.66%
Other	1.96%

We then asked respondents how much money they spent on the most recent trip. We top-coded each spending category at the 99th percentile to avoid problems with outliers in statistical analyses. The average total amount of spending is \$479. The largest spending categories are lodging (\$124), restaurant meals (\$95), gasoline (\$75), and entertainment (\$67). Respondents spent less than \$50 on travel, souvenirs, groceries, gear, and “other.”

Variable	Mean	StdDev	Min	Max
Total Spending	\$479.23	559.65	0	5500
Lodging	\$124.35	244.31	0	1500
Restaurants	\$95.12	116.24	0	600
Gasoline	\$74.66	88.87	0	500
Entertainment	\$66.58	127.58	0	800
Groceries	\$47.86	93.97	0	600
Souvenirs	\$24.47	53.70	0	300
Gear	\$23.48	75.00	0	500
Travel	\$11.78	54.88	0	400
Other	\$11.10	44.78	0	300

Respondents were asked to consider the quality of the outdoor recreation experience on their most recent trip. Seventy-five percent of respondents were “very satisfied” with trip quality, and 19% were “somewhat satisfied.” Five percent were “neutral,” and less than one percent were dissatisfied. We asked respondents if the most recent trip was “one of [their] typical trips to western North Carolina for the primary purpose of outdoor recreation” after considering trip duration, activities, travel party, over-night stay, and location. Eighty-three percent of respondents reported that the most recent trip was typical. Of those who said that their trip was not typical, 23% say that they typically visit somewhere other than North Carolina, 19% say that their typical trip is of longer duration, 15% travel with more people, 14% take shorter trips and 13% take trips to different locations within North Carolina. Less than 5% state that their typical trips involve a different outdoor activity, fewer people, or a different over-night stay mode.

Economic Benefits

We use the travel cost method to estimate the demand for outdoor recreation trips to each county and the Qualla Boundary in the study region (see Appendix A)¹. The statistical results are as expected, i.e., the results conform to economic theory. The number of visits to each recreation site is negatively correlated with the travel cost to each site. The substitute travel cost is positively correlated with visits. In other words, the lower the cost of a visit to an alternative site, the fewer visits are taken to each recreation site. The number of visits is positively correlated with income. In other words, as income increases, a respondent takes more visits.

Consumer surplus is the economic benefit of a recreation trip, over and above the money spent. The consumer surplus per trip estimate from the recreation demand model (Appendix A) is \$212 with a 95% confidence interval of [\$169, \$255].

¹ The travel cost method is discussed in detail in the materials for Month 3 of the Building Outdoor Communities Program “Outdoor Economic Impact Toolkit”. The video discussion can be found at: < https://www.youtube.com/watch?v=n_0GiCBKH0Y>

Table 7. Consumer surplus per trip				
CS	SE	t-stat	95% Confidence interval	
\$212.17	21.89	9.69	\$169.26	\$255.09

The consumer surplus per day per person estimate is computed as the consumer surplus per trip divided by the product of the average number of days on the most recent trip and the number of people on the most recent trip (for those who took a typical trip). Consumer surplus per day per person is \$25. By comparison, The US Forest Service estimates that the “consumer surplus per activity day per person” ranges from \$21 for backpacking to \$139 for non-motorized boating (inflated to 2022 dollars by the consumer price index).² By this comparison, our consumer surplus estimates are reliable in that they are within a range of estimates developed from a large number of studies from the outdoor recreation literature.

Using an estimate of the number of trips taken for the primary purpose of outdoor recreation to the study region of 6.83 million (see Appendix A), we estimate that the annual aggregate benefit of outdoor recreation in the study region is \$1.45 billion.³

Economic Impacts

The 6.83 million estimated number of trips taken for the primary purpose of outdoor recreation is used to estimate further the total economic impacts of outdoor recreation across the region. Visitors traveling to the region from other parts of North Carolina or other states for recreation provide an injection of expenditures into the regional economy. The economic effects of these monetary injections consist of the direct impacts of local spending and the subsequent secondary impacts as these dollars circulate through local businesses and are, in turn, spent locally again. The initial injections of money and subsequent spending would not occur in the region in the absence of the recreation activity. The total economic impacts are then captured through developing a geographically specific input-output model. The key component of the input-output model is that it provides a conceptual insight into the relationship between direct spending from visitors and secondary effects through the multiplier process. To capture the initial injection of visitor spending, respondents were asked to report their expenditures from the last trip, broken out by spending category (hotels, restaurants, groceries, etc.).

² Randall S. Rosenberger, Eric M. White, Jeffrey D. Kline, and Claire Cvitanovich, Recreation Economic Values for Estimating Outdoor Recreation Economic Benefits from the National Forest System, General Technical Report PNW-GTR-957, August 2017.

