



# Economic Impact of Rock Climbing in Kentucky's Red River Gorge

James N. Maples, PhD

Michael Bradley, PhD





A woman with dark hair, wearing a bright pink tank top, blue leggings, and a climbing harness, is seen from the side as she ascends a steep, textured rock face. She is using her hands and feet to grip the rock, with a rope visible nearby. The background shows a lush, green forest with trees and foliage, suggesting a natural climbing area.

## Executive Summary

- EKV's Division of Regional Economic Assessment and Modeling (DREAM) conducted a 2020 economic impact study of climber expenditures in the Red River Gorge climbing region.
- The researchers estimate climbers visiting the Red River Gorge spend an estimated \$8.7 million annually with over 102,000 climber visits per year.
- On a typical trip, climbers spend an estimated \$74 per person per trip plus an additional \$5-\$40 for lodging.
- Climber expenditures support \$2.6 million in local wages and an estimated 104 jobs in a typical year.
- Results indicate the Red's climbers are highly aware of Leave No Trace knowledge which helps limit their impact on natural areas.
- Red River Gorge climbers are well-educated with 44% holding a bachelor degree and another 40% holding advanced degrees.
- Following COVID-19 closures in early 2020, climbing visitation adapted by extending into the summer season and revisiting less-used areas. The end result was no change in annual visitation.



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## Meet Your Research Team



**Dr. James Maples** is an Associate Professor of Sociology and Director of the Division of Regional Economic Assessment and Modeling (DREAM) at Eastern Kentucky University. His research agenda examines transitional rural economies with a focus on utilizing outdoor recreation as a sustainable base of economic growth.



**Dr. Michael J. Bradley** is an Associate Professor in the Department of Parks, Recreation, and Hospitality Administration at Arkansas Tech University. He is also the director of Red Dirt Consulting. His professional and academic interests include human dimensions of natural resource and wildlife; beer, wine, and spirits; and recreation and tourism as economic development tools.



## Methodology

This study examined the economic impact, use patterns, Leave No Trace knowledge, and demographics of climbers visiting Kentucky's Red River Gorge area.

### Study Area

For this study, the Red River Gorge climbing region is defined as including Estill, Lee, Menifee, Powell, and Wolfe Counties in Kentucky. This covers the towns, cities, and places where climbers are likely to spend money during their trip, as well as the main corridors (such as the Bert T. Combs Mountain Parkway) used to access the region. This area also includes portions of the Daniel Boone National Forest (DBNF) which includes the Red River Gorge Geological Area. Note that the term Red River Gorge in this study will refer to the wide collection of crags and climbing areas located in the study area, not the Geological Area.

Rock climbing began in the late 1960s in the Red River Gorge. Ron Stokley and Dieter Britz recorded the earliest first ascents there in November 1969 at Tower Rock on the DBNF Climbing visitation surged in the late 80s alongside the rise in sport climbing's popularity. The 2004 founding of both Muir Valley and Pendergrass-Murray Recreational Preserve soon led to the bulk of climbing routes in the region being located outside the Red River Gorge Geological Area and off the DBNF. The Red River Gorge later served as the location for the 2007 Petzl RocTrip which firmly established the region as a world-famous climbing location.

### Data Collection

This study used an online survey containing questions examining climber expenditures, use patterns, Leave No Trace (LNT) knowledge as it pertains to climbing impacts, and demographics. The survey is available upon request. Variables are summarized and described throughout the report by topic. Data were collected from March 15, 2020 to November 15, 2020. The survey was released to the Access Fund email/social media lists in both spring and fall as well as RRGCC and Muir Valley email/social media throughout the year. In all, 2,310 persons initiated the survey. As the exact population of climbers in the Red is unknown, the authors treated this as a convenience sample. In the event a respondent did not answer a particular question or stopped the survey before completing it, their responses are included up to the moment they discontinued the survey. In a few cases, climbers were also interviewed or included in focus groups to fact-check variables like visitation estimates as explained later in the report.

### Data Cleaning

Additional data cleaning is required specifically for the economic impact variables to ensure conservative, reliable estimates. These include the following common methodological steps of excluding persons who did not climb in the Red over the last year (135 cases), persons with abnormal stays (operationalized as three standard deviations from the mean, here over 31 nights, 24 cases), groups with eight or more persons (24 cases), and persons living in the study area (56 cases). Note their responses are included in the remainder of the study. Local resident expenditures are summarized separately but not included in the economic impact estimates.

Additional steps to reduce overestimation include recoding retail purchases over \$500 as missing data. In the present study, three persons' expenditures in recreational retail inside the study area were recoded as missing data. One additional case of retail expenditures outside the study area but inside Kentucky was recoded as missing data.



## Climber Visitation and Use Patterns

Table One examines climber use patterns for the Red River Gorge. On average, respondents indicate climbing there around 21 days per year. Note this could be one long trip or multiple shorter stays. In comparison, respondents indicated spending over 100 days visiting climbing gyms in any location.

Table One also describes respondents' climbing interests when visiting the Red River Gorge. In all, 93% indicated they engage in sport climbing while around 39% indicated they engage in trad climbing there. Top-roping (20%) and bouldering (16%) were the next two most-popular climbing interests in the Red River Gorge, while few were interested in mixed (5%) or ice climbing (3%).

As a related historical note, the Red River Gorge was primarily a traditional (or trad) climbing destination until sport climbing rose in popularity in the 1980s in Oregon. Whereas trad climbing uses removable fall protection in existing cracks and rock features, sport climbing utilizes permanent anchors for safety. These permanent anchors also allow climbers to ascend otherwise featureless areas commonly found in the Red River Gorge. During the mid late 80s and 90s, the Red became known as a sport climbing destination. Today, it remains famous among the popular sport climbing destinations around the globe.

The increasing popularity of gym climbing has created the presupposition that climbers often begin their climbing experiences indoors. In the case of the Red River Gorge, this expectation does appear accurate as over half of climbers indicated first starting climbing in gyms while 27% began outdoors. The remainder started climbing in both around the same time.

**Table One: Climber Use Patterns**

Variable	N	Min	Max	Mean	SD
Days spent climbing in Red River Gorge yearly (any kind of outdoor climbing)	2,079	0	365	20.97	32.66
Days spent climbing in a gym in any state yearly	2,079	0	351	103.51	68.73
Interested in Trad climbing in RRG	2,235	0	1	.39	.48
Interested in Sport climbing in RRG	2,235	0	1	.93	.24
Interested in Bouldering in RRG	2,235	0	1	.16	.37
Interested in Mixed climbing in RRG	2,235	0	1	.05	.23
Interested in Ice climbing in RRG	2,235	0	1	.03	.19
Interested in Top-rope only in RRG	2,235	0	1	.20	.40
Started climbing indoors	2,056	0	1	.51	.47
Started climbing outdoors	2,056	0	1	.27	.44



## Climber Visitation and Use Patterns

Outdoor recreation users often engage in more than one activity while visiting outdoor recreation areas. Table Two lists some of the activities climbers engaged in beyond climbing as a result of their most recent visit to the Red River Gorge. In all, 67% of respondents indicated going on a day hike as a result of their climbing visit and 39% indicated using paid developed camping. Likewise, 32% indicated spending part of their visit seeing natural features in the Red River Gorge while around one in five used dispersed camping, most likely on the DBNF. Climbers also reported visiting wineries/breweries, doing overnight hikes, and driving for pleasure while in the region.

It is useful to note that climbers very rarely camp at climbing areas. Moreover, this behavior is discouraged in the climbing community today. Instead, they use established campgrounds or utilize dispersed camping available throughout the DBNF.

**Table Two: In what other activities will you engage while on your current trip?  
(Select all that apply)**

Variable	N	Min	Max	Mean	SD
Day hiking	1,776	0	1	.67	.46
Backpacking/overnight hikes	1,776	0	1	.12	.32
Mountain biking	1,776	0	1	.04	.20
Cycling	1,776	0	1	.03	.19
Horseback Riding	1,776	0	1	~.01	.07
Hunting	1,776	0	1	~.01	.07
Fishing	1,776	0	1	.03	.19
Seeing historic sites	1,776	0	1	.08	.27
Visiting wineries/breweries	1,776	0	1	.17	.38
Seeing natural features	1,776	0	1	.32	.46
Paddling/SUP	1,776	0	1	.05	.22
Off-highway vehicle (OHV) use	1,776	0	1	.01	.11
Dispersed/Primitive Camping	1,776	0	1	.21	.40
Paid Campground Camping	1,776	0	1	.39	.48
Trail work	1,776	0	1	.09	.28
Driving for pleasure	1,776	0	1	.12	.32



## Climber Visitation Estimates

Visitation is an important component of examining economic impact and understanding climbers' use patterns. As part of this study, the authors collaborated with the Red River Gorge Climbers' Coalition and Friends of Muir Valley to estimate climber parking use in the study area. By estimating car counts, the authors can later estimate the number of climbers visiting in a typical year.

There are numerous parking areas spread across the Red River Gorge's climbing areas. The great majority of these spaces are located in a handful of specific locations, such as the Muir Valley and RRGCC parking lots in Wolfe and Lee Counties, respectively. The DBNF has numerous climbing locations with 1-2 space roadside pull-offs throughout the Red River Gorge. A good example of this is Tower Rock, where climbing began in the Red. A notable exception is Left Flank and Military Wall which is accessible from a lot with approximately 25 available spaces (including roadside overflow). In all, there are approximately 88 public parking lot opportunities modeled in this dataset.

To estimate visitation, the research team compiled a dataset of parking areas around climbing locations and the capacities of those lots. Working with count data from Muir Valley and RRGCC, lot observations, and anecdotal climber parking experiences, the research team modeled out the estimated percentage of each lot filled on each day of the year. As not all climbing areas see the same rates of traffic, the dataset modeled rarely-visited locations (mostly smaller crags on the DBNF) with lower use rates while frequently used areas (such as those around The Motherlode in Lee County) were modeled with higher use rates. The database takes into account seasonal holiday increases in use, the typical length of the climbing season over the last decade, and the arrival and departure of climbers throughout the day. The end result is an estimation of what climbing visitation looks like in a typical year with typical weather.

Table Three summarizes the results of this table examining the average number of cars predicted to be in each parking area on a typical day in that month. The researchers estimate approximately 56,000 climber vehicles are parked in climbing area parking lots during a typical year. The research team estimated there are 1.8 climbers per vehicle based on survey group sizes, interviews with climbers, and observations in the region's parking lots. Using this number, the research team estimates there are approximately 102,000 climber visits per year in the Red River Gorge with 2% of these visits coming from persons living in the study area. Note this estimate allows for a climber to visit more than once and should not be interpreted as unique climbers.

**Table Three: Summary of Climber Visitation in the Red River Gorge (Rounded)**

Month	Estimated Vehicle Counts	Estimated Climbers
January	664	1,195
February	591	1,064
March	3,419	6,154
April	6,797	12,235
May	10,014	18,025
June	5,012	9,022
July	2,054	3,697
August	1,686	3,035
September	4,618	8,312
October	9,210	16,578
November	8,691	15,644
December	4,073	7,331



## Economic Impact: Study Area Summary

Economic impact study areas are built around the location where the activity being studied (here, climbing) occurs and the cities and towns where visitors are most apt to spend funds as part of their trip. For this analysis, five counties in and around the Red River Gorge represent its study area: Estill, Lee, Meniffee, Powell, and Wolfe Counties.

Table Four lists descriptive economic indicators for the study area. The population for the study area is around 47,000 persons. There are just shy of 9,000 jobs in this area with an unemployment rate of 6%. Many living in the region choose to commute to other areas (including Lexington), as evidenced by an average 35 minute commute and a stark difference in population and jobs. The mean household income is \$30,064 with around 12% of residents living in poverty.

Jobs in the study area are largely concentrated in a few sectors. Healthcare and social assistance are the leading sector with nearly 1,900 jobs followed by retail at shy of 1,000 jobs. Accommodation and food services are another important area with 628 jobs. It is a common misconception that extraction jobs are a major employer in the Red River Gorge area. In truth, coal deposits are further east of this region. Instead, oil supplies are found throughout the region and account for the bulk of extraction work (alongside coal washing) found there. County Business Patterns data are censored in cases with few jobs in a county, and that is the case here as only Estill County reported jobs in this sector. The extraction job count should be treated cautiously as it is likely somewhat higher.

**Table Four: Economic Summary of Study Area**

Regional Indicator	Study Area Estimates
Total Population (2019)	47,392
Persons in Labor Market (2019)	22,381
Mean Unemployment Rate (2018)	6.02%
Total Annual Employees (2018)	5,901
Total Jobs in Area (2019)	8,916
Median Household Annual Income (2019)	\$30,064
Mean Commute Time (2019)	35 minutes
Mean Percentage of Persons in Poverty	12.36%
Total Employers (2018)	575
Total Payroll in 1,000s (2018)	\$163,369
Total Manufacturing Jobs (2018) (excludes Lee)	463
Total Retail Jobs (2018)	982
Total Healthcare & Social Assistance Jobs (2018)	1,879
Total Accommodation & Food Services Jobs (2018) (excludes Meniffee)	628
Total Extraction Jobs (2018) (includes only Estill County)	44



## Economic Impact: Visitor Expenditures

Table Five (see next page) summarizes climber expenditure patterns in the Red River Gorge area. This table includes expenditures in lodging, travel, food, and retail. The results are summarized below.

**Lodging:** This study examined three lodging expenditure types frequently used by climbers: hotel/motels, camping, and rental cabin/homes. These estimates represent only persons staying overnight during their visit (which is approximately 90% of visitors). On average, climbers spend \$8 per trip when camping or using RV/travel campers, \$40 per trip when renting cabins or homes, and \$5 per trip when staying at hotels. These estimates also include cases where respondents reported staying in a particular category but reported no expenditures due to a partner or group member paying for the trip.

The researchers also ran these estimates to exclude zero-expenditure cases and provide a comparison. When excluding zero expenditure cases, climbers choosing to stay in hotels spend an average of \$124 (rather than \$5) per visit on their trip, while those camping spend an average of \$16 (rather than \$8) on their trip. Climbers using rental cabins typically spend around \$190 (rather than \$40) during their trip under this scenario.

The researchers estimated that 80% of overnight climbing visitors utilize camping in some form, 5% utilize hotels/lodges, and 15% utilize cabins/rental homes as lodging in a typical year.

**Travel:** On average, climbers spend \$20 on gasoline inside the study area each visit. Food purchases at gas stations are examined separately in the next paragraph.

**Food:** On average, climbers spend around \$3 per trip at fast food restaurants. In comparison, climbers spend an average of \$26 at dine in restaurants which employ wait staff. Climbers spend around \$3 per trip on food from gas stations and convenience stores. Note that several local gas stations in the region now have displays marketed specifically to climbers. Climbers also spend an average of \$11 per trip on groceries at local grocery stores and farmer markets.

**Retail:** Climbers spend around \$3 on general retail purchases at stores like Wal Mart or a Dollar General. Climbers spend around \$7 per trip on climbing gear. Note that, as either form of retail purchases could hypothetically be used in the future outside the Red River Gorge, the economic impact analysis later in this study only utilizes 20% of the value of these expenditures in the modeling. Recall also that retail expenditures are capped at \$500 to reduce the chance of inflating estimates.

**Services:** While guides, shuttles, and rental gear options do exist in the Red River Gorge, they are rarely used by climbers. Parking is relatively near to climbing areas and carpooling is a common behavior in climbing communities. Climbers are likely to reuse gear or share gear, leading to purchases rather than rentals. Only four cases of rental gear were reported, and all four were excluded during data cleaning as being atypical results. Thus no summary statistic is reported for rental gear. Guiding is allowed in most Red River Gorge crags by permit or approval, but is more often used by first time or infrequent visitors.



## Economic Impact: Visitor Expenditures

**Table Five: Economic Expenditure Patterns Inside Study Area for Climbing Visitors to Red River Gorge**

Variable	N	Min	Max	Mean	SD
Hotel	1,130	0	350	\$5.06	29.30
Camping	1,115	0	75	\$8.73	13.27
Cabin/Rental	1,127	0	1000	\$40.01	107.15
Gas	1,295	0	100	\$20.08	19.97
Fast Food	1,282	0	40	\$2.89	6.65
Dine In	1, 289	0	150	\$26.03	30.22
Convenience Food	1,282	0	25	\$3.08	5.24
Groceries	1,270	0	138	\$11.70	22.34
Retail	1,290	0	60	\$3.42	9.57
Rec Retail*	1,270	0	100	\$7.22	18.72
Guiding Services	1,294	0	37.5	\$.06	1.40
Transport/Taxi/Shuttle	1,301	0	5	\$.01	.13
Rental gear**	1,301	0	0	-	-

\*only 20% of this expenditure is used in later modeling  
 \*\*No expenditures modeled in this study.

## Economic Impact: Festivals

Each year, the Red River Gorge is home to Rocktoberfest, a climbing festival currently held at Land of the Arches Campground in Wolfe County. Rocktoberfest averages an annual attendance of 1,200 climbers, although the 2020 event was held online due to the COVID-19 pandemic.

Based on attendance of 1,200 and mean expenditures from this study, the research team estimates Rocktoberfest typically generates nearly \$85,000 in annual visitor expenditures. This estimate excludes five percent of attendees as persons living in the study area. It also does not include lodging as most stay on-site during the event as part of their registration costs. The estimate also does not attempt to model the expenditures of organizing and hosting the event or the expenditures of vendors at the event.

Rocktoberfest is held as a fundraising event for the RRGCC. It is important to note the above estimate is not a figure going to the RRGCC but rather money being spent within the study area economy. The research team also does not include proceeds from this event in its analysis as the RRGCC is located outside the study area.

Additionally, the Red River Gorge sees a number of trail days and homecoming events that are relatively small in size but may slightly increase expenditures during that week. These are not modeled in this study, but as they attract visitors above and beyond normal visitation, they could be examined in future studies.



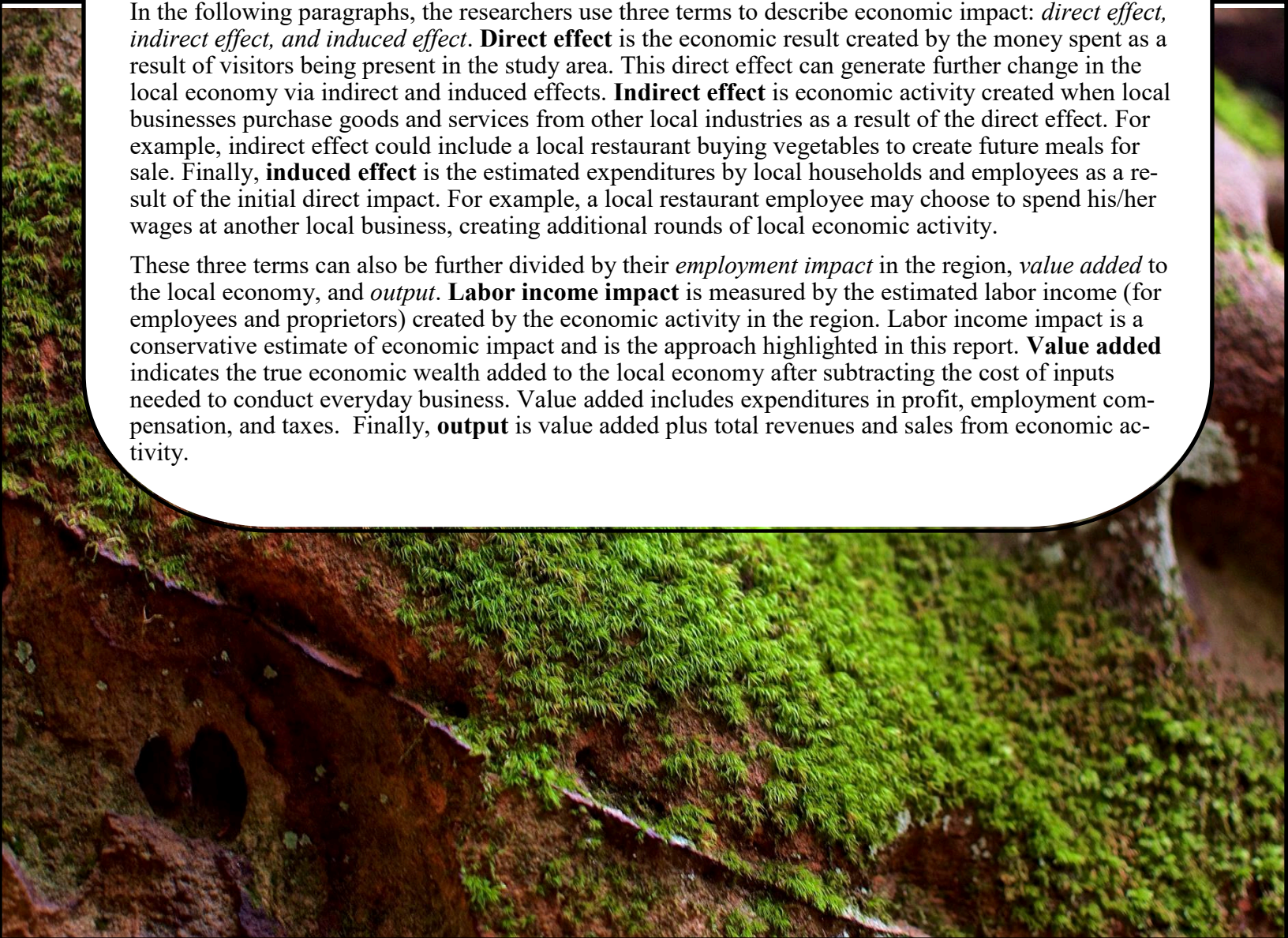
## Economic Impact: Terminology

In the coming pages, the research team employs IMPLAN, a leading economic impact estimator, to create economic impact estimates for what climbers contribute to the Red River Gorge's economy in a typical year. IMPLAN (or Impacts for Planning) uses input-output modeling to establish economic impact by exploring what happens when climbers spend money in specific sectors (such as food, lodging, and retail). The analysis follows approaches used in prior peer-reviewed research and Forest Service studies.

**Several steps have already been taken to ensure the resulting economic impact results are conservative.** Recall that cases with disproportionately long stays or large group sizes (greater than eight) have been excluded and instances of unusually high expenditures have been listed as missing data. **This process continues in modeling the resulting expenditures in IMPLAN.** For example, local purchasing percentages are set at 100% which is appropriate for this kind of study. This means that the researchers expect the sales and employment involved in this study are occurring inside the Red River Gorge. Retail purchases are also margined to give a more nuanced perspective on their impact. This prevents overestimating how much of these purchases remain inside the analysis. Additionally, as retail expenditures can be used outside the area where they are purchased, only 1/5 of the average retail and recreation retail expenditures are actually included in the economic impact estimates.

In the following paragraphs, the researchers use three terms to describe economic impact: *direct effect*, *indirect effect*, and *induced effect*. **Direct effect** is the economic result created by the money spent as a result of visitors being present in the study area. This direct effect can generate further change in the local economy via indirect and induced effects. **Indirect effect** is economic activity created when local businesses purchase goods and services from other local industries as a result of the direct effect. For example, indirect effect could include a local restaurant buying vegetables to create future meals for sale. Finally, **induced effect** is the estimated expenditures by local households and employees as a result of the initial direct impact. For example, a local restaurant employee may choose to spend his/her wages at another local business, creating additional rounds of local economic activity.

These three terms can also be further divided by their *employment impact* in the region, *value added* to the local economy, and *output*. **Labor income impact** is measured by the estimated labor income (for employees and proprietors) created by the economic activity in the region. Labor income impact is a conservative estimate of economic impact and is the approach highlighted in this report. **Value added** indicates the true economic wealth added to the local economy after subtracting the cost of inputs needed to conduct everyday business. Value added includes expenditures in profit, employment compensation, and taxes. Finally, **output** is value added plus total revenues and sales from economic activity.





## Economic Impact: Annual Estimates

The below estimates examine mean expenditures and visits to the Red River Gorge region. Again note these results exclude persons who live inside any of the study area counties. Recall that local resident expenditures are not considered new expenditures inside a study area as they already exist inside the economy. For reference purposes, mean expenditures for both per visit and festival expenditures are outlined in Table Five.

Based on the results of the study, the researchers estimate that **climbers visiting the Red River Gorge spend \$8.7 million dollars annually in the study area.** This estimate comes from \$1.1 million in lodging and \$7.4 million in food/gas/retail expenditures during a typical climbing season plus \$84,918 in estimated festival-related expenditures. This estimate is built on total visitation estimates of 102,484 with 2% of those visits coming from persons living in the study area and 90% of the visits involving overnight stays.

Table Six highlights what occurs when these funds are spent inside the study area. Focusing on labor income (the most conservative measure of economic impact of the three listed), **climbing generates an estimated \$2.6 million dollars in labor income inside the study area.**

Climbing expenditures also support jobs in the study area. Note that IMPLAN reports jobs related to economic expenditures in portions of jobs rather than whole jobs. The idea is that few jobs would be entirely dedicated to climbers as clientele. Instead, a portion of an employee's time would involve working with climbers and their expenditures. Likewise, jobs estimated can include a mix of part and full-time jobs, as well as proprietors and owners. With these explanations in mind, the researchers estimate that **climbing expenditures support around 104 jobs or portions of jobs inside the study area.**

**Table Six: Economic Impact Summary**

Impact Type	Employment	Labor Income	Value Added	Output
Direct	92.2	\$2,292,172	\$2,717,313	\$4,951,484
Indirect	5.2	\$150,665	\$259,424	\$586,770
Induced	7.2	\$212,081	\$435,884	\$841,006
Total Effect	104.6	\$2,654,918	\$3,412,621	\$6,379,259





## Economic Impact: Annual Estimates

Table Seven shows jobs categories supported by climbers' expenditures in the study area. Recall again that these jobs represent portions of jobs, not necessarily whole jobs as explained on the previous page.

Climber expenditures in the study area notably support the presence of jobs in full-service restaurants (including wait staff and kitchen work), other accommodations (including campgrounds and rental cabin/houses), grocery stores, gas stations, fast-food restaurants, and sporting goods stores. Likewise, their activities also support related sectors, such as engaging real estate sales, business accounting, and physicians offices. Note these last three example activities are most likely utilized by businesses and workers in the study area, not climbers.

Climber expenditures also produce taxes at the local, state, and federal level as summarized in Table Eight. In all, climbers' estimated expenditures supported \$451,521 in local/state taxes and \$346,672 in federal taxes.

**Table Seven: Labor Income Generated**

Description	Total Employment	Total Labor Income
Full-service restaurants	61.6	\$1,052,092.6
Other accommodations	13.4	\$882,855.8
Retail - Food and beverage stores	6.1	\$141,974.7
Retail - Gasoline stores	5.8	\$144,655.7
Limited-service restaurants	4.5	\$80,742.3
Retail - Sporting goods, hobby, musical instrument and book stores	2.1	\$15,000.0
Real estate	0.9	\$9,788.3
Accounting, tax preparation, bookkeeping, and payroll services	0.4	\$5,294.7
Offices of physicians	0.4	\$31,766.0
All other food and drinking places	0.4	\$10,334.8

**Table Eight: Annual Estimated Taxation Generated**

Tax Type	State/Local Amount	Federal Amount
Employee Compensation	\$3,759	\$259,757
Proprietor Income	\$0	\$32,584
Tax on Production and Imports	\$379,203	\$38,797
Households	\$65,951	\$156,707
Corporations	\$2,608	\$15,377
Totals	\$451,521	\$346,672



## Expenditure Patterns Beyond Study Area

Table Nine summarizes expenditure patterns outside of the Red River Gorge but still inside Kentucky. Overall, these findings support the idea that climbers are finding few reasons to stop before arriving in the Red River Gorge as whatever expenditures that need to be made can be spent in the study area.

**Lodging:** This study finds that lodging for climbers is almost universally located inside the Red River Gorge, meaning that climbers are spending where they recreate. Note only a handful of cases reported staying outside the Red.

**Travel:** Gasoline is an important part of traveling from regional airports and surrounding regions to the Red River Gorge and typically represents the largest expense for climbers outside the area being studied. In this case, climbers spent an average of \$6 on gasoline outside the area. This implies a few possibilities: climbers are driving from locations near enough the trip may be done in one gas tank, climbers are refilling before they leave the Red River Gorge, or climbers simply find fewer reasons to stop before getting into the Red River Gorge. Climbers from outside of Kentucky may also simply be filling up outside of Kentucky, which would not be tracked in this study.

**Food:** Climbers spent minimal amounts on food while traveling to the Red River Gorge and while in Kentucky. For example, climbers spent (on average) around \$1.50 each on dine-in restaurants and fast food, \$.26 gas station / convenience store food, and \$2 at grocery stores. This supports that climbers are getting food inside the study area.

**Retail:** Retail purchases outside the study area are also uncommon. In traveling to the Red River Gorge, climbers spent negligible amounts on general retail and recreation retail. Again, they are instead purchasing things inside the study area.

**Services:** Services represent a small sliver of economic expenditures beyond the study area. Expenditures in guide services, taxis, and rental gear are all effectively zero beyond the study area.

**Table Nine Economic Expenditure Patterns Outside the Red River Gorge Study Area but Still Inside Kentucky**

Variable	N	Min	Max	Mean	SD
Hotel	1,131	0	300	\$.76	11.97
Camping	1,131	0	200	\$.42	7.56
Cabin/Rental	1,131	0	500	\$1.48	19.17
Gas	1,284	0	57	\$5.92	11.60
Fast Food	1,281	0	20	\$1.41	3.89
Dine In	1,292	0	50	\$1.42	6.25
Convenience Food	1,260	0	8	\$.26	1.16
Groceries	1,285	0	83	\$2.21	8.54
Retail	1,294	0	25	\$.13	25
Rec Retail	1,292	0	50	\$.28	2.96
Guiding Services	-	-	-	-	-
Transport/Taxi/Shuttle	-	-	-	-	-
Rental Gear	1,302	0	25	\$.05	1.01



## Estimated Impacts of COVID-19 on Visitation

Beginning in early March 2020, COVID-19 impacted access to public lands and shifted visitation patterns across the nation. In short, the impacts of the pandemic on outdoor recreation visitation are unclear and will be the subject of study often over the coming decade. In the meantime, it is important to note how COVID-19 might impact what a typical year of visitation would look like for climbing in the Red River Gorge.

While climbing is present year round in the Red River Gorge, it is most common during two periods during the year: spring and fall. It typically runs from early March until May and slows down in the summer heat before picking back up in late September and continuing until as late as the end of the year depending on the weather. Of the two, the most active is by far the fall season, with September through November being peak months for the Red.

During the early weeks of the spring climbing season, the DBNF remained largely open while the Red River Gorge Geological Area closed from March 27-May 22. Similarly, local climbing organizations followed suit to limit climbing visitation by instituting policies to minimize exposure to COVID and restrict sick persons from traveling into the area to protect local residents and other climbers.

Closures and COVID greatly reduced visitation during the spring climbing season. As a comparison, this has similarly happened due to particularly rainy Kentucky springs (such as in 2019). Historical evidence shows the most common reaction to a shortened spring season is two-fold. First, climbers will continue climbing later into the summer months at increased rates. Second, the fall season predictably experiences higher visitation to make up for time lost in the spring.

This familiar trend appears to have happened in 2020 in the Red River Gorge. For example, conversations with climbers indicated climbing happening in late June and even July among the cooler, shaded crags. Additionally, the fall season has seen popular areas with socially-distanced lines of climbers waiting to use a route. Climbers have also resorted to visiting less-used crags to reduce crowding, thus spreading visits out over the study area. Regional climate trends also supported the 2020 climbing season in continuing through December 31.

Anecdotal evidence across the United States has indicated a surge in public land use since the summer across all types of outdoor recreation. Again, this seems to have been the case for climbers in the Red River Gorge.

The end result was largely interpreted by the researchers as an even trade: the abbreviated spring season led to a busier fall season further complemented by desirable weather. **As such, the researchers do not find evidence to reduce the economic impact estimates in this study as a result of COVID.** While the visitation estimates modeled in this study are meant to represent a typical year, there is ample evidence to support that these results are still indicative of 2020.



## Local Resident Expenditures

Readers have likely noticed that local residents (persons living inside Estill, Lee, Meniffee, Powell, or Wolfe Counties) were not included in this study as a form of economic impact. Why is this the case?

Let's consider who is being studied in an economic impact study: *visitors to the area*. Visitors represent persons who are new contributors to the economy and do not live in the area being studied. Whenever they enter the area to spend funds, they create expenditures that were not previously there. Now consider local residents, who are persons already living in the area being studied. Their expenditures, whether it is a mortgage payment, a trip to a retail store, or purchasing gasoline, are already considered to be part of the economy. This means that they would not be new expenditures, and by definition would not be a form of economic impact.

Although they may not be considered a form of economic impact, local residents are still important contributors to the region. Table Ten summarizes some of their annual expenditures in the region, including mortgages, retail purchases, taxes, rents, and more totaling over \$13,000 per person per year. There is no existing count of climbers living in the study area, but anecdotal evidence supports there being 100-200 such cases in the study area when including both primary and secondary residences. This results in \$1.3-\$2.7 million in additional funds existing in the local economy as a result of climbing that would otherwise be overlooked in economic impact research.

**Table Ten: Local Resident Data**

Variable	N	Min	Max	Mean	SD
Annual restaurant expenditures (any kind)	56	0	5,000	\$950.44	1,109.21
Annual retail expenditures	56	0	6,000	\$820.44	1,325.02
Annual infrastructure services expenditures (such as phone, internet)	56	0	40,000	\$1955.35	5,597.35
Annual personal services expenditures (such as oil, landscaping)	56	0	5,000	\$586.16	1,028.78
Annual property taxes	56	0	40,000	\$1322.55	5,337.06
Annual mortgage payments	54	0	50,000	\$2603.70	7,207.85
Annual rent payments	56	0	9,600	\$592.85	2,064.31
Annual business taxes	56	0	100,000	\$4449.10	16,838.82
Annual memberships (such as gyms)	56	0	800	\$76.60	170.70
Annual local donations (such as food or money)	56	0	10,000	\$424.01	1,533.20



## Leave No Trace Knowledge

Leave No Trace (LNT) is a set of seven principles designed to minimize user impacts while in outdoor recreation settings. These include common-sense ideas such as staying on trails, packing out trash created or found in the area, and not taking natural items (such as rocks) from outdoor settings. Collectively, LNT principles minimize impacts while also allowing future visitors a similar experience.

Table Eleven lists several common approaches to teaching LNT Principles. These include climbing-oriented efforts (the Climbers' Pact), three programmatic efforts designed by the Center for Outdoor Ethics, and being raised with a wilderness ethic as a child. By far the most popular option for respondents in this study was the Climbers' Pact, a program designed by Access Fund asking climbers to adhere to LNT principles and publicly commit to minimizing their impacts. In all, nearly 75% of respondents indicated they have signed this commitment.

In comparison, 27% indicated they have participated in some form of LNT workshop. Note several LNT workshop events have been held in the Red River Gorge's climbing community. Less often, climbers are utilizing the Center for Outdoor Ethics for their information on LNT, with 10% completing the LNT Trainer Course and 5% completing the LNT Master Educator course. The former can be completed in one day during a training event, while the latter requires a greater time commitment and multi-night trip. Most climbers reported growing up with at least some exposure to outdoor recreation ethics. In all, 61% felt this described their childhood.

**Table Eleven: LNT Principle Program Participation**

	N	Mean	SD	Min	Max
Have you signed the Climbers' Pact?	1,467	.749	.433	0	1
Have you completed an LNT Master Educatory course?	1,798	.054	.227	0	1
Have you Completed an LNT Trainer course?	1,790	.104	.305	0	1
Have you participated in an LNT Workshop?	1,763	.270	.444	0	1
Would you say that you were raised with an outdoor ethic as a child?	1,298	.615	.486	0	1





## Leave No Trace Knowledge

Tables Twelve and Thirteen on the following pages summarize Red River Gorge climbers' knowledge of LNT principles based on a climbing-oriented 28 item LNT scale. This scale utilizes the logic and approach of the Leave No Trace Attitude Inventory Measure, a scale designed to measure LNT knowledge in hiking and camping scenarios, and applies it specifically to rock climbing activities.

The scale asks respondents to read each item in the tables and respond if they are very inappropriate (1) to very appropriate (5). The directions ask the respondent to specifically think about the Red River Gorge while answering these questions, as location could feasibly change certain answers in the scale. The scale includes sub-sections linking each item to a specific LNT Principle. Note that several of the items are reverse coded, which means the meaning is counter-intuitive. Although not used as a scale in this instance, this measure does function as a viable scale ( $\alpha=.7710$ ) and inter-item reliance supports keeping all items in this scale.

Throughout this measure, respondents indicated knowing LNT Principles as they apply to climbing. For example, climbers indicated it was very appropriate to know climbing regulations in advance (4.88) and to only use designated trails (4.87). Likewise climbers knew it is very inappropriate to create trail shortcuts (often called user trails) to climbing areas (1.19) or leave their feces on top of the ground to biodegrade (1.20).

Three items fell into the neutral category and are areas to consider in future training programs. First, climbers were, on average, unsure about what to do with used toilet paper (3.19). This could be, in part, due to ambivalence in LNT training and climate differences. Ideally, packing this out would be best, but LNT training does outline procedures for correctly burying feces and toilet paper in certain climates. Note also that training in previous decades favored burying while more recent efforts support packing out as much as possible. Climbers also increasingly use devices (poop tubes and wag bags) to remove waste from the area and pack it out. These are also required in certain climbing areas, such as Zion National Park.

Next, brushing excess chalk off the route was another area of concern (3.96). It would be appropriate to remove chalk (or use earth-toned chalk) to help present the area as undisturbed for the next user. However, note that certain areas such as Hueco Tanks State Park actively encourage climbers to use chalk before touching rock faces to reduce the impacts of skin oils on the rocks.

Similarly, climbers were unsure about the appropriateness of cleaning vegetation off a wall while climbing (2.57). This represents a common issue for climbing and environmental impact, and it would be considered inappropriate by LNT Principles training. However, it is still sometimes done in the community.

These are all areas for future improvements as climbers seek ways to minimize their impacts. It is also important to note that a measure of knowledge should not be misconstrued as a measure of behavior. Future work should be done to examine climbers' LNT behaviors through in-person observations, as well.



## Leave No Trace Knowledge

**Table Twelve: Leave No Trace Knowledge of Climber Impacts**

	N	Mean	SD	Min	Max
<b>Principle One: Plan Ahead and Prepare</b>					
Knowing the climbing regulations where I'll climb in advance.	1,339	4.88	0.44	1	5
Limiting my group size to protect the climbing area.	1,339	4.58	0.65	1	5
Carpooling to the climbing area whenever possible.	1,339	4.70	0.57	1	5
<b>Principle Two: Travel and Camp on Durable Surfaces</b>					
Using only designated trails in and around climbing areas.	1,338	4.87	0.43	1	5
Traveling in a single file whenever walking with others on the trail.	1,339	4.43	0.72	1	5
Creating trail shortcuts when trails do not go straight to the climbing area.	1,339	1.19	0.60	1	5
<b>Principle Three: Dispose of Waste Properly</b>					
Packing out all the trash I create while climbing.	1,332	4.99	0.17	1	5
Minimizing the amount of chalk I used.	1,333	4.07	0.83	1	5
Packing out any forgotten or discarded gear I find.	1,329	4.63	0.65	1	5
Leaving my feces on top of the ground so it will biodegrade.	1,331	1.20	0.63	1	5
Urinating at least seventy steps from the trail.	1,330	4.25	0.95	1	5
Burying my toilet paper.	1,325	3.19	1.68	1	5
Pooping close to the trail.	1,329	1.10	0.48	1	5

## Leave No Trace Knowledge

**Table Thirteen: Leave No Trace Knowledge of Climber Impacts**

	N	Mean	SD	Min	Max
<b>Principle Four: Leave What You Find</b>					
Brushing off excess chalk on the route when I am done climbing it.	1,331	3.96	0.95	1	5
Taking small rocks home with me as mementos.	1,326	1.72	0.73	1	5
Dislocating rocks that make it hard to climb.	1,322	1.58	0.92	1	5
Cleaning vegetation off the wall while climbing.	1,320	2.57	1.04	1	5
<b>Principle Five: Minimize Campfire Impacts</b>					
Using a portable stove rather than start a campfire should I need to cook something at the crag.	1,326	4.56	0.76	1	5
Making a campfire at the climbing area to cook or keep warm.	1,323	1.41	0.75	1	5
<b>Principle Six: Respect Wildlife</b>					
Cutting down trees that are in the way of the route.	1,321	1.39	0.78	1	5
Using tree-safe straps or a protective cloth to protect tree bark if using a hammock.	1,322	4.53	0.82	1	5
Keeping a dog on a leash or tethered at all times when I bring it to the crag.	1,320	4.60	0.69	1	5
Packing out my dog's feces when I bring it to the crag.	1,320	4.78	0.59	1	5
Feeding my food scraps to the local wildlife.	1,320	1.14	0.50	1	5
Not climbing a route if I knew it would stress out nesting birds.	1,321	4.74	0.70	1	5
<b>Principle Seven: Be Considerate of Other Visitors</b>					
Making sure everyone can hear music if I listen to it while climbing.	1,323	1.07	0.37	1	5
Carving names into the climbing wall.	1,323	1.03	0.31	1	5
Leaving tic marks to help climbers that are not in my group.	1,322	1.64	0.85	1	5



## Climber Demographics

Table Fourteen summarizes the demographic variables of respondents. In several cases, the variables are dichotomously coded, which means a one equals the presence of the trait being studied and a zero equals the absence of this trait. The mean results can be interpreted as percentages.

In all, 35% of respondents identified as being female. The average respondent age was 34. Note that persons under the age of 18 did not qualify to participate in this study which certainly impacts this variable. About half the respondents indicated they began climbing indoors and the average starting year was 2008. Around one in five respondents reported ever bringing a dog to a climbing crag.

As has been found in past studies, climbers are well-educated. In all, 44% indicated having a four year degree while another 40% indicated having a graduate degree such as master's or doctorate degree. Correspondingly, 63% of respondents noted having personal annual incomes greater than \$50,000 while one in four reported six figure incomes.

One in five indicated their job was, in some way, related to outdoor recreation. Fifteen percent of respondents indicated owning their own business, and nearly one third of those respondents indicated their business was related to outdoor recreation.

**Table Fourteen: Climber Demographics**

Variable	N	Min	Max	Mean	SD
Respondent Sex (1=Female, 0=Male)	1,751	0	1	.35	.47
Respondent age	1,761	18	90	34.88	10.97
Respondent's first year climbing	2,039	1920	2020	2008	9.87
Started climbing indoors	2,056	0	1	.51	.47
Started climbing outdoors	2,056	0	1	.27	.44
Has Bachelor's College degree	1,764	0	1	.44	.49
Has Advanced degree	1,764	0	1	.40	.49
Personal income greater than \$50K	1,647	0	1	.63	.48
Personal income greater than \$99K	1,647	0	1	.26	.43
Has ever brought a dog to crag	1,760	0	1	.19	.34
Job is in outdoor recreation	1,740	0	1	.19	.39
Owens a business, any location	1,756	0	1	.15	.36
Owens outdoor rec business (limited to those who owned a business, any location)	266	0	1	.31	.46



## Contact Information for Future Studies

EKU's Division of Regional Economic Assessment and Modeling (DREAM) offers valuable research studies at a reasonable price across the nation. These include:

- Economic impact studies
- Feasibility studies
- Visitor experience studies
- Marketing studies
- Needs assessments
- Recreation studies
- Tourism studies
- Cost-benefit analyses
- Place-attachment studies
- Motivation studies



Please contact DREAM Director, Dr. James Maples ([james.maples@eku.edu](mailto:james.maples@eku.edu)) with questions or ideas regarding studies needed in your community and region.

