

Economic impact of rock climbing on the communities surrounding
the Red River Gorge, Kentucky

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Abstract

The sport of rock climbing has exploded in America over the last decade resulting in millions of climbers flocking to the available areas near and far from their home. Such traffic demands clear and effective policy-making from land managers, public and private, in order to conserve and protect valuable natural resources. The Red River Gorge area hosts thousands of climbers each year and contains over 1,000 climbing routes in ten separate areas with an array of amenities for lodging, food, and other recreation. However, no research has been completed to determine the benefits of these climbing resources for local businesses and residents.

This study was designed to investigate the economic impact of rock climbers on the local communities in and around the Red River Gorge area. Surveys obtained from 141 climbing groups over fifty-one days provided travel distances, group size, trip duration, and the amount of expenditure inside and outside the Gorge area. Climbers surveyed spent \$34,708.45 in Kentucky, an average of \$28.17 per climber per day. Specifically within the delineated Gorge area, the expenditure totaled \$25,563.50, or \$19.95 per climber per day. The data were analyzed using the input-output model, IMPLAN, to determine the impact on employee compensation, labor income, total value added, and employment in the designated area. The total economic effect inside the Gorge area, based on \$1 million in annual climber expenditure, was \$307,318.

Americans have been scaling backyard bluffs and wilderness peaks for centuries, pioneering traditions and methods with little need for regulation or management consideration. Rock climbing places many demands on its participants: mental and physical agility, prowess, stamina, and more often than not, a human partner. In the constant search for new companions to go climbing, Americans have spread the addiction far and wide. The Outdoor Industry Association Participation Study in 1997 indicated 200 climbing gyms were operating in the United States. In two years, that figure more than doubled to 500 gyms nationwide. The current tally of active climbing participants is approximately 7 million persons with nearly 25 million people having participated in technical climbing at least once (Grijalva, 2000). Growth means more participants, which in turn means greater impact environmentally, socially, and economically.

Although impact does not necessarily mean the destruction of resources, it does present the need for smart management. Effective administrative decisions require quality information on all aspects of the affected resource, including usage data, social and economic effects, and environmental concerns. However, the increase in rock climbing participation over the past decade is stressing current public and private management systems (Grijalva, 2000). In fact, the current tendency is to shut down climbing areas altogether or limit climbing to certain areas at the first sign of trouble (Ekstrand, 1994). The effects that such a ruling may have on the local and national economy have been the subject of several recent studies, although some would argue that changes in management strategies or policy do not directly affect recreation visitation at a given location (Alward et al, 1998).

This study was designed to provide information applicable to climbing management decisions in the Red River Gorge area by examining the extent of the economic impact of

climbing on the local region. The background of the Red River Gorge area and the history of climbing in the area are presented along with a summary of the local businesses and municipalities and a brief listing of related terms and definitions. The professional literature related to this study including summations of the economic research mentioned above are reviewed in Chapter 2. In Chapter 3, the researcher discusses the methodology chosen and the rationale for the research protocol. The survey tool is also outlined in detail. The findings and analysis of the research are presented in Chapter 4, and the implications of this study and opportunities for future research are discussed in Chapter 5.

Background and history of the Red River Gorge area

Located in the wooded hills of eastern Kentucky, the Red River Gorge Geological Area (RRGGA) lies within the Daniel Boone National Forest and is currently managed by the United States Forest Service (USFS). The U.S. government began to investigate the area during the 1920's and had purchased the majority of the land by the 1930's. In 1937, President Franklin D. Roosevelt established the Cumberland National Forest; in 1966 the name was changed to Daniel Boone National Forest under President Johnson (Ruchhoft, 1986). Today, the Red River Gorge area covers approximately 53,000 acres within the forest and extends into Powell, Menifee, and Wolfe Counties. Based on the numerous natural arches, rock shelters, caves, and other natural features, approximately 28,000 acres within the Gorge received the distinction of National Geologic Area in the 1970's. Directly to the east lies the Clifty Wilderness Area, a federally protected wilderness that boasts some 9,000 acres. The Red River cuts through the heart of the Gorge and has been designated a Wild & Scenic River. The 2,000-acre Natural Bridge State Resort Park (NBSRP) is situated due south of the RRGGA in Wolfe County and is managed separately by the commonwealth of Kentucky.

Motorized access to the Gorge is limited to Kentucky backroads and the heavily traveled Mountain Parkway, which provides east/west access from Winchester (30 miles west), and Pikeville (70 miles east). Highway 11 from Beattyville in the south splits the state park and arrives at the RRGGA at Slade, Kentucky, Exit 33 on the Parkway. The Mountain Parkway and Highway 11 are the most popular routes for gaining access to the area. State Road 715 and 77 connect and loop north through the RRGGA from the town of Pine Ridge west to Nada. State Road 77 provides access to those few traveling in from north of the area. Paralleling the Parkway, State Road 15 moves west from Campton past Clay City and continues through Powell County. The closest regional airport is in Lexington, Kentucky, 50 miles west. The only trains running through the area are used for mining and other commercial purposes. According to Forest Service officials, the RRGGA receives over 468,000 visitors per year. This information is based on vehicle counts and other visitor surveys (J. Hersel, USFS, personal communication, March 28, 2002). The Natural Bridge State Resort Park receives nearly 1 million visitors per year (R. Drake, NBSRP, personal communication, March 29, 2002).

The businesses found in the area create a diverse economic picture; however, most revolve around the tourism industry, whether through entertainment or lodging or necessities such as groceries or gasoline. The largest of the three counties, Powell (pop. 13,237), boasts two dozen commercial and industrial members from the Gorge area including a go-cart track, several bed and breakfast inns, rental cabins, gift shops, trading posts, several guide/outfitter services, and a sky lift. Gas stations, groceries, restaurants and many motels provide the basic services (PCCC, 2002). Outside the national forest, Powell County includes the incorporated towns of Stanton and Clay City, which are relatively well-developed cities. According to the 2000 U.S.

Census, the county has a non-agricultural labor base of 2,461 persons in 179 private establishments. This figure increased 44% from 1990 (U.S. Census, 2000).

Within Wolfe County (pop. 7,065), Cliffview Resort and Torrent Falls Bed & Breakfast are two options that provide food and lodging. The owners of Torrent Falls have recently constructed a steel ladder system, or via ferratta (Latin, meaning “the iron way”), allowing for easy, safe access to high places for those with little or no climbing experience. This activity is the first of its kind in North America. NBSRP offers a full-service lodge in addition to miles of hiking trails, a swimming pool, special events, restaurant dining, and much more. Recreational vehicle and tent camping is allowed both within the state park campgrounds and the RRGGA campgrounds. Campton, which lies to the east of the RRGGA, is Wolfe County’s only incorporated city (Wolfe County Web, 2002). The largest employer in Wolfe County is state and local government (362 employees). Manufacturing firms employ 282 persons, service organizations provided 215 jobs, and wholesale and retail trade support 196 jobs (Wolfe County Web, 2002).

Menifee County (pop. 6,556) lies due north of the RRGGA and is largely covered by the national forest. Frenchburg is the only incorporated town, but its location is well off the beaten path taken to reach the Red River Gorge area. The U.S. Census in 2000 listed 564 private non-farm jobs in the county.

Recreation opportunities abound within the Gorge area. The RRGGA boasts the highest concentration of rock shelters east of the Rocky Mountains and the largest trail system in Kentucky. Trails wind from the natural arches to the ridgetops with sweeping views and back to the densely forested bottoms. Many of the arches and shelters are accessible a short distance from a parking area allowing persons of all ages and abilities to enjoy the natural splendor. The

RRGGA hosts a reconstructed historic log house and farm, complete with a small herd of bison, at the Gladie Historic Site. A Forest Service-managed campground at Koomer Ridge provides lodging for the outdoor-oriented. Paddling enthusiasts can enjoy the miles of the Red River that snake through the Gorge. The adjacent Clifty Wilderness Area provides much-needed solitude from the rigors of daily life. Rock climbing and rappelling are popular activities. Off-road vehicles, mountain bikes, and horses are not allowed within the RRGGA or the Clifty Wilderness Area.

Rock walls, cliffs, and boulders are scattered about the region. While most of the documented climbing routes are found inside the RRGGA, numerous routes can be found throughout the region. Modern climbers began exploring the walls and bluffs in the 1950's, and a few routes were published in the "Cumberland Climbers' Climbing Guide" (Bronaugh, 1998). The 1970's saw an increase in climbing traffic and more official guidebooks documenting established climbing routes. With the advent of safe bolting methods and techniques (drilling permanent anchors fixed in the rock) in the late 1980's, the number of routes in the Gorge increased to about 300. In the 1990's, the Gorge area exploded with new routes as more and more walls were "discovered" and developed. The most recent guidebook, Bronaugh's *Red River Gorge Climbs* (1998), lists more than 1,000 climbing routes of varying difficulty and style in ten separate regions on over 100 different walls, and more are added every year. The Red River Gorge is regularly featured in the leading climbing magazines and receives attention from domestic and international climbers.

Purpose of Study

Without a full understanding of the economic benefits of rock climbing, some communities with enormous climbing resources have been reluctant to accept and promote rock

climbing as a legitimate recreational activity. Further, many management policies currently in place in climbing areas around the nation can be classified as reactive rather than pro-active.

The rule-of-thumb has generally been to ban all climbing at first question, regardless of the facts (Ekstrand, 1994). As most management policies are based on the economic ramifications of the policy implementation, it stands to reason that a study on the economics of rock climbing would be beneficial to managers and communities hosting climbing resources.

The motivation for this study was fueled in part by the current dearth of information on the economics of climbing. In spite of the fact that the Red River Gorge area has long been a popular destination for climbers, no research had been undertaken to establish the level of economic impact rock climbing has on the area. To that end, this project was focused on providing data helpful to a variety of interests when considering climbing management decisions. Specifically, the researcher tried to determine whether the sport of rock climbing had an impact on the economies of the communities in and around the Red River Gorge and to describe the impact in detail.

Statement in lieu of hypothesis

Using the expenditure data collected from climbers, the researcher will study the level of economic impact in Powell, Wolfe, and Menifee Counties due to rock climbing. Climbers spend large amounts of money inside the demarcated Gorge area; this expenditure will be analyzed and the actual economic impact extracted.

Significance of Study

As stated earlier, effective management begins with up-to-date and accurate information including the nature of user groups and levels of participation. At the time of this investigation, the research related to rock climbers in the Gorge was limited to a general visitor study by the

Forest Service in 1993 and a survey of climbing traffic (quantity of climbers over a given time period) at two locations within the RRGGA (Red River Gorge Climbers' Coalition, 1998).

Although the resulting Coalition study produced a visitor baseline for the two surveyed climbing areas, no additional information on individual climber behavior (including economic, social, travel or otherwise) was obtained. Both studies are discussed in greater detail in Chapter 2.

Alward et al (1998) expressed the importance of accurate economic information for management decision:

In many areas near Forest Service lands, there exists an economic structure that has evolved to directly support the activities that occur on Forest Service property. Many of these businesses depend, in whole or in part, on how the public lands are managed (p. 2).

Consequently, this research was directed towards providing information useful to the respective public land managers and private landowners; retail, resort, and restaurant businesses; local commerce commissions; and local residents when considering rock climbers directly. The information gathered can be utilized in developing climbing management plans, marketing strategies for businesses and tourism agencies, and, most importantly, resource management plans. The study also yielded a model for further exploration of climbing impacts at other locations throughout the world.

Delimitations

The size of the sample was limited to 141 participants. To reduce instances of bias, the survey was not submitted to the membership rolls of local climbing organizations. Surveys were distributed in person rather than by mail in order to increase the response rate. Because the study focused on the spending habits of rock climbers, non-climbers were not surveyed. The survey time period was delimited to approximately sixty days through February and March 2002.

Individuals with a home zip code inside the delineated Gorge area (defined as locals) were also excluded from consideration.

Limitations

Because of the nature of the survey, the researcher was primarily concerned with inflated or deflated responses from participants due to memory, unknown bias for or against, and inability to accurately forecast future expenditures. The information obtained in this study relied on the estimates of the participants for several key questions. However, this method is the most reliable and the most feasible for gathering the necessary data. As with all economic impact studies, the figures obtained can at best be considered “guesstimates” (Crompton, 2002). It is crucial to understand this limitation when considering the results.

The basic premise of any impact study involves positioning various forms of economic activity within the appropriate sector and applying the correct variables in order to determine the effect. “Thus, any measure of economic effects must be done with reference to some particular accounting stance or framework” (Alward et al 1998, p. 2). This research project was designed around the analysis model, IMPLAN, an economic software program licensed to the USFS. Prior to the initial data gathering phase, the investigator gained tenuous permission to use the program under supervision of Forest Service personnel. However, at the start of data analysis, the researcher was notified that the license agreement between the USFS and the Minnesota IMPLAN Group prohibited outside users. However, Susan Winter of the USFS, Fort Collins, agreed to run IMPLAN using the data collected from this study.

Lastly, in order to relate spending to an annual basis, it is critical for any expenditure analysis to have a valid and credible figure for the number of visitors or visits the area or site receives per year. To date, no scientifically sound studies have gathered this information for

climbers in the entire Red River Gorge area. Accordingly, any extrapolation to a yearly figure is tenuous at best and based solely on estimates rather than hard data. Without such data, the impact analysis was limited in its scope.

Assumptions

The investigator made all analyses and conclusions based on the assumption that participants completed the survey honestly. It was further assumed that the volunteers did not tamper with or otherwise adjust completed questionnaires. The investigator provided specific survey collection training to volunteers and assumed that the data was obtained according to these preset guidelines.

Definition of Terms

The following terms were related to the research and are defined below to increase the reader's understanding of study-specific language:

1. **Bouldering** – the simplest form of climbing, usually only several feet off the ground, consisting of a number of moves from start to finish without ropes or harness.
2. **Yosemite Decimal System (YDS)** – a method of rating rock climbs according to difficulty; an open ended scale starting at 5.0, currently ending at 5.15a; ratings above 5.9 are subdivided into “a-d” levels, i.e. 5.10a, 5.10b, etc.; climbs above the 5.10a level require specialized equipment and technique and strength training.
3. **Immediate group** – the total number of persons traveling with the participant for whom he or she may be paying expenses (Crompton, 2001).
4. **IMPLAN** – IMpact analysis for PLANning software developed by the U.S. Forest Service in 1979 (Minnesota IMPLAN Group, 1997); used in conjunction with local databases providing comprehensive economic data based on zip code; calculates eight

different measures of economic impact including four most common: sales, personal income, value added, and employment (Crompton, 2001).