³ The annual aggregate benefit is calculated as per-trip consumer surplus multiplied by the total number of trips taken to the study region.

At the regional level, Table 8 provides the average spending per trip for each spending category—the aggregate spending levels by spending category across the region as a whole. Annual total direct visitor spending is \$3.3 billion.

Spending Category	Spending (\$Millions)
Lodging	\$849.4
Restaurants	\$654.4
Gasoline	\$509.2
Entertainment	\$466.3
Groceries	\$339.4
General	\$337.0
Gear	\$170.8
Total	\$3,326.5

Economic impacts are estimated and presented in three major ways (employment, labor income, and economic output) to provide a complete picture of the impacts. The direct injection of visitor spending into the regional economy creates over \$3.4 billion in regional economic activity (or gross regional product). This is equivalent to creating 37,840 full-time equivalent jobs, generating over \$1.1 billion in labor income. This economic activity then spurs a further \$1.48 billion in business-to-business secondary activity as the multiplier effect takes hold. In total, the visits to the region generate economic output of \$4.9 billion. This level of economic activity is equivalent to creating almost 48,000 full-time employment positions across various sectors in the regional economy and \$1.48 billion in labor income that otherwise would not have occurred. Finally, the total economic activity associated with recreation spending in the region generates \$197.5 million in regional-level tax revenues.

Impact	Employment	\$Millions	
		Income	Output
Direct	37,840	\$1,109.6	\$3,418.4
Indirect	6,583	\$238.0	\$982.9
Induced	3,420	\$133.3	\$493.4
Total	47,843	\$1,481.0	\$4,894.8

Appendix A – Technical Details

Recreation Participation Model

Logistic regression is used to estimate the factors that are related to participation in outdoor recreation in WNC. Logistic regression is a type of regression analysis where the dependent variable is a “dummy” variable ($y = 0, 1$). A logistic regression model estimates the “log odds” of the outcome variable:

$$\ln\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta'x$$

Where $\ln(\cdot)$ is the natural logarithm, π is the probability that the event y occurs, $\frac{\pi}{1-\pi}$ is the “odds ratio”, $\ln\left(\frac{\pi}{1-\pi}\right)$ is the log odds ratio (i.e., “logit”), α is an estimated constant, β is a vector of estimated coefficients and x is a vector of independent variables. The logistic distribution constrains the estimated probabilities to lie between 0 and 1. The regression coefficients can be interpreted as odds ratios for the dummy (0,1) variables and marginal effects for the continuous variables. The odds ratio is computed as $\exp(\beta)$. The marginal effect of an independent variable on the predicted probability is equal to $\left(\frac{\pi}{1-\pi}\right)\beta$.

We employ a number of variables as potential factors affecting participation behavior. We calculated the distance variable (mindist) as the minimum of the 26 distances from the respondents’ home zip code to each of the 25 counties and the Qualla Boundary in the study region (distances are computed from Google Maps). The average minimum distance is 155 miles, with a minimum of 1 (those respondents who live in the region) and a maximum of 438 miles. The NC variable is equal to 1 if the respondent lives in North Carolina (46%). The Local variable is equal to 1 if the respondent lives in the study region (6%). The Female variable is equal to 1 if the respondent’s gender is female (51%). The age variables are dummies for respondents who are between the ages of 18 and 24 (11%), 25 and 44 (37%), and 45 and 64 (32%). The excluded category is respondents 65 and older (20%). The White variable is equal to 1 if the respondents’ race is white (71%). The school variable is the number of years of schooling (14 years). The income variable is 2022 household income in \$1000s (\$68.5).

The logistic regression model indicates that each of the demographic factors contributes to the explanation of who participates. Each 100 miles of distance further away from the study region decreases participation by 5%. Respondents who live in NC are 1.5 times more likely to participate in outdoor recreation in the study region. Those who live in the study region are 3.3 times more likely to participate. Respondents who are between the ages of 18 and 24, 25 and 44, and 45 and 64 are 3.4, 3.3, and 1.8 times more likely to participate, respectively, relative to

respondents who are 65 years old and older. Female respondents are 1.4 times less likely to participate. White respondents are 1.4 times more likely to participate. Each year of schooling increases participation by 2%. Each \$10,000 in income increases participation by 1%.

	Mean	Min	Max	Coeff.	SE	t-stat
Distance	154.66	1.05	438.26	-0.00255	0.00036	-7.16
NC	0.46	0	1	0.430	0.065	6.67
Local	0.06	0	1	1.186	0.144	8.21
Female	0.51	0	1	-0.359	0.062	-5.82
Age: 18-24	0.11	0	1	1.238	0.126	9.86
Age: 25-44	0.37	0	1	1.186	0.093	12.71
Age: 45-64	0.32	0	1	0.608	0.096	6.33
White	0.71	0	1	0.318	0.072	4.44
School	14.26	8	20	0.097	0.015	6.41
Income	68.50	20	225	0.005	0.001	7.65
Constant				-3.159	0.247	-12.77
Sample size	5462					
Model χ^2 (df)	714 (10)					

Recreation Demand Model

Single-site travel cost method recreation demand models are typically estimated with negative binomial count data regression models. Count data regression models statistically account for the fact that recreation trips are integers. The demand model is:

$$\ln v_{ij} = \alpha + \beta c_{ij} + \gamma ac_i + \delta m_i$$

where v_{ij} is the number of visits by individual $i = 1, \dots, 1786$, taken to site $j = 1, \dots, 26$, c_{ij} is individual i 's travel cost to site j , ac_i is the average travel cost to all recreation sites in the study region ($ac = \sum_{j=1}^J c_j / J$) and m_i is individual i 's household income. The average travel cost to all recreation sites is included to account for substitution possibilities. The estimated regression coefficients are α , β , γ and δ . The travel cost variable is measured as

$$c = o \times d + \theta \times w \times t$$

where o is the operating cost per mile, d is round-trip distance, θ is the opportunity cost of time, w is the wage rate and t is the round-trip time of travel (in hours). The operating cost per mile, \$0.2439 for a compact SUV, is from AAA's 2022 "Your Driving Costs" study, and w equals annual income divided by 2000 work hours. We also estimated the models with the minimum travel cost included, and most results were similar.

The negative binomial regression model indicates that the trip visitation data behaves as expected relative to economic theory. As travel costs rise, the number of visits falls (and vice versa). As the composite substitute travel cost variable increases, the number of trips to a particular site also increases. As income increases, the number of visits increases, indicating that outdoor recreation visits to the region are “normal goods”.

	Coeff.	SE	t-stat
Travel cost	-0.0047	0.0005	-9.69
Mean travel cost to all sites	0.0035	0.0005	7.01
Income	0.0042	0.0007	5.97
Constant	-1.9013	0.0469	-40.53
Dispersion Parameter	2.288	0.342	6.70
Pseudo R ²	0.315		
Sample size	46,436		

An elasticity facilitates understanding of the magnitude of the regression coefficient. In general, elasticity is the percentage of visits that change in response to percentage changes in an independent variable. A travel cost elasticity measures how sensitive visitors are to changes in the cost of a trip to the region. With a semi-log demand model, the elasticities are equal to the product of the regression coefficient and the variable's mean. The travel cost, substitute travel cost, and income elasticities are $\epsilon_c = \beta_c$, $\epsilon_{ac} = \gamma_{ac}$, and $\epsilon_m = \delta m$.

The absolute value of travel cost elasticity is not statistically different from one, which suggests that the percentage change in visits is equal to the percentage change in travel costs. So, a 10% increase in the travel cost of a trip to the region will cause a 10% decrease in the number of trips. This is termed “unitary elasticity”. The substitute travel cost elasticity is 0.68, and the income elasticity is 0.32.

Consumer surplus is the economic benefit of a recreation trip, over and above the money spent. The consumer surplus of a single recreation visit is: $CS = -\frac{1}{\beta_{TC}}$. The consumer surplus per visit is $CS = \frac{-1}{-0.00471} = \212 . Failure to include a measure of substitute travel costs will lead to upward biased consumer surplus estimates. If the average travel cost variable is not included, then the consumer surplus per visit is biased upwards, $CS = \frac{-1}{-0.00203} = \494 .

Appendix B presents a recreation demand model with interaction terms between the travel cost and the recreation site. This allows for an individual estimate of the consumer surplus per visit to each recreation site: $CS_j = -\frac{1}{\beta_{TC} + \beta_j}$, where $j = 1, \dots, 26$ sites.

Spending

In order to investigate the reliability of the spending variable, we conduct an ordinary least squares regression analysis with total spending as the dependent variable and the number of nights stayed, travel party size, whether the respondent lives in the study region, and whether the most recent trip was a typical trip as the primary independent variables. Total spending increases by \$139 for each night stayed and \$45 for each person in the travel party. Local respondents spend \$170 less, and respondents spend \$72 more on a typical trip. The variation in the independent variables explains almost 22% of the variation in spending. In contrast, before the spending data is top-coded, only 8% of the variation in spending is explained. This analysis suggests that the spending data is reliable and somewhat conservative, as many respondents may spend more on a typical trip to western North Carolina.

Variable	Coeff.	SE	t-value
Intercept	81.30	39.21	2.07
nights	138.82	7.68	18.07
party	44.67	8.19	5.46
typical	72.27	32.95	2.19
Local2	-170.10	38.45	-4.42
R2	0.216		
Sample size	1786		

Aggregate Number of Trips

The participation rate from the online survey has the potential to overestimate the aggregate number of outdoor recreation trips taken to the western NC region. The survey firm, Dynata, was contracted to provide a fixed number of completed interviews of western NC outdoor recreation participants. Dynata did not conduct a random sample of their panel but attempted to minimize the number of interviews with panelists who did not participate in outdoor recreation. To minimize this number, a survey firm will present the invitation to complete the survey to panelists who live close to the study region and exhibit characteristics that make them more likely to participate in outdoor recreation. Naively applying the participation rate from our data leads us to estimate the aggregate number of outdoor recreation trips of 19 million in 2022.

In contrast, Visit NC⁴ estimates that there were 43 million “person trips” taken by 11.5 million visitors in a 23-county western North Carolina region in 2022. Eight-five percent of these trips were for the primary purpose of leisure and, dividing this by the average party size of 2.5, yields an estimate of 14.62 million leisure trips. In 2022, 73% of leisure trips originated from NC (37%), GA (12%), SC (12%), VA (5%) and TN (7%). So, the Visit NC estimate of the number of leisure trips originating from our 5-state sample is 10.67 million.

⁴ <https://partners.visitnc.com/contents/sdownload/73349/file/2022+North+Carolina+Regional+Visitor+Profile.pdf>

Not all of these visits are for the primary purpose of outdoor recreation. Visit NC reports that 32% of overnight visitors to the mountain region participate in hiking, and 10% participate in other nature activities. Eighteen percent visit state parks and recreation areas, and 10% visit national parks and recreation areas. These categories and others in the Visit NC study may overlap, so there is some additional uncertainty about the best estimate of the aggregate number of visitors. At the least, we know that 32% of overnight visitors are hiking.

In order to estimate the number of aggregate trips, we begin with the Visit NC estimates of 10.67 million leisure trips, with 32% of those involving the hiking activity. The number of trips that include is, therefore, 3.415 million ($10.67 \times .32$). Our sample is composed of outdoor recreation trips and 50% of those involve hiking (Table 4). An estimate of the total number of outdoor recreation trips is obtained by scaling up Visit NC's estimate of hiking trips by our estimate of the number of trips that involve hiking. We obtained an estimate of 6.83 million trips by dividing our population of 3.415 million by 50%. Our estimate suggests that 64% of all of Visit NC's leisure trips involve an outdoor recreation activity.

Since it is difficult to determine the 23 counties in the Visit NC region and unclear how to adjust that number for our study region, we use the 23-county estimate of trips from Visit NC as our estimate of the total number of visits to the 25-county and the Qualla Boundary BOC study region. In order to develop estimates of the number of trips taken to each of the 26 study sites, we will use the percentage of trips taken to each county and the Qualla Boundary from our survey.

Economic Impact Analysis

In the economic impact model, aggregate spending levels, by category, are disaggregated by county. The total number of trips to each county are estimated using the ratio of county-level participation-weighted trip counts to the total number of trips. Total county-level spending estimates, by county, are estimated by multiplying the average spending levels, by category, by the estimated county-specific trips. These county-level spending flows constitute a direct injection of recreation-based expenditures from outside the region, kick-starting a chain reaction of secondary spending that generates total economic impacts that would not occur absent the recreation activity. The total economic impacts are estimated through developing a geographically-specific input-output model. The key component of the input-output model is that it provides a conceptual insight into the relationship between direct and secondary effects through the multiplier process. Direct visitor-related expenditures equate with a certain level of economic activity. These are termed "direct effects". The direct flows associated with this are then disbursed in five different ways. Three local recipients (businesses, households, and local government) and two non-local recipients (non-local governments and other non-local leakages). The three local recipients of the disbursement will continue to spend this money in the same five ways over successive rounds of spending. These are termed "secondary effects" and comprise both indirect and induced effects. Indirect effects are business-to-business purchases in the supply chain occurring in the region of interest stemming from the initial direct expenditure flows. Induced effects reflect subsequent spending stemming from changes in household income from employees within the business supply chain.

The model of choice for this project is the IMPLAN model. IMPLAN is an input-output model that uses financial flow data generated from businesses' accounting data, and spending patterns for households of particular income levels, to describe the economic linkages that exist within a regional economy. These models begin with U.S. government-generated county-level data on business purchases and receipts in order to model the inputs that are used from across the many sectors of the economy in the production of particular goods and services. The level of geographic and commodity detail can vary from production of printing ink, to banking services, to retail services, and in a geographic area as small as a county or as large as the national economy. The most commonly reported and useful level of detail is county-level geography at the North American Industry Classification System (NAICS) level of commodity detail.

Economic impacts can be measured in different ways. We estimate and present impacts in three major ways to provide a complete picture of the impacts. The expenditure flows create jobs. Thus, a job count is an appropriate way to measure impact. It is also an intuitive concept and provides a broad measure of economic opportunities created for workers. However, it has the shortcoming that not all jobs are equal, and differences in industry structure between regions and differences in pay for similar jobs due to other factors (e.g., quality of life) may mean that jobs in one region are different from jobs in another region. Relying on jobs alone would overlook the implications of a region that creates low-paying manufacturing jobs at the expense of relatively higher-paid service-sector employment. Regional employment created by the recreation activity is reported.

Perhaps the most widely accepted measure of economic impact is the change in total industry output, or gross regional product (GRP). The change in output attributable to the expenditure flows represents the change in the annual value of production, by industry. Essentially, the change in output can be thought of as the increase in the value of sales plus or minus inventory. We report the economic impacts in terms of output contributions. Further, the additional employment and output create labor income in the region. Labor income is also reported. As such, the analysis quantifies the impact of expenditure flows on the local economy in terms of employment generation, its contribution to local output, and labor income.

Modeling assumptions for the analysis are made. First, some of the spending categories in the survey instrument are at a more aggregated level than the input-output model. For example, restaurant expenditures can be at either full-service, limited-service, or other drinking and food establishments. Similarly, entertainment spending can be attributed to different input-output sectors. The restaurant and entertainment sectors are aggregated in the model to account for this. Also, all spending flows are assumed to be at the producer price level. As such, no margins are applied for the cost of production or transportation in the spending chain.

Appendix B – Data Summary and Results by County and the Qualla Boundary

Table B1. Annual participation and trips

	Location	Trips	StdDev	Min	Max
Alexander	8%	1.94	2.36	1	15
Alleghany	12%	1.93	3.75	1	45
Ashe	11%	1.87	3.14	1	45
Avery	11%	2.05	3.98	1	45
Buncombe	29%	2.25	3.66	1	45
Burke	9%	2.56	4.26	1	33
Caldwell	8%	2.73	6.00	1	45
Cherokee	14%	1.90	2.79	1	35
Clay	5%	2.34	5.89	1	45
Graham	5%	1.53	1.40	1	10
Haywood	9%	1.71	2.68	1	30
Henderson	10%	1.67	1.60	1	15
Jackson	10%	1.91	2.13	1	16
Macon	6%	1.62	1.38	1	10
Madison	6%	1.81	2.26	1	17
McDowell	5%	1.55	1.27	1	7
Mitchell	3%	2.60	7.28	1	45
Polk	6%	1.79	4.03	1	45
Qualla Boundary	7%	1.62	1.72	1	14
Rutherford	5%	1.78	1.80	1	12
Surry	7%	2.23	2.32	1	15
Swain	7%	1.61	1.48	1	13
Transylvania	7%	1.99	3.49	1	30
Watauga	15%	2.17	3.65	1	45
Wilkes	8%	1.92	1.88	1	10
Yancey	3%	2.19	3.20	1	20

Table B2. Characteristics of a most recent trip						
Location	Location	Overnight	Nights	Party	Satisfied	Typical
Alexander	2.1%	76%	1.55	3.16	92%	79%
Alleghany	3.3%	64%	1.47	2.92	86%	71%
Ashe	7.1%	65%	1.37	3.09	96%	82%
Avery	3.6%	69%	2.16	3.34	92%	91%
Buncombe	12.5%	65%	1.55	2.99	95%	82%
Burke	4.0%	76%	1.82	3.01	97%	88%
Caldwell	3.1%	61%	1.52	3.34	93%	80%
Cherokee	14.9%	76%	1.73	3.13	94%	85%
Clay	2.6%	60%	1.38	2.83	91%	77%
Graham	1.8%	69%	1.84	3.88	88%	75%
Haywood	3.2%	74%	1.86	3.48	98%	88%
Henderson	5.4%	56%	1.61	3.23	96%	86%
Jackson	3.4%	72%	1.55	3.15	93%	80%
Macon	2.0%	71%	2.37	3.31	100%	91%
Madison	2.4%	64%	1.60	3.64	93%	74%
McDowell	1.8%	63%	1.63	2.91	88%	75%
Mitchell	1.1%	63%	2.00	3.05	100%	95%
Polk	3.0%	62%	1.49	3.43	87%	74%
Qualla Boundary	2.1%	81%	2.08	3.30	100%	92%
Rutherford	2.1%	61%	1.84	3.39	95%	71%
Surry	2.7%	37%	0.69	3.14	94%	73%
Swain	2.2%	72%	1.92	2.90	97%	87%
Transylvania	2.7%	57%	1.69	3.12	94%	88%
Watauga	6.9%	59%	1.52	3.38	97%	90%
Wilkes	3.5%	53%	1.24	2.97	97%	84%
Yancey	0.4%	43%	0.86	3.29	86%	43%

Table B3. Overnight trip mode of stay on most recent trip									
	Mode ^a								
Location	1	2	3	4	5	6	7	8	9
Alexander	18%	5%	39%	3%	0%	3%	0%	5%	3%
Alleghany	15%	7%	25%	3%	0%	2%	2%	8%	2%
Ashe	13%	2%	33%	2%	2%	4%	1%	6%	2%
Avery	16%	2%	11%	0%	3%	14%	5%	13%	6%
Buncombe	9%	4%	29%	2%	3%	11%	1%	8%	0%
Burke	19%	6%	32%	4%	6%	1%	0%	7%	1%
Caldwell	18%	9%	16%	2%	5%	2%	2%	7%	0%
Cherokee	19%	1%	31%	6%	6%	4%	4%	3%	0%
Clay	9%	6%	28%	4%	2%	2%	2%	4%	2%
Graham	6%	0%	25%	6%	3%	13%	0%	13%	3%
Haywood	14%	5%	28%	3%	0%	10%	2%	12%	0%
Henderson	6%	1%	25%	3%	4%	8%	4%	4%	0%
Jackson	8%	3%	28%	0%	2%	8%	7%	13%	2%
Macon	14%	6%	17%	0%	6%	9%	6%	9%	6%
Madison	12%	0%	29%	2%	2%	12%	0%	5%	2%
McDowell	0%	0%	41%	3%	6%	0%	6%	6%	0%
Mitchell	5%	5%	21%	5%	16%	0%	0%	11%	0%
Polk	28%	2%	17%	0%	2%	0%	0%	11%	2%
Qualla Boundary	16%	3%	41%	5%	5%	0%	3%	8%	0%
Rutherford	13%	5%	24%	0%	0%	11%	3%	5%	0%
Surry	0%	2%	14%	0%	4%	4%	0%	10%	2%
Swain	10%	5%	23%	5%	5%	10%	8%	5%	0%
Transylvania	4%	0%	14%	14%	2%	10%	4%	8%	0%
Watauga	8%	2%	17%	2%	3%	16%	1%	7%	2%
Wilkes	15%	2%	16%	0%	2%	3%	2%	13%	2%
Yancey	14%	0%	29%	0%	0%	0%	0%	0%	0%
^a Note: 1. Camper/RV/Trailer/Van 2. Condo/Townhouse 3. Hotel/motel 4. Public Campground 5. Private Campground 6. Short-term rental house 7. Resort 8. Friends/family 9. Other									

Table B4. Travel cost demand model with interactions			
	Coefficient	Std.Error	t-state
Constant	-1.7912	0.0470	-38.09
TC	-0.0048	0.0006	-8.10
AVGTC	0.0032	0.0005	5.87
INCOME	0.0044	0.0007	6.16
TC X Alleghany	0.0019	0.0003	6.89
TC X Ashe	0.0010	0.0003	3.27
TC X Avery	0.0012	0.0003	3.46
TC X Buncombe	0.0037	0.0003	10.98
TC X Burke	-0.0010	0.0004	-2.28
TC X Caldwell	-0.0004	0.0004	-1.16
TC X Cherokee	0.0018	0.0004	4.81
TC X Clay	-0.0014	0.0004	-3.38
TC X Graham	-0.0007	0.0004	-1.67
TC X Haywood	-0.00005	0.0004	-0.12
TC X Henderson	0.0002	0.0004	0.39
TC X Jackson	0.0005	0.0004	1.26
TC X Macon	-0.0013	0.0005	-2.82
TC X Madison	-0.0013	0.0005	-2.89
TC X McDowell	-0.0034	0.0005	-6.68
TC X Mitchell	-0.0055	0.0006	-9.57
TC X Polk	-0.0023	0.0005	-4.60
TC X Qualla Boundary	-0.0006	0.0004	-1.36
TC X Rutherford	-0.0034	0.0005	-6.41
TC X Surry	-0.0022	0.0005	-4.32
TC X Swain	-0.0004	0.0005	-0.95
TC X Transylvania	-0.0014	0.0005	-2.87
TC X Watauga	0.0015	0.0004	3.38
TC X Wilkes	-0.0015	0.0005	-3.33
TC X Yancey	-0.0054	0.0007	-8.00
Dispersion parameter	2.248	0.322	6.99
Pseudo R ²	0.3085		
Sample size	46,430		
Note: Alexander is the omitted category			

Table B5. Consumer surplus estimates					
	CS	SE	t-stat	95% Confidence Interval	
Alexander	208.97	25.80	8.10	158.40	224.85
Alleghany	348.65	66.55	5.24	218.21	358.92
Ashe	266.96	43.23	6.18	182.23	279.07
Avery	275.12	43.90	6.27	189.08	287.41
Buncombe	919.63	446.37	2.06	44.75	923.67
Burke	174.15	21.22	8.21	132.56	190.24
Caldwell	191.83	22.97	8.35	146.80	208.19
Cherokee	339.49	57.51	5.90	226.78	351.05
Clay	162.04	14.55	11.14	133.52	183.87
Graham	182.96	18.64	9.82	146.43	202.21
Haywood	206.69	28.51	7.25	150.81	220.90
Henderson	216.56	29.74	7.28	158.27	230.83
Jackson	234.54	32.32	7.26	171.20	248.77
Macon	164.11	17.50	9.38	129.81	182.49
Madison	163.49	18.07	9.05	128.07	181.23
McDowell	122.50	11.38	10.77	100.20	143.61
Mitchell	96.92	7.66	12.66	81.91	121.73
Polk	140.57	14.01	10.03	113.10	160.23
Qualla Boundary	186.28	21.57	8.64	144.00	203.21
Rutherford	122.23	10.85	11.26	100.96	144.30
Surry	143.85	14.76	9.75	114.92	162.96
Swain	191.91	22.41	8.56	147.98	208.69
Transylvania	161.45	18.00	8.97	126.17	179.03
Watauga	299.82	56.76	5.28	188.57	310.17
Wilkes	158.96	17.00	9.35	125.63	177.29
Yancey	98.35	7.93	12.40	82.81	122.66

Table B6. Consumer surplus per person per day			
	Days	Party	CS/person/day
Alexander	2.47	2.92	48.61
Alleghany	2.55	3.16	71.11
Ashe	2.37	3.09	63.13
Avery	3.16	3.34	38.16
Buncombe	2.55	2.99	198.16
Burke	2.82	3.01	31.76
Caldwell	2.52	3.34	37.85
Cherokee	2.73	3.13	62.53
Clay	2.38	2.83	41.40
Graham	2.84	3.88	25.61
Haywood	2.86	3.48	31.87
Henderson	2.61	3.23	41.73
Jackson	2.55	3.15	48.04
Macon	3.37	3.31	20.88
Madison	2.60	3.64	28.13
McDowell	2.63	2.91	25.94
Mitchell	3.00	3.05	15.87
Polk	2.49	3.43	27.46
Qualla Boundary	3.08	3.30	27.15
Rutherford	2.84	3.39	19.55
Surry	1.69	3.14	65.96
Swain	2.92	2.90	34.44
Transylvania	2.69	3.12	30.53
Watauga	2.52	3.38	58.52
Wilkes	2.24	2.97	43.13
Yancey	1.86	3.29	34.92
Note: Days is equal to Nights + 1			

Table B7. Aggregate Benefits of Outdoor Recreation Trips		
Location	Total trips	Aggregate Benefit
Alexander	224,829	46,982,619
Alleghany	365,213	127,330,853
Ashe	325,187	86,812,443
Avery	340,139	93,578,133
Buncombe	1,006,467	925,581,431
Burke	336,799	58,652,792
Caldwell	342,512	65,702,800
Cherokee	396,272	134,529,037
Clay	168,055	27,231,166
Graham	112,454	20,574,614
Haywood	246,970	51,046,309
Henderson	251,531	54,471,615
Jackson	281,094	65,927,752
Macon	139,579	22,906,324
Madison	169,614	27,730,248
McDowell	109,302	13,389,495
Mitchell	108,173	10,483,849
Polk	158,717	22,310,864
Qualla Boundary	170,279	31,719,584
Rutherford	128,678	15,728,292
Surry	239,985	34,521,850
Swain	167,884	32,218,626
Transylvania	199,866	32,268,316
Watauga	514,473	154,249,398
Wilkes	231,201	36,751,641
Yancey	95,189	9,361,943

Location	Total	Entertainment	Lodging	Restaurants	Gasoline	Travel	Souvenirs	Groceries	Gear	Other
Alexander	421.58	87.37	90.17	74.61	75.59	6.61	19.56	32.49	18.73	16.44
Alleghany	567.82	80.24	104.32	101.95	73.76	39.08	29.95	61.74	63.00	13.79
Ashe	419.50	44.90	112.38	76.92	76.59	13.71	24.06	41.50	20.75	8.70
Avery	566.91	99.23	132.13	113.30	84.02	11.91	22.00	72.27	17.36	14.70
Buncombe	493.79	61.33	168.04	105.79	65.71	11.86	21.36	32.85	17.98	8.87
Burke	461.04	64.72	85.72	82.67	71.31	12.43	22.01	59.39	40.08	22.71
Caldwell	424.39	55.00	60.21	93.45	82.77	19.05	22.57	53.95	21.95	15.45
Cherokee	517.27	69.55	126.26	106.34	89.45	8.46	37.55	49.82	23.07	6.76
Clay	426.75	57.94	83.43	73.94	67.70	17.13	19.36	54.15	31.83	21.28
Graham	816.44	173.47	122.31	191.91	91.13	24.84	57.66	72.34	59.34	23.44
Haywood	654.50	69.48	215.76	122.90	95.35	32.31	23.79	63.31	18.26	13.35
Henderson	473.15	48.27	172.39	98.37	67.07	5.77	19.63	29.19	24.84	7.63
Jackson	471.80	85.75	86.02	108.53	72.23	16.80	18.85	54.96	17.43	11.22
Macon	587.20	61.71	134.69	110.06	89.14	14.63	23.00	81.29	41.37	31.31
Madison	422.57	51.91	89.12	74.11	69.86	7.14	23.10	68.17	34.41	4.76
McDowell	301.06	61.94	82.28	70.22	41.72	5.19	6.50	28.44	2.88	1.91
Mitchell	577.95	104.58	101.05	83.79	98.05	11.84	47.63	68.53	32.47	30.00
Polk	315.30	51.89	53.58	52.72	72.17	7.17	8.59	40.70	18.02	10.47
Qualla Boundary	541.16	81.78	136.62	74.19	91.68	20.70	29.87	61.54	35.32	9.46
Rutherford	612.92	83.29	180.45	125.58	85.18	6.32	23.58	72.24	29.50	6.79
Surry	306.94	46.51	82.27	68.39	45.78	10.82	15.06	26.27	3.86	8.00
Swain	479.51	75.26	153.05	91.54	63.87	3.72	18.85	48.72	14.74	9.77
Transylvania	429.98	65.61	102.96	82.67	60.92	12.25	24.29	52.57	19.18	9.53
Watauga	455.00	53.83	156.65	89.13	68.67	3.67	21.92	38.63	14.44	8.07
Wilkes	393.24	67.44	69.71	79.79	62.00	7.02	21.16	45.40	30.57	10.16
Yancey	300.81	0.00	80.00	75.81	60.00	0.00	14.29	37.86	18.57	14.29

Table B9. Aggregate Impacts of Outdoor Recreation Trips			
Location	Output	Employment	Labor Income
Alexander	\$82,558,135	957	\$23,108,508
Alleghany	\$222,993,089	2,436	\$67,283,676
Ashe	\$135,986,909	1,452	\$36,293,789
Avery	\$183,531,944	1,921	\$64,132,068
Buncombe	\$571,650,642	4,793	\$201,110,164
Burke	\$160,907,629	1,774	\$47,403,415
Caldwell	\$160,688,538	1,722	\$47,909,817
Cherokee	\$211,844,135	2,112	\$56,982,462
Clay	\$68,693,452	853	\$18,084,338
Graham	\$90,827,785	893	\$23,632,104
Haywood	\$147,960,426	1,445	\$47,894,819
Henderson	\$99,932,877	926	\$33,537,464
Jackson	\$150,058,634	1,440	\$52,382,852
Macon	\$91,510,495	841	\$31,084,610
Madison	\$68,102,943	753	\$20,382,292
McDowell	\$28,208,712	299	\$8,069,737
Mitchell	\$64,993,699	692	\$20,174,144
Polk	\$43,674,302	520	\$11,846,165
Qualla Boundary	\$101,178,216	958	\$33,294,711
Rutherford	\$77,309,040	744	\$22,523,734
Surry	\$76,486,923	767	\$23,334,659
Swain	\$71,775,400	729	\$23,660,693
Transylvania	\$89,442,911	859	\$28,049,198
Watauga	\$235,798,640	2,323	\$77,126,009
Wilkes	\$102,912,629	1,103	\$29,066,400
Yancey	\$22,164,295	222	\$6,375,885