

Economic Impact of Rock Climbing in the Red River Gorge, KY

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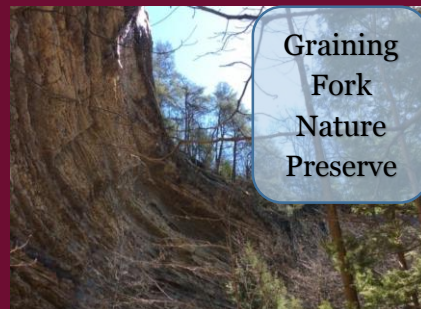
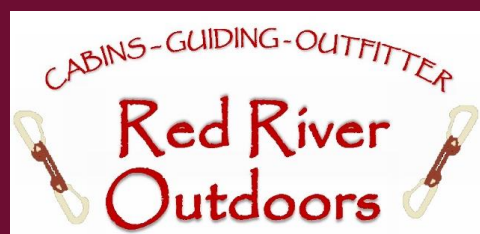
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Executive Summary of Study



The Red River Gorge (RRG) is a canyon system in Eastern Kentucky containing world class climbing areas.



An estimated 7500 unique climbers visit the RRG every year to participate in its vibrant climbing culture.



Our research team worked with community partners to establish climbers' economic impact upon the region.

Our major findings include:

1. Climbers spend an estimated \$3.6 million dollars in the regional economy each year.
2. Climbers generate an estimated \$2.7 in total revenues for local business owners and support an estimated 39 full-time jobs in a region with high poverty rates.
3. Climbers are generally highly educated, with the majority having (or working on) college degrees.
4. Climbers are strongly interested in selective economic development in the RRG utilizing locally owned businesses.
5. We strongly recommend that local policy increase access to climbing areas to further increase climbers' economic impact.

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Meet Your Eastern Kentucky University Research Team



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Methodological Notes

Purpose

Working alongside our community partners (Access Fund, Red River Gorge Climbers' Coalition, Daniel Boone National Forest, Friends of Muir Valley, and Red River Outdoors), our research team designed and executed a field survey to examine the economic impact, economic development interests, and demographic profile of rock climbers found in the Red River Gorge (or RRG).

Survey Instrument Design and Delivery

The survey instrument included standard questions that addressed our study purposes. The survey instrument received Institutional Review Board approval (a scientific standard for ethical research) on October 24, 2014. The final survey is available upon request. Maples, Clark, and Sharp collected survey data on sixteen occasions (both weekdays and weekends) during the 2015 spring and fall climbing seasons. The research team administered surveys at approximately 95% of known climbing regions in the RRG with permission from land owners and managers in advance of data collection.

Sampling Frame and Response Rate

Our sampling frame for this study is rock climbers present at or near climbing areas in the RRG. This group has an estimated population of 7500 unique members. Using a 95% confidence level with a confidence interval of $\pm 5\%$, the research team needed 365 respondents to have results that reflect the population. In all, 727 participants responded to our survey with only 13 persons declining to participate.

Economic Impact Categories

The research team analyzed economic impact in the following categories (IMPLAN code in parenthesis): lodging (499), food purchased at gas stations (402), food purchased at grocers (400), food purchased at restaurants (502), car rentals (442), gasoline and oil (402), general retail purchases (405), climbing gear purchases (404), climbing guide fees (512), personal care (509), and amusement (496). We carefully selected each category based on previous research on rock climber expenditures.

Data Entry and Analysis

Maples and Clark entered the raw data into Excel. Our analysis utilized Stata 14 and SPSS 22, both industry-standard statistical packages, to examine the survey data on most of our study purposes. Our economic impact portions utilized IMPLAN, a leading economic impact platform, to calculate economic impacts.

Study Region

Our study region consists of Estill, Lee, Menifee, Owsley, Powell, and Wolfe counties in Kentucky. Each of these counties surrounds and includes the RRG and its many climbing areas. Additionally, each of these counties contain frequent destinations for climbers during their visits. **Table One** includes brief descriptive statistics for counties in our study, as well as Kentucky and national data for rough comparison. Notably, counties included in our study region are often listed among the poorest counties in the nation. Based on median income data, Owsley County ranks third in the nation, while Lee County is 11th and Wolfe County is 14th. Estill

Table One: Descriptive Statistics of Study Region by County

County	Population	Persons in Poverty (percent)
Estill	14,447	29.8%
Lee	7,594	35.0%
Menifee	6,287	27.1%
Owsley	4,508	45.1%
Powell	12,434	26.7%
Wolfe	7,214	36.2%
KY	4.4 M	19.1%
USA	318.9 M	14.5%

Population: 2014 Census Estimates
Persons in Poverty: 2010-2014 Small Area Income & Poverty Estimates

County appears much further down the list at 96th poorest in the nation. In comparison, Harlan County, KY, an area nationally maligned for its poverty, ranks at 21st and several slots above three counties in this study. Moreover, two population centers in our study are among the 100 lowest-income places in the nation. Based on annual income, Beattyville (Lee County) is the third poorest in the nation for its population size while Clay City (Powell County) ranks 62nd poorest.

Table Two describes the study region's largest non-governmental employment sectors in 2014. Several forms of natural resources stand out in the study region. Coal mining continues to be a critical economic force in the study area economy, accounting for the most jobs, income, and economic output (total revenues and sales generated) on the list. Natural gas, an activity gaining recent attention in the RRG, ranks as the eighth largest employer but in the top five in terms of output. In agriculture, both beef cattle and non-beef livestock generate nearly one thousand jobs in the study region when

Table Two: Descriptive Statistics of Study Region's Largest Non-governmental Employment Sectors, 2014

Sector Description	Jobs	Job Income (millions)	Output (millions)
Coal mining	1231	\$102.7	\$936.3
Restaurants	1176	\$19.1	\$70.6
Hospitals	1002	\$44.9	\$111.9
Nursing facilities	725	\$24.1	\$44.2
Physician offices	723	\$55.6	\$87.6
Wholesale trade	663	\$40.5	\$147.1
General retail	632	\$16.5	\$40.3
Natural gas	550	\$22.1	\$109.5
Business support	541	\$12.4	\$22.7
Beef cattle	491	\$2.4	\$11.1
Other livestock	462	\$1.9	\$4.6
Food retail	461	\$10.2	\$24.2

examined together. Medical facilities (hospital, nursing homes, and physician offices) also represent a critical source of economic activity in the study region. This can also partly be attributed to an aging population both in the study region and nationally and generally low quality health in the Appalachian region. Restaurants, the sole tourism-oriented sector on the list, represents the second largest employer in the study region when examined as the sum of both limited service (e.g., fast food) and full service (sit-down) restaurant sectors.

Table Three summarizes several important economic indicators in the study area. The study area's Gross Regional Product (or *GRP*, which accounts for the total economic activity in that area) is over one billion dollars. Over half of the GRP in the study region is employee compensation (\$919 million) while only \$91 million is proprietor income. Around \$604 million comes from other sources, such

Table Three: Economic Indicator Summary of Study Area, 2014

Indicator	Value
Gross Regional Product	\$1,774,338,305
Total Personal Income	\$1,959,773,000
Total Employment	26,586
Number of Industries	176
Land Area (Square Miles)	1,431
Population	67,647
Households	27,154
Diversity Index Score	.684

as rents and interest. Taxes on production (\$158 million) accounts for the remainder of GRP. Total personal income (the total resident wages across all sources) nearly reaches two billion dollars. There are approximately 26K jobs across 176 industries. The Shannon-Weaver Diversity Index Score (which numerically describes the division of jobs across industries in the study area, with scores moving towards one indicating more diversity) is .684. This score is fairly similar to other counties in the greater region.

Table Four lists the economic activity of the sectors examined in this economic impact study. In terms of total jobs, the largest sectors are in restaurants, general retail, grocers, and sales at gasoline stores (both food and fuel).

Table Four: Economic Activity in Sectors Examined in this Study

Sector	Jobs	Job Income (millions)	Output (millions)
Lodging	61	\$.6	\$4.3
Restaurants	1176	\$19.1	\$70.6
Retail: Gas	339	\$9.3	\$21.4
Retail: Grocer	461	\$10.2	\$24.2
Retail: Gear	60	\$.001	\$.002
Retail: General	631	\$16.5	\$40.3
Rental Car	3	\$.7	\$.06
Entertainment	39	\$.2	\$1.5
Other Service	86	\$.5	\$3.1
Personal Service	210	\$.4	\$5.4



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Rock Climber Demographics

Demographic profile of RRG Climbers

Table Five lists the demographic profile of participants in the study. Based on our statistical sample, we expect that around 60% of climbers in the RRG are males. RRG climbers are also predominately white. Although not included in the table, most climbers are also non-Latinos in addition to their racial identification. Climbers in the RRG are generally well educated with all 18 and above respondents having a high school education. Notably, the greater share of respondents have a four year degree. Additionally, about one in five respondents have graduate degrees, including terminal degrees in law, science, and medicine. Turning to individual incomes, about 44% of climbers make less than \$30K, with the majority of those persons (222) receiving less than \$20K. Notably, many of these are full time students. Around 22% earn in the \$30K-49K range. Interestingly, around 1/3 of climbers earn individual incomes of \$50K or more, with 53 climbers reporting incomes greater than \$99.9K per year.

Table Five: Demographic Profile of Study Participants

Variable	Number	Percent
Sex	-	-
Male	441	61.8
Female	273	38.2
Race	-	-
Asian	46	7
Black/Af-Am	4	1
White	614	90
Another race	20	2
Education	-	-
Less than BA/BS	247	34.7
BA/BS	316	43.5
Greater than BA/BS	148	20.4
Individual Income	-	-
\$0-29.9K	304	44.8
\$30K-\$49.9K	151	22.2
\$50K and up	224	33.0

Economic Categories

One important component of our study is measuring the frequency of visits to the RRG and documenting how this shapes spending patterns. For example, a climber coming to the RRG for only one week a year may be far more likely to go all out on lodging and drinks, whereas someone visiting 50 days a year may be more focused on stretching dollars through cheap lodging and fewer restaurant visits. Our study categorizes climbers by the number of days they typically climb in the RRG and estimates their typical expenditures. This gives us a strong sense of how spending changes across categories and how climbers' economic impact can be increased. This is an important strength of our study and makes our work highly useful in future discussions examining the number of climbers in the RRG and their economic presence.

To generate these categories, we asked climbers the number of days they generally spend in the RRG each year. We then disaggregated climbers into categories based on their responses to this question.

Table Six lists our climber categories, the number of responses in each category, the estimated population size, the average per visit expenditures, the multiplier for our averages, and the annual total category expenditures. The first nine categories are based on the number of days per year the respondent typically spends in the RRG. The last three categories address climbers who indicated they do not usually come to the RRG and were there on a one-time trip. In these cases, we categorized climbers based on

Table Six: Estimated Population Size, Per Trip Expenditures, and Annual Expenditures Disaggregated by Visit Frequency Category.					
Category (days per year in RRG)	Response Count	Estimated Population Size	Average Per Visit Expenditures	Multiplier	Annual Total Category Expenditures
1-3 days	156	1099	\$50.39	2	\$55,378.61
4-8 days	260	1831	\$138.08	6	\$252,824.48
9-19 days	239	1683	\$410.52	14	\$690,905.16
20-40 days	186	1310	\$885.91	30	\$1,160,542.10
41-79 days	69	486	\$1,178.90	60	\$572,945.40
80-100 days	19	134	\$1,859.20	90	\$249,132.80
101-139 days	5	35	\$2,478.92	120	\$86,762.20
140-180 days	7	49	\$3,305.23	160	\$161,956.27
181 or more days	8	56	\$3,739.04	181	\$209,386.24
One time visitors	-	-	-	-	-
1-3 days	60	423	\$119.54	1	\$50,565.42
4-9 days	31	218	\$289.23	1	\$63,052.14
10-60 days	25	176	\$506.50	1	\$89,144.00
Totals	1065	7500	NA	-	\$3,642,594.80

their length of trip. Using response counts (the number of survey responses in that category) and an estimated population size of 7500 unique annual climbers, we estimated the population size for each group. Using responses to our economic impact question series, we estimated per trip expenditures as the mean expenditure for persons in that category. Annual category expenditures are calculated by multiplying the population size in each category by their per trip expenditures and again by the mean days in their category (our multiplier). For example, the mean days in the 1-3 days category is two, so the mean days multiplier would be two. For the 20-40 days category, the mean days would be 30, so the mean days multiplier would be 30. This provides a conservative measure of typical activity from climbers in that category and improves on previous work treating all climbers as spending the same amounts per trip to the RRG.

Exclusions

To ensure accurate estimates, we dropped a limited number of cases for two reasons. First, 37 respondents did not offer any economic expenditures data in their survey

responses. Second, 13 cases offered disproportionately high expenditures when compared to similar responses. In all, we excluded 50 cases from the study, which is about seven percent of our sample. From an analytical perspective, this is an acceptable number of cases that can be dropped without harming our results.

Economic Impact Terminology

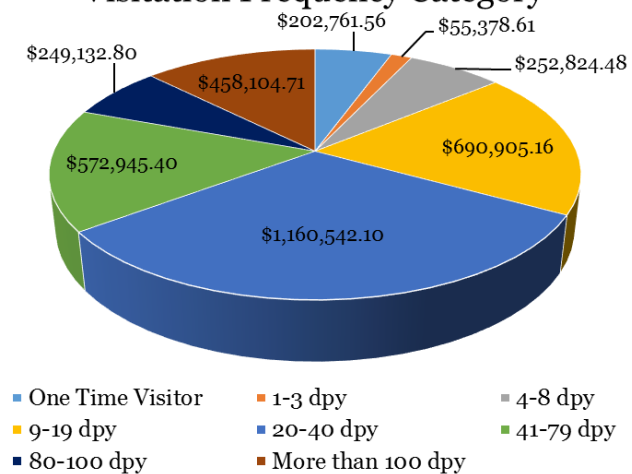
In the following paragraphs, we use three terms to describe economic impact: *direct effect*, *indirect effect*, and *induced effect*. **Direct effect** is the economic impact created by the presence of the economic activity. For example, if a local restaurant sells \$1K in food, its direct effect would be \$1K. 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 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 created by the economic activity in the region. In certain studies, we will also explore the potential number of jobs created by economic activity. **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 the total revenues and sales from economic activity.

Economic Impact Modeling

Based on our population estimate of 7500 unique rock climbers and disaggregating climbers into our visitation frequency categories, **we estimate that rock climbers spend an estimated \$3.6 million dollars in the study region economy. Figure One** breaks down annual expenditures by categories. Note that the biggest spending category is in the 20-40 days per year category. Based on demographic and occupational data, the majority of persons in this category are often professionals who regularly visit the RRG on weekends.

Figure One: Percentage of Expenditures by Visitation Frequency Category



Economic Impact Sectors

Table Seven lists the eleven categories along with the IMPLAN sector code used in the economic impact analysis. We identified these categories through preliminary research asking climbers about the sectors in which they spent their funds while in the RRG. Climbers indicate that their most common expenditures included lodging, food, travel, retail purchases, personal services, and recreation activities.

Table Seven: Economic Impact Sectors in Study

Category	IMPLAN Code
Lodging	499
Food: gas stations	402
Food: grocer	400
Food: restaurants	502
Travel: rental car	442
Travel: gas and oil	402
Retail: general	405
Retail: climbing gear	404
Climbing Guide	512
Personal Care	509
Amusement	496

Economic Impact: Overall Summary

Based on our estimates, **rock climbers generated \$2.7 million dollars in total economic output in the study region in 2015.** This means that rock climbers generated

\$2.7 million in total revenues and sales in a single year for business owners in the study area. Rock climbers' economic activity supported approximately 39 full-time jobs and generated \$776,340 in job income. Rock climbers' initial economic impact generated \$1.3 million in value added to the economy after subtracting the cost of inputs needed to conduct business. **Table Eight** summarizes rock climbers' economic impact in 2015.

Table Eight: Economic Impact Summary

Category (explanation)	Amount
Total Expenditures (total spent)	\$3,642,594
Total Output (total revenues)	\$2,738,517
Jobs Generated (full-time only)	39
Value Added (minus business costs)	\$1,373,372
Job Income Generated (employee wages)	\$776,340

Economic Impact: Direct Effect

Recall that direct effects examine rock climbers' direct economic inputs (the funds they spend in the study area) and the results of that activity. Breaking down this economic impact, our estimates indicate that rock climbers generated over a half million dollars in labor income in 2015. Nearly all the job creation occurred at this level, which is fairly common in economic impact studies.

Economic Impact: Indirect and Induced Effect

Recall that indirect and induced effects occur as a result of direct impacts. Indirect effects occur when businesses restock their shelves from a sale, for example. Induced effects occur when employees spend funds locally. Our estimates indicate that rock climbers indirectly generated over \$100K in labor income and \$400K in total revenues. When employees in the study region spent their paychecks in the study region, this generated an additional \$87K in income and \$304K in output.

Economic Impact: Federal, State, and Local Taxes

At the state and local level, rock climbers generated just shy of \$196K in taxes. Most comes from taxes on production and imports in the form of sales taxes. At the federal level, rock climbers generated \$189K in taxes distributed across employee compensation taxes, taxes on production, household taxes, and corporation taxes.

Omissions and Considerations for Future Research

During the research process, we identified minor issues that can be discussed to improve future research on rock climbing in the RRG and beyond. First, two economic impact categories (lodging and restaurants) will provide more nuanced results by asking economic impact questions about specific kinds of lodging and restaurants. For example, in the RRG, lodging is distributed among campgrounds, RV parks, cabin rentals, and a few motels. Our question only addressed lodging in general, which may slightly alter the mean scores. Similarly, restaurants include sit-down and pay at the end restaurants (considered full service restaurants) and take-out, fast food styled restaurants (limited service restaurants). Although economic impact scholars generally see little difference in how we calculate economic impact using the two categories, it may, nonetheless, be useful for future research to be more specific in the questions.

Second, as is always the case with economic impact studies, our work must be treated as estimations. Our economic impact study utilizes categories and mean expenditures to estimate expenditures that may vary from year to year, visit to visit, and person to person. Although it is conjectural evidence, our conversations with climbers in 2015 do support that climbers are often creatures of habit, stopping at the same restaurants and gas stations and spending similar amounts each visit.

Third, due to low population size for visitors in the highest visitation frequency categories (101-139, 140-180, and 181 and above), we used estimated expenditures for the 80-100 category. This conservative approach slightly lowered the total economic output of each of the three categories, but provides a more balanced and conservative measure of typical economic impact.



Economic Development Interests

In our survey, our research team asked respondents to rank (on a scale of one to ten, with one being weak interest and ten being strong interest) their economic interests for future developments in the RRG. **Table Nine** explores climber responses to these questions across ten categories.

Strong Interests

Climbers expressed their strongest support for locally owned restaurants (mean response of 8.42). Over half of all respondents ranked this interest as a nine or ten. Next highest are live music (6.93) and festivals (6.91), two ideas that are often combined at

events such as Rocktoberfest, a well-known climbing event in the RRG. Live music would also include an interest in local music venues. Although it is conjecture, climbers may also be interested in non-climbing oriented festivals, such as folk craft or local festivals like the Beattyville Woolly Worm Festival. Natural grocers (6.61) also ranked strongly, given a general shortage of non-restaurant food options nearby the climbing areas. In their comments, climbers also stated a common interest in locally owned businesses. Notably, many of the businesses who serve climbers' needs in the RRG are locally owned and operated.

Ambivalent and Weak Interests

Climbers expressed ambivalence about liquor stores and liquor by the drink. In fact, more respondents ranked liquor stores a one (135 persons) than those who ranked it a ten (113 persons). This relationship also continues with liquor by the drink (173 ranked it as one, 82 ranked it as ten). Although alcohol is available in parts of the study region, overall feelings about it are ambiguous. Climbers expressed a weak interest in chain grocers (4.01), with over 70% of respondents ranking this a five or less. Climbers similarly are disinterested in retail shopping opportunities (3.96) and dinner theatre and plays (3.02). However, perhaps the most notable response is a nearly unanimous disinterest in chain restaurants being built in the RRG. With a mean response of 2.28 and 92% of respondents ranking this a five or less (and 414 ranking it a one), chain restaurants is the least desired of the ten categories. Finally, it is worth noting that a small contingent of climbers rejected *all* economic and business development in the RRG due to concerns that it would change the region for the worse.

Table Nine: Economic Development Interests of Climbers in the RRG

Category	Mean response	Responses
Local restaurants	8.42	718
Live music	6.93	716
Festivals	6.91	717
Natural grocers	6.61	718
Liquor stores	5.47	717
Liquor by the drink	4.89	713
National chain grocers	4.01	717
Retail shops	3.96	715
Dinner theatre and plays	3.02	716
National chain restaurants	2.28	717

Outcomes and Soundbites

Finding One: Climbers are a substantial economic force in the RRG.

Based on our 2015 study, rock climbers are spending \$3.6 million dollars annually in an area that includes some of the poorest counties in the United States. Their expenditures create \$1.3 million dollars in added value to this economy and \$2.7 million in total revenues in sales for local business owners.

Finding Two: Demographic data contradicts prevailing climber stereotypes.

Prevailing myths about rock climbers often suggest they are uneducated, unemployed, and contribute little to the local economy. However, over half of respondents in our study have college degrees and one fifth of our respondents have terminal degrees such as doctorates. Most of those who do not have college degrees are, in fact, college students.

Finding Three: Climbers create job opportunities in the RRG.

Based on our 2015 study, we find that rock climbing generates approximately 39 full-time jobs in the RRG. This does not include any cases of part-time jobs, seasonal workers, or business owners and entrepreneurs.

Policy Recommendations

Recommendation One: Increase access to climbing areas.

Based on discussions with the climbing community, the best way to increase rock climbers' economic impact is to increase access to rock climbing walls. Over time, the number of climbing areas and climbing routes in the RRG has increased steadily, and non-scientific observations imply that the population has similarly increased in size.

Recommendation Two: Utilize rock climbing as a renewable economic resource. As Appalachia and Eastern Kentucky's economy transitions into the future, it is critical to identify and support economic engines capable of supporting a stable economy while redeveloping manufacturing and service-driven sectors. Rock climbing provides a viable source of sustainable economic development. Moreover, its built-in audience are well-educated professionals with a strong interest in local businesses.

Recommendation Three: Support a climber friendly environment in the local community. Data from our study indicates that local residents do not have a strong presence in the RRG climbing community. Anecdotal evidences supports that barriers exist between the climbers and the local community that prevent the two from interacting as much as they could. Common stereotypes about climbers (now disproven by our demographic data) should function as a starting point in uniting climbers and local residents in a shared effort to encourage economic activity in the region. We encourage local community organizations to reach out to climbing organizations such as the Red River Gorge Climbers' Coalition and Friends of Muir Valley and build community partnerships. These partnerships may include climber support for local economic activity and shaping local policies that attract and sustain rock climbing in the region, as well as community service and engagement.

Recommendations for the Rock Climbing Community

Recommendation One: Conduct a climber census with EKU.

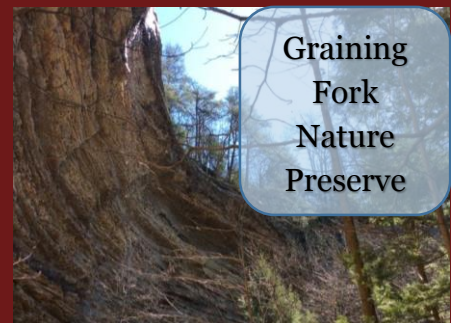
One concern in our economic impact summary is that there are no firm numbers on how many unique rock climbers visit the RRG every year. The great issue here (and something we address in our study) is that most climbers in the area come to the RRG more than once per year. Conducting a climber census will set at ease discussions over population size and support future work on this group. Moreover, EKU stands ready to work with the rock climbing community to conduct such a study.

Recommendation Two: Conduct a dynamic economic impact study with EKU.

Our economic impact study captures only three types of economic impact (direct, indirect, and induced) but dynamic economic effects (such as the development of rock climbing-friendly restaurants and shops over time, land purchasing, and governmental support) can enhance or hinder economic development in critical ways. Such a study will greatly benefit policy recommendations, as well, on increasing economic impact while preserving the RRG. Again, EKU stands ready to work with the rock climbing community to conduct such a study.

Recommendation Three: Conduct a follow-up economic impact study with EKU in the next five years.

Our economic impact study catches one moment in time. Conducting follow-up economic impact studies will help us examine how economic impact changes in relation to climbing season length, opening access to new climbing areas, and the appearance of new businesses. EKU stands ready to serve our community partners.



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Institutional Review Board Information

This study was conducted under IRB Protocol 15-083 at Eastern Kentucky University.

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Dr. Alice Jones Chair of Appalachian Studies	Rick Bost RRGCC	Liz and Rick Weber FOMV
Dr. Paul Paolucci Chair of Anthropology, Sociology, and Social Work	Red River Gorge Climbers' Coalition Board of Directors	Craig and Wendy Bentley Red River Outdoors
	Graining Fork Nature Preserve	

Contact Information for Future Studies

Our research team regularly conducts economic impact studies, community resource inventories, customer surveys, customer and community member need assessments, cultural/historical/natural resource interpretation studies, and other kinds of community-driven studies throughout Eastern Kentucky and the surrounding region.

If you or your organization is interested in conducting a study, please contact lead researcher Dr. James Maples at james.maples@eku.edu for further information.