5. **Inside the Red River Gorge area** – For the purposes of this study, this refers to the counties that share borders running through the RRGGA, Powell, Menifee, and Wolfe Counties. The majority of all rock climbs in the area are in one of the three counties.
6. **Red River Gorge Climber’s Coalition (RRGCC)** – a non-profit organization for climbers dedicated to working with landowners and managers to protect access to Gorge climbing areas and create equitable solutions to access conflicts within the area.
7. **Rock climber** – any person who has participated in the sport of rock climbing at least once whether inside or outside the Gorge area.
8. **Route** – the vertical rock path or trail a climber follows created by the series of holds or weaknesses in a rock face.
9. **Sport climbing** – a style of climbing involving using fixed anchors in the rock (drilled bolts) to protect against a ground fall.
10. **Traditional climbing** – a style of climbing involving using removable anchors placed while climbing to protect against a ground fall.
11. **Trip** – For this study, a trip is defined as the elapsed time from when the individual left home to when he/she returns home.
12. **Employment impact** – the number of jobs created economy-wide due to climber expenditures.
13. **Total Value Added Impact** – gross local product generated by climber spending. Similar to the Gross National Product.

14. **Labor Income Impact** – A subset of total value added; total increase in employee compensation and proprietor’s income from climber expenditures.
15. **Employee Compensation Impact** – a subset of total value added; the total increase in salaries and benefits from climber spending.
16. **Leakage** – an economic loss to a community occurring whenever money is spent on goods or services that are imported from outside the local community (McIntosh & Goeldner, 1984).
17. **Climbing Day** – equal to one climber spending one day at a site; if eight climbers are intercepted on one day, then eight climbing days are noted.

Review of related literature

The author attempted to determine the economic impact of rock climbing on the communities within the Red River Gorge area by collecting expenditure data directly from climbers. Other studies have been designed using various methods to determine the economics of climbing. As such, the literature related to this study tended to fall into one of three categories: 1) Red River Gorge-specific information, 2) rock climbing management and participation, and 3) economic research and development.

Red River Gorge

Although managed by the USFS, the Gorge area has been the subject of few research projects. In fact, no data on climbers existed until 1997 when members of the Red River Gorge Climbers’ Coalition (RRGCC) conducted an observation-based survey. The objective of the study was to determine the ratio of climbers vs. non-climbers and analyze the distribution of climbers over various routes and difficulty grades at two prominent areas in the Gorge (RRGCC, 1998). Volunteers were assigned to conduct a physical count of climbers and vehicles at the

Martin Fork Trailhead, which serves Military Wall and Left Flank Wall. Parking lot, hiking trails, and climbing wall observations were recorded from May 1997 to November 1997. Fifty-one separate surveys were conducted over the period of research. Of the 992 vehicles recorded in the Martin Fork parking lot, 75% were from Kentucky, Ohio, Indiana, and Michigan; 35 other states and two Canadian provinces were also represented (RRGCC, 1998). Over the six-month period, 2,023 individuals were active in the Martin Fork area. Of these, 1,509 persons were participating in rock climbing, while an additional 178 were “potential” climbers surveyed on the access trails. Researchers concluded that 83% of visitors to the Martin Fork area were climbers and 17% were casual hikers. By combining visitor and car counts, each vehicle at the Martin Fork area brought an average of 2.04 visitors (RRGCC, 1998). The type of data collected did not permit total annual climbing participation calculations.

The most extensive research to date on climbing resources within the Gorge was originally conducted by John Bronaugh in 1993. Five years later, revisions were made, new routes added and the second edition of *Red River Gorge Climbs* was produced (Bronaugh, 1998). In this comprehensive guidebook, the Gorge area is subdivided into ten regions with each containing multiple climbing walls. Each wall is described by type of access, size, and quantity of individual routes. Route information includes brief start-to-finish directions, length in feet, difficulty grade, type (sport, traditional, or mixed), and credits for the first ascent. Additional information on the ancient and modern history of man in the region, and the local history of climbing is also provided. Bronaugh tallied 1039 climbing routes found in the Red River Gorge area. Of those, 631 were classified as traditional (61%), 355 as sport (34%), and 53 classified as mixed (5%). The majority of routes (77%) fall into the moderate range on the Yosemite Decimal System (YDS) difficulty scale (5.8 to 5.12) (Bronaugh, 1998).

Climbing management and participation

The Access Fund recently published the primary work regarding climbing management entitled *Climbing management: A guide to climbing issues and the production of a climbing management plan* (2001). The goal of the publication was to share information and promote management consistency between climbing areas in the United States. The guide contains information regarding climbing and cultural resource protection, management issues, vegetation impact considerations, practices to limit liability, and increase education and outreach. A complete how-to section for drafting and implementing a climbing management plan including a review of issues is provided. A brief section on the economics of climbing debates the value of climbing resources and points readers to several recent economic studies. The publication also includes an annotated bibliography listing climbing-related literature as an appendix.

Several sources have provided figures of climbing participation on a national level. The National Survey on Recreation and the Environment (NSRE) prepared by the United States Forest Service in 1994 and 1995 reported approximately 7 million U.S. citizens participating in rock climbing and approximately 9.5 million participating in mountain climbing. The original NSRE was completed in 1982; however, no rock climbing data were obtained, making growth conclusions unavailable. A national telephone survey conducted in 1998 by the Survey Research Center of the Institute for Public Policy (IPP) at the University of New Mexico asked respondents whether they had ever participated in technical rock climbing or bouldering (Grijalva, 2000). Affirmative responses were received from 9.7% of those interviewed. Based on the U.S. population in 1998 (270 million), approximately 25 million persons in the United States have participated at least once in technical rock climbing. Clarification on the two figures is as follows: “the NSRE predict[ed] *annual* U.S. climbing potential to be 7 million individuals,

while the IPP results indicat[ed] that the *potential* U.S. climbing participation could be as high as 25 million” (Grijalva, 2000, p. 45). Additionally, the *Economist* reported an estimated 100,000 Americans try rock climbing every year (1995). This figure represents those individuals who attempt the sport for the first time.

Economic impact

Although Americans have been rock climbing for centuries, only recently has the United States government officially recognized climbing as a valid recreational activity. The National Park Service did not address the need for regulations and climbing management guidelines in national parks until 1993 (58 FR 1993, 32878-80). Other government agencies have since implemented a variety of measures in response to increased climbing activity with mixed results. In 1998, the U.S. Forest Service submitted a proposal to restrict climbing in wilderness areas (USFS, 1998). The plan was based on the Forest Service’s interpretation of the legislative intent of the Wilderness Act of 1964 and proposed prohibiting the use or placement of fixed anchors in federally designated wilderness areas. However, these anchors are essential for safely ascending or descending climbing routes and the elimination of fixed anchors would in effect eliminate a majority of the rock climbing resources. In 2000, Grijalva published the results of an investigation into the “economic losses to climbers due to changes in institutional rules for rock climbing access on federal and state public lands” (Grijalva, 2000, p. viii). Original motivation for her research came from federal mandates (Executive Orders 12866 and 12291) requiring benefit-cost analyses prior to any major federal regulations; major being defined as any regulation with an economic effect of \$100 million or more (Grijalva, 2000). The researcher hypothesized that the elimination of climbing in designated wilderness areas would result in a loss greater than \$100 million to rock climbers, establishing climbers as a group with standing.

Accordingly, the USFS would be unable to make any unilateral decisions on climbing resources without first conducting appropriate analyses of the effects, i.e., the proposed ban on fixed anchors would be subject to economic impact review and likely rejected.

Grijalva's research method utilized a repeated-discrete choice random utility model to collect the survey data on the trip-taking behavior of 597 climbers dispersed throughout the United States (Grijalva, 2000). The investigation produced data from approximately 13,000 trips to 60 separate climbing areas in the U.S. The application of count data regression models resulted in a seasonal economic loss from \$477 to over \$1,000 per climber. When the low-end figure (\$477) is applied to the total number of U.S. climbing participants (7 million persons in 1994), the total economic loss from climbing restrictions is a staggering \$3.3 billion dollars (Grijalva, 2000).

Another group of researchers in Nevada investigated the economic value of climbing resources at Red Rock Canyon National Conservation Area with specific attention given to the ban on the placement of new permanent anchors (Vossler, et al, 1997). The study compared the benefits of the ban with the potential economic losses to climbers and the Las Vegas economy (Vossler, et al, 1997). The results of the study were unavailable for review at the time of this investigation.

Ekstrand completed similar work in 1994 but on a more limited basis. His investigation examined the economic value of climbing resources in Eldorado Canyon State Park, Colorado. The study was designed to measure the economic value of climbing resources and determine the effect of climber congestion, setting, and remoteness of location on this value. The questionnaire was designed so the results could be applied to either the travel cost model (TCM) or the contingent valuation model (CVM) (Ekstrand, 1994). Participants were asked about travel

distances and expenses, as well as other expenses incurred during the trip for the TCM.

Additional questions for the CVM revolved around the participant's willingness to pay for the climbing resource with a variety of conditions imposed, i.e., wait time, crowding, length and difficulty of the hike to the crag. A value for a day of climbing was reported at \$26.38 under the CVM. Using a yearly total for climbers at the state park (30,545) the study concluded the Eldorado Canyon State Park climbing resources could be valued at \$805,777 per year. The investigator made the assumption that if the daily value (\$26.38) could be applied to the national participation figures available at the time (3 million climbing participants), the value of all climbing resources for 1991 would be \$1.98 billion (Ekstrand, 1994).

Shaw and Jakus completed research in 1996 on the travel cost models for rock climbing demand in the Shawangunks of the Catskill Mountains, New York. Data were collected by survey from 220 climbers who indicated they visited the area primarily for climbing (Shaw and Jakus, 1996). Information from other visited areas was also included. Various models were applied to the data, including multiple site choice model, a trip frequency model for one site, and a combined multiple site/total seasonal trips frequency model (Shaw and Jakus, 1996).

In parallel research, Ewert's study of tourism in a portal community indicated that the spending of mountain climbers traveling through and staying in the town of Talkeetna, Alaska had a significant impact on the local economy. Talkeetna serves as the jump off point for attempts on Denali (Mount McKinley). His survey compiled the results of 169 usable responses from climbers on their total expenditures both inside and outside the state. The mean value of \$4,249.00 per person was applied to the 1,000 climbers per year average. The expenditure impact in 1993 exceeded \$4 million (Ewert, 1996).

In 1998, several researchers from various fields combined to produce the draft of a document for the USFS detailing the creation of expenditure profiles for recreational visitors to Forest Service lands. The purpose of the research was to identify average expenditure profiles that would then be used in Resource Planning Act (RPA) analyses. The study used data collected at numerous Forest Service locations by several agencies over a period of many years. The first data set was gleaned from the Public Area Recreation Visitor Survey (PARVIS) which gathered expenditure information from 1985 to 1987 (Alward et al, 1998). The CUSTOMER survey program collected data during a period stretching from 1988 to 1996. Both data sets (totaling 5100 expenditure surveys) were used in the research although the methods of collection had been different and did not present a completely whole visitor picture. Incidentally, the study collected visitor data for the Daniel Boone National Forest in 1993.

Expenditures were divided into five general categories for analysis: Lodging, Food, Transportation, Activities, and Other. These five were further subdivided into twelve sections that more accurately described the various expenditures. With the understanding that addressing every available activity on Forest Service land and the related expenditures would be futile, the study organized activities into one of five aggregates: Developed site, Mechanized travel, Trail use, Winter, and Other Activities (Alward et al, 1998). Data was collected on a per trip basis making it necessary to define the length of stay for each participant.

The study formulated four separate expenditure profiles based on the inclusion/exclusion of locals, adjustments for at home expenditures, travel costs, and others. The results of the study indicated that non-local visitors spend more per trip than locals and trips by non-locals generally last longer than the trips of locals. The average spending ranged (depending on the expenditure profile applied) from \$55.00 per person (Profile D) to over \$118.00 per person (Profile C)

(Alward et al, 1998). The research concluded that the application of a particular profile was dependent of the nature of the resource, activities and local economy. Alward stated, “In short, there is no one simple answer or formula” (p. 16, 1998).

Beyond rock climbing, John Crompton developed a compilation of proper procedures and principles for pursuing valid economic impact studies of festivals and special events. He stated that although the key purpose of conducting an economic impact study is to measure the economic return to residents, the entire process is, at best, inexact (Crompton, 2001). Because impact studies rely upon participants recalling and estimating expenses, labeling results as hard data or fact is inaccurate. Accordingly, results and conclusions can be considered only “guesstimates” (Crompton, 2001).

It is important to understand the role of economic impact studies in establishing the value of activities, special events or recreational resources. The impact study can provide insight into the actual profit or loss of a resource, be it a one-time or continuous occurrence. The results offer an answer to the question of whether local taxes spent on the event or promotion of a resource have any effect on the community or not. The real advantage to an impact study is its ability to bring the economic returns directly to the level of the citizen. Many economists and tourism promoters have pointed to the total expenditure in a community due to an event or resource and proclaimed the result as an economic impact figure. “It is used because it generates the highest economic impact number; but residents have no interest in sales generated, they are primarily interested in how it personally impacts them in terms of personal income” (Crompton, 2002, p. 72). In fact, the magnitude of sales generated is a benign number and has little or no relation to the individual citizen because the figure does not trace where the money goes after it is spent. That process, known as the multiplier effect, allows for the “leakage” of money from a

community; that is, money that was spent inside a community is turned around and used to pay for goods and services that come from outside the community, which creates no gain for the citizens. “Only those dollars remaining within a host community after leakage has taken place constitute the net economic gain” (Crompton, 2002, p. 20). Useful economic impact research must involve applying this concept to the totals and focus on the money that is turned around inside a community’s economic engine.

Crompton identified three principles crucial to a proper study: (a) exclusion of local residents, (b) exclusion of “time-switchers” and “casuals,” and (c) use of *income* rather than *sales output* measures (Crompton, 2001). Local resident expenditures should not be considered in impact results because they represent a recycling of money that was already there. Money already in a community does not provide any additional economic stimulus and should not be considered. “Time-switchers” were defined as individuals already planning to visit a community, but changed the timing to coincide with a particular event. These individuals are excluded from consideration because their spending would have occurred in the community regardless of the occurrence of the focus event. “Casuals” were described as those individuals who happened to be in the community at the time of the event but were attracted by other features and elected to attend the event in lieu of doing something else (Crompton, 2001). These must be discarded for similar reasons as the “time-switchers.” The event being studied held no importance to the visitor when the destination was chosen; therefore, the spending cannot be related to the event. If these three principles were ignored, Crompton argued that the data would include invalid figures that have no relation to the actual economic benefits of the event.

It is interesting to note that there is some disagreement on validity of excluding locals from consideration in studies involving recreational activities. The argument for use of local

resident recreational spending when determining impact is based on the concept that the expense is not a necessity and therefore could be included (Winter, USFS, personal communication, 2002).

The survey tool used in Crompton's research was designed to be analyzed by the Impact analysis for PLANning (IMPLAN) software. Developed by the U.S. Forest Service in 1979, IMPLAN accepts raw expenditure data and calculates eight different measures of economic impact, although only four are commonly used: sales, personal income, value added, and employment (Crompton, 2001). The *sales* measure reports on the direct and indirect effect of the extra spending input from a visitor on the economics within a community. *Personal income* represents the direct and indirect effect of the extra spending input from a visitor on the personal income and welfare of the residents of the community. *Value added* refers to other income to the community through taxes and fees imposed on the visitor. The *employment* measure provides a figure for the number of new jobs created to handle the influx of visitor spending (Crompton, 2002).

Since the economy varies from one locale to another, the data must be subjected to appropriate regional parameters. The structure and condition of the economy effects the degree to which leakage occurs. For example, in a agriculturally based economy, money spent on farm machinery is more likely to leave the community than money spent on locally processed cattle feed because of the location of the manufacturer. IMPLAN uses databases providing comprehensive local economic data based on zip code to accomplish this process (Minnesota IMPLAN Group, 1997). These data were compiled over several decades by various public and private sources and include information gleaned from 528 different industrial sectors (Crompton, 2001).

Methodology

Research involving the economic impact of any subject must be carefully formulated and follow sound methodology. As such, a solid foundation is crucial. This research was designed to collect expenditure information from climbers on a per trip basis. The tool used in Crompton's studies provided a base model for the survey instrument and analysis procedures for this project.

Subjects

Two different methods were used to determine eligible participants for this study. A subject was classified as eligible if he or she had climbed in the Red River Gorge area or was intercepted in the Gorge area while climbing at the time of the interview. Non-climbers were not surveyed.

During the survey period, trained volunteer interviewers were stationed at various climbing locations in the Gorge area to intercept and survey any climbers found. Participants were asked to complete the questionnaire immediately and return it to the interviewer. Additional collection procedures are discussed in depth later in this chapter.

Responses were also obtained in various climbing gyms throughout the Midwest and southeast United States. Volunteers gathered these responses - defined as off-site - in person. Only those climbers that had climbed previously in the Red River Gorge were surveyed.

Survey forms were submitted and approved by the Human Subjects Review Board at Western Kentucky University. An informed consent document was deemed necessary by the HSRB and attached to the survey (see Appendix A).

Instruments

The survey instrument used in this investigation was based upon one originally designed by Crompton for use with special events and festivals (Crompton, 2001). Slight modifications

were made to the instrument to garner climber-specific responses. (see Appendix B) Major efforts were made to keep the questionnaire short - in order to increase the likelihood of cooperation from participants - and the questions clear and simple. Several questions were added to obtain information very useful to land managers and landowners. The questions and supportive rationale are as follows:

1. What is the zip code at your home address? _____

This question clarified the status of the participant as either local or non-local. Referring to Crompton's principles stated earlier in Chapter 2, locals are excluded because the money spent was already in the community and does not represent any new input into the economy.

Differentiating between these users is important in regards to calculating impact in the local and state economy. Moreover, a comparison between in-state visitors and out-of-state visitors can be very insightful for managers. This resulting data will be useful in future research for calculating average travel distances and average associated costs for visitors.

2. Is rock climbing the reason you are visiting the Red River Gorge on this trip? Yes_____ No_____

The research procedure required that only climbers complete the survey. This question simply verified if the respondent was actually participating in rock climbing. If a respondent indicated "No" then he or she was advised they had completed the survey.

Alternative Question #2 for off-site distribution: (a) Have you been to the Red River Gorge previously? Yes_____ No_____ (b) If yes, on your most recent trip, was the reason for your trip centered on rock climbing? Yes_____ No_____

The selected phrasing was used in order to make the questionnaire clear for off-site participants. Using past tense and referring to the "most recent trip" clarified the parameters for the question. (see Appendix C)

3. On average, how many days per year do you spend climbing at Red River Gorge?

4. How many months/years of climbing experience do you have? _____months _____years

Not imperative to an economic impact study, these questions were added at the request of the Red River Gorge Climbers' Coalition. The results were useful in establishing the demographics of the climbers visiting the Red River Gorge.

5. How many days will you be at the Red River Gorge on **this trip**? _____

The design of the study focused on the per trip expenditures of each group. In order to calculate per day data, this question was included. The data also provided for the comparison of climbers' spending habits based on the length of stay.

6. How many people (**including yourself**) are in your immediate group? (This is the number of people for whom you typically pay the bills, e.g. your family or close friends) _____ people

By collecting group information rather than individual, this question avoided any confusion due to possible overlap in group expenses, i.e. one person pays for another, or is paid for by another. Therefore, only one individual from each group completed the survey. The responses also allowed for calculation of per visitor and per group expenditures.

7. Please indicate the ages of those in your immediate group: (How many persons in each category?)

0-10___ 11-20___ 21-30___ 31-40___ 41-50___ 51-60___ 61-70___ 71 & up___

It is vital to know age classifications of user groups in order to make positive and effective management decisions for any activity. The information gleaned from this question allowed the creation of a more complete user profile.

8. To better understand the economic impact of climbers at Red River Gorge, we are interested in finding out the approximate amount of money you and other visitors in your immediate group will spend, including travel to and from your home. We understand that this is a difficult question, but please do your best because your responses are very important to our efforts. **DURING THE COURSE OF YOUR VISIT,**

WHAT IS THE APPROXIMATE AMOUNT YOUR IMMEDIATE GROUP WILL SPEND IN EACH OF THE FOLLOWING CATEGORIES?

<u>TYPE OF EXPENDITURE</u>	Amount spent in the RRG area*	Amount spent outside the RRG area but in Kentucky
A. Admission/Fees	\$ _____	\$ _____
B. Food & Beverages (restaurants, concessions, etc.)	_____	_____
C. Retail Shopping (clothing, souvenirs, gear, etc.)	_____	_____
D. Lodging Expenses (hotel, motel, campgrounds, etc.)	_____	_____
E. Private Auto Expenses (gas, oil, repairs, parking, etc.)	_____	_____
F. Rental Car Expenses	_____	_____
G. Guiding or Tour Expenses (guides, tours, etc.)	_____	_____
H. Any Other Expenses	_____	_____
	<i>Please identify:</i> _____	

*Red River Gorge area refers to any locale within Powell, Menifee, and Wolfe Counties which includes Clay City, Stanton, Slade, Torrent, Campton, Frenchburg, Denniston, Lee City, and Burkhart.

This question required participants to estimate their total expenditures within the Gorge area (Powell, Menifee, and Wolfe Counties) surrounding the Red River Gorge. The second column was included in order to assist participants in clarifying exactly where their money was spent, whether inside the Gorge area or inside Kentucky. If disregarded, there was a greater probability of incorrect answers due to participants having misread or misinterpreted the question (Crompton, 2001). However, in order to establish the spending habits of climbers traveling to the Gorge, the information from the second column could prove very useful and will be discussed in Chapter 5 as further research. It was understood that the amounts listed by the participant were only approximations for two reasons; “(1) if respondents complete the questionnaire before they leave... the impacted area, they have to estimate the additional expenditures they are likely to incur, and (2) if they complete the questionnaire after the

[trip]...then their recall memory may be faulty” (Crompton, p. 39, 2001). As stated earlier, economic impact studies can only be classified as estimates.

A map of the Gorge area with “inside” and “outside” clearly demarcated was photocopied onto the reverse of the questionnaire to assist participants with understanding the Gorge area. (see Appendix D)

In order to determine readability of the instrument, the tool was given to six climbers with histories of climbing in the Red River Gorge. Minor wording changes were made after the results were examined. The survey took approximately four to five minutes to complete.

Procedures

Data collection began on February 9, 2002 with a meeting of the investigator and individuals volunteering to assist in the data collection. Detailed procedures for conducting the survey were explained verbally, and each volunteer was provided with an interviewer’s packet containing information on logistics. (see Appendix E) The volunteers were instructed to greet potential participants according to the prepared statement of purpose and intent (see Appendix F) and conduct the survey as stated.

Volunteers logged many hours distributing questionnaires at various climbing destinations within the Red River Gorge. Upon first contact, participants were asked verbally if they had completed the survey elsewhere. It is important to note the procedures followed if an individual replied they had in fact completed the survey at another time prior to the current encounter. If the participant indicated he or she had responded earlier, the interviewer was instructed to determine if the previous survey was completed on the current trip. If yes, then no additional survey was conducted. If the participant had completed the survey on a previous, separate trip, then a new survey was administered. Because the research is concerned with the

per trip expenditure, and many climbers visit the Gorge more than once, multiple responses by the same individual for separate trips were anticipated. If no surveys were completed on the current trip, then participants were asked to complete the questionnaire in its entirety immediately and return it to the interviewer. A second interview simply meant excluding questions 3 and 4. These questions were dismissed on the secondary survey because the information requested was not trip-specific and using the data would result in improper inflation of the demographic information. Surveys were collected during February 2002 and March 2002. Climbers completed 121 surveys on site with 117 usable responses.

A secondary method of data collection utilized the travels of volunteers to various climbing gym locations throughout the Midwest and southeast United States in January 2002. Climbers were intercepted at these gyms in much the same way as if they were in the Gorge area. Upon first contact, respondents were asked verbally if they had completed the survey elsewhere. The same statement of intent and purpose as used in the Gorge distribution was read to the participants at the climbing gyms. Participants were then asked to complete the questionnaire immediately and return it to the interviewer. Upon completion, surveys were placed in an envelope and mailed in bulk to the investigator. Twenty climbers responded to surveys in gyms, with 18 usable responses.

Mail-response collection was not used due to the absence of an address database for rock climbers.

Analysis

At the end of the data collection period, the author was advised that the software chosen for analysis, currently licensed to the U.S. Forest Service by the Minnesota IMPLAN Group, required an established agreement prior to any data collection or even survey development.

Tentative permission to use IMPLAN through the cooperative agreement between the Forest Service and the Red River Gorge Climbers' Coalition had been previously obtained from the local Forest Service supervisor. In actual fact, the USFS was prohibited from providing direct access to the IMPLAN program due to the nature and language of the software license contract. An alternative plan of analysis was used instead. With the help of the Forest Service, the data were applied to the IMPLAN model by a trained Forest Service employee and four measures (Employment, Employee Compensation, Labor Income, and Total Value Added) were produced based on the three-county area (Powell, Wolfe, and Menifee) surrounding the Red River Gorge. The results are discussed at length in the following chapter. That the researcher was not allowed free reign and access with the IMPLAN program was the only complication to the original study design.

Apart from IMPLAN, many basic miscalculations were possible with the gathered data without proper constraints. Starting with a sum total expenditure of \$20,000.00, the average paid out per trip (100 total trips) could be as high as \$200.00. Simply considering the total sum of reported trip days (250), the average spending per day could be \$80.00. However, the problem with both figures is the lack of consideration for individual spending habits, group size, and length of stay rendering each calculation unproductive and useless for anyone.

Two formulas were used for data analysis. To calculate the total reported expenditure per climber per day, the author began with the reported expenditures inside or outside the Red River Gorge on each response. The sum of the expenditures was divided by the number of persons reported in that survey. The result was then divided by the corresponding length of stay. That is, for each survey the following equation was applied:

$$E_{io} = (R_{io} / p) / L \tag{1}$$

where:

- E = Expenditure per climber per day
- R = Reported expenditures recorded in survey
- p = Number of persons in surveyed immediate group
- L = Length of trip reported in survey
- i = Inside the Gorge area
- o = Outside the Gorge area but in Kentucky

By substituting outside expenditures (R_o) for inside, this formula was applied to expenses outside the Gorge area with the same result (E_o). Adding both together and applying the formula resulted in E_{io} or the expenditure per climber per day for entire trip. This method considered the individual differences between surveys, which was then reflected in expanded calculations on the dataset as a whole.

Thus, in order to compute the average daily outgo, the results of Equation 1 for each survey were added together and then divided by the total number of valid surveys. Data set averages for expenditures inside and outside the Gorge area were included.

Moving to the yearly input of climbers into the Red River Gorge community required more flexibility and a reminder of the nature of economic studies and the reliance on the estimations of survey participants. The method is best expressed below:

$$Y_{io} = E_{io} (D_y) \tag{2}$$

where:

- Y = Expenditure per climber per year inside/outside the Red River Gorge area
- E_{io} = Expenditure per climber per day inside/outside the Gorge area
- D_y = Estimated days spent in the Gorge per year by responding climber

Applying the average process to the dataset, the investigator was able to obtain an average annual expenditure per climber inside the Gorge area, outside the area in Kentucky, and total expenditure in Kentucky.

Other calculations

Average group size, length of trip, and time spent in the area per year were also figured. A brief comparison of the expenditure and trip data for Kentucky residents and out-of-state visitors is also noted. These findings are presented in depth in the following chapter. Although this research was directed toward the economic impact, the data gathered provided an abundance of additional usable information ranging from experience levels, travel distances, and ages of participants. Possible areas for further exploration with the collected data are discussed later.

Results and Analysis

The project was designed to gather specific demographic, economic, and trip data from rock climbers at the Red River Gorge, Kentucky. Participants were intercepted by trained volunteers at various locations in the Gorge area and at climbing gyms in Kentucky and invited to complete a short survey. The volunteers collected 141 surveys over a fifty-one-day period in February and March 2002.

Data analysis

Of the 141 collected responses, 135 were deemed acceptable and used in the data analysis outlined below. Six responses were set aside for one or more of the following reasons: participant provided a home zip code that was inside the demarcated Gorge area (1), one or more essential questions were left blank or incomplete (4), or the survey was improperly filled out (1). This last survey was word-processed and the investigator assumed it was not received or

completed in person. Some surveys left Question 3 blank (estimated days climbing at the Red River Gorge per year). In this case, the reported length of the current/most recent trip was used.

Because of the nature of the survey, the researcher was primarily concerned with inflated or deflated responses from participants due to memory, unknown bias for or against, and inability to accurately forecast future expenditures. It is crucial to understand this limitation when considering the results. The information obtained in this study relied on the estimates of the participants for several key questions. However, this method is the most reliable and the most feasible for gathering the necessary data. As with all economic impact studies, the figures obtained can be considered “guesstimates” at best (Crompton, 2002).

Non-economic results

Twenty-four states, Washington D.C., and Canada were represented in the survey. Only 33 of 134 usable responses for this question came from Kentucky residents. This number was the most from any state surveyed. Ohio, Indiana, Illinois, and Michigan rounded out the top five states. Canadian climbers were recognized with a 6.7% share of the total responses. The remaining 19 states, including Massachusetts, California, and the District of Columbia, provided 12.5% of the responses. Note that non-Kentucky responses were by far the majority at 67% (102 responses). (See Table 4.1 for more information)

All 135 responses provided the length of the current or most recent trip to the Gorge in days. While the surveys represented a total of 400.5 days of climbing, the trip length per surveyed climber averaged 2.97 days. Visits varied from one day in length (numerous responses) to twelve days (one group from Georgia). Kentucky residents spent an average of 1.3 days per trip in the Gorge area, while out-of-state climbers averaged 3.5 days. Canadian visits ranged from three to seven days with a mean of 5.4 per trip.

Participants were requested to estimate the number of days he or she spends climbing in the Gorge area each year. Results varied from one day for first-time visitors to climbing guides that visit the area nearly two-thirds of the year. The climbers surveyed estimated a total for climbing days per year of 3,552 with the average time at 26.3 days. Surprisingly, out-of-state visitors spent more time in the area - 17.9 days on average with a total of 1826. Kentucky residents averaged over twice that figure at 55.7 days. The total climbing days for Kentuckians was 1726. However, it is interesting to note that when the eight Kentucky responses indicating 100 days or more per year were removed, the total was 676 climbing days and the average dropped to 29.4 days per year.

The 135 surveys collected represented a total of 457 climbers, and the size of each immediate group ranged from one person (seven responses) to eleven persons (one response). Of note here, six of the seven one-person surveys were from out-of-state climbers. The average for the immediate group was 3.4 persons. In-state climbers had smaller groups in general with an average of 2.8 persons per group while out-of-state groups averaged 3.5 persons. Kentucky residents totaled only 20% (93 persons) of surveyed climbers while nonresidents totaled 364 (80%).

Several questions that were not crucial to the impact analysis were included in the survey. Participants were asked to quantify in months and years the amount of rock climbing experience he or she has had. Responses varied from four months to 34 years. The average length of experience for the entire survey group was 5.93 years.

Lastly, participants were asked to identify the appropriate age group for each member of their immediate party. The groups were defined by decades from 0 to 10 years, 11 to 20, 21 to

Table 4.1

State/country of origin per reported zip code

State	Response total	Percentage
KY	33	24.6%
OH	17	12.7
IN	13	9.7
IL	12	8.9
CA, NC, NY, CO, IA, MO	12*	8.9
MI	11	8.2
MA, WA, PA, AL, TX, VA, WV, WI, MS, DC	10**	7.5
Canada	9	6.7
GA	7	5.2
VT, MA	6	4.4
TN	4	2.9

Note: n = 134. * 2 responses received from each state. ** 1 response received from each state.

30, and so on. At least six responses left this question blank or incomplete. Twenty-one to thirty-year olds created the largest age group (263 persons). Seventy-four climbers were in the eleven to twenty year age bracket and fifty-seven were included in the 31-40 year group. Thirty individuals were represented in the 41-50 age group. Responses indicated eight persons under age eleven. Two persons over 51 were identified. No surveys reported climbers ages sixty-one or higher.

Expenditure results

Participants were asked to estimate their expenditures on the current/most recent trip to the Gorge area and define the expense in one of eight categories: Admissions/Fees, Food & Beverages, Retail Shopping, Lodging expenses, Private Auto expenses, Rental Car expenses, Guiding or Tour expenses, and Other expenses. These categories were chosen based on

Crompton's previous impact research. Participants were also asked to differentiate between expenses occurring inside the Red River Gorge area and those occurring outside the Gorge area but in Kentucky. Refer to Table 4.2 for additional information on each category.

Expenses inside the Red River Gorge area exceeded those outside by nearly a 65% margin. Participants reported spending a total of \$34,708.45 in the commonwealth of Kentucky during the survey period. An important distinction should be made as regards the spending habits of Kentucky climbers versus those from out-of-state.

Surveyed Kentuckians spent only \$3,286.00 in their travels to and from the Gorge for climbing. The remainder (\$31,422.45) was brought into the commonwealth by non-residents.

Category A, Admissions/Fees, included any entry ticket charges, permits, or other related expenses. The U.S. Forest Service implemented an overnight parking fee system over the last year for the Red River Gorge Geological Area only. Those permits are available at local gas stations and groceries.

Food & Beverages (Category B) constituted the largest area of expense for climbers visiting the Gorge area. Several gas stations, restaurants, and markets in Slade and Stanton see

Table 4.2

Expenditure results by category

Category	Inside the Gorge area	Outside the area*	Total
Admission/fees	\$192.00	\$153.00	\$345.00
Food & beverages	10,761.00	2,960.00	13,721.00
Retail shopping	1,598.00	1,769.95	3,367.95
Lodging expenses	10,390.50	455.00	10,845.50
Private auto expenses	2,159.00	2,117.00	4,276.00
Rental car expenses	375.00	120.00	495.00
Guiding/tour expenses	-	70.00	70.00
Other expenses	-	-	-
Total	\$25,563.50	\$7,644.95	\$34,708.45

Note: Dashes indicate no expenses reported in this category. * Indicates expenses occurring outside the delineated Gorge area but within Kentucky.

much of the business in this regard. Reported expenditures on food and beverages inside and outside the area totaled \$13,721.00.

Retail Shopping expenses outside the Gorge area more than doubled those inside the area. The amount difference is likely due to the limited retail outlets within the delineated Gorge area.

Lodging expenses were close to the top in total expenses at \$10,845.50. However, expenses inside the area were almost 23 times greater than those outside the area. This difference may be explained in part to the lack of lodging outside the area and yet still in close proximity to climbing resources. The Gorge area itself abounds with campgrounds, motels, lodges, cabin rentals, and bed and breakfast inns.

Private Auto expenses accounted for the gas, oil, and possible repairs encountered by visitors during travel to and from the Red River Gorge.

Under the Rental Car expense category, participants reported \$495.00 in total expenses. Expenses inside the area more than doubled those reported outside the area.

Guiding and Tour expenses was the most vague and open category for participants. Besides the obvious fees for guides and tours, this category accepts expenditures for entertainment such as movies or climbing gym entry charges. Several participants recorded these expenses under the Other Expenses heading. According to Susan Winter of the USFS, the IMPLAN analysis recognizes considers movie and gym admissions as Guiding or Tour expenses. For this study, Guiding and Tour expenditures totaled \$70.00 occurring completely outside the area. No usable Other Expenses were reported.

Data extrapolations

Without proper restraint, many basic miscalculations were possible with the gathered data. Starting with the known sum total expenditure of \$34,708.45, the average paid out per trip

(135 total trips) could be as high as \$257.10. Simply considering the total sum of reported trip days (400.5), the average spending per day could be \$86.66. However, the problem with both figures is the lack of consideration for individual spending habits, group size, and length of stay.

Application of the equations discussed in Chapter 3 allowed the researcher to develop more useful numbers. The average of the results of Equation 1 (expenditure per climber per day) using expenditures from inside the delineated area for the entire dataset was \$19.95. Expansion to annual expenditures per climber (Equation 2) at the Red River Gorge indicated a mean of \$450.21 per climber inside the delineated area, \$215.88 per climber per year outside the area but in Kentucky, and \$666.09 total in Kentucky per climber per year. (see Table 4.3 for complete results)

Impact analysis

The researcher worked in conjunction with a Forest Service employee licensed and trained to use the IMPLAN program. The data set was provided to the analyst and four impact measures were produced: Employment, Employee Compensation, Labor Income, and Total Value Added.

Based on economic data collected in the survey, IMPLAN determined a weight for each category of expenditure both inside the Gorge area and outside the area. This weight was then applied to the annual climber expenditure and IMPLAN was able to construct a total response coefficient for each economic measure. The key to this model is a valid annual expenditure, which is directly dependent on a valid annual visitor total. No valid research has been conducted to date that provides a solid annual climber visitation figure for the area in question. The USFS has reported an estimate of 5,000 climbers per year in the Gorge from 1995 (J. Hersel, USFS, personal communication, March 28, 2002).

An RRGCC representative, Shannon Stuart-Smith, felt this figure was very conservative and did not reflect the current level of visitation in the Gorge area. However, using the data collected in this study, the researcher was able to construct several figures that provide a framework for annual visitation. The results of these combinations are presented in Table 4.4. Participants were asked to estimate the number of days spent in the Gorge area per year (3,552 days). If

Table 4.3

Average expenditure per climber/ day (Eq. 1.¹) and per climber/ year (Eq. 2²)

Data group	Equation 1	Equation 2
Total Dataset		
Inside area	\$ 19.95	\$ 450.21
Outside area	8.22	215.88
Total	28.17	666.09
Kentucky Residents		
Inside area	8.90	560.28
Outside area	7.74	386.86
Total	16.64	947.14
Out-of-state visitors		
Inside area	23.62	422.08
Outside area	8.48	178.86
Total	32.10	600.94

Note: ¹ Equation 1 = $E_{io} = (R_{io} / p) / L$

where:

- E = Expenditure per climber/ day
- R = Reported expenditures recorded in survey
- p = Number of persons in surveyed immediate group
- L = Length of trip reported in survey
- i = Inside the Gorge area
- o = Outside the Gorge area but in Kentucky

² Equation 2 = $Y_{io} = E_{io} (D_y)$

where:

- Y = Expenditure per climber/ year inside/outside the Red River Gorge area
- E_{io} = Expenditure per climber/ day inside/outside the Gorge area
- D_y = Estimated days spent in the Gorge per year by responding climber

applied to the total average expenditure per climber per year, the total annual expenditure by climbers is \$2.4 million. Participants also reported a total of 456 days climbing during the survey

period. When extended to visits per year, the total is 3,257, creating an annual expenditure of \$2.1 million. When the USFS estimate of 5,000 climbers per year is used to calculate annual expenditure, the result is \$3.3 million. Thus, using available visitor data, the annual expenditure by climbers in the Gorge could range from over \$2 million to more than \$3 million. In lieu of a reliable annual figure and in order to maintain the integrity of the analysis results, the impact analysis with IMPLAN was calculated using just \$1 million dollars of annual climber expenditure, which is well below the estimates of yearly expenditures outlined above.

The Employment Impact measure provides the total of jobs stimulated by the spending in the area for a year's time. All types of jobs are included in this model (full-time, part-time, temporary, and seasonal) with no distinction between them. Based on the weights assigned by IMPLAN and \$1 million in climber spending, the total Employment Impact inside the Gorge area was 13.9 jobs per year. The economic impact outside the area decreased slightly to 13.7 jobs per year.

Labor Income refers to the level of impact to employee compensation (salaries and benefits) and proprietor's income. The reported expenditures inside the Gorge created a total impact of \$185,455. Spending outside the Gorge was greater than inside, and the calculated economic effect reflected that discrepancy, totaling \$309,222 per year.

The third measure constructed by IMPLAN was Employee Compensation Impact. This impact calculated the effect climber spending had on the level of salaries and benefits of employees in the delineated area. Using \$1 million in annual climber expenditure, this impact totaled \$153,133 per year inside the Red River Gorge area. Outside spending grossed \$277,281 per year.

The overall economic effects of climbing in the Red River Gorge area were determined under the fourth measure used: Total Value Added (TVA). Similar to the Gross National Product, the TVA indicates the total impact from the annual expenditures in the subject area. The reported expenditures inside the Red River Gorge area created \$307,318 in economic stimulus within the area. Expenditures from outside the three-county area but in Kentucky resulted in an impact of \$520,271.

Discussion of results

The research produced a number of interesting data for consideration. The quantity of out-of-state climbers (80%) versus Kentucky residents (20%) was surprising. The resulting difference in the level of spending (\$29,556.45) was then expected. Combined in-state and out-of-state responses left a total of \$25, 563.50 within the area, compared with \$7,644.95 outside the area but in Kentucky. Inside expenditure more than tripled that outside the area.

Table 4.4
Annual expenditure by Red River Gorge climbers in Kentucky

Climbing Days per year	Annual Expenditure¹ (in millions)
3,552*	
Inside area	1.60
Outside area	.77
Total	2.37
3,257**	
Inside area	1.47
Outside area	.70
Total	2.17
5,000 ²	
Inside area	2.25
Outside area	1.08
Total	3.33

Note: ¹ Annual expenditure is listed in millions of dollars. * This figure was calculated using the total number of days spent climbing in the Gorge area per year. ** Calculated by extending the reported trip length (456 days over 51 days or 14% of a 365-day year) on each survey to a full year. ² Obtained from the USFS as an unofficial estimate of climbing visitors per year to the Gorge area.

More importantly, however, the economic effect of the \$7,644.95 spent outside was far greater – by almost a quarter million dollars – than that of the inside expenditures when calculated by IMPLAN. The nature and type of economic infrastructure within a community can be quite effective in preventing the leakage of dollars from that community. The economic engine within the delineated Gorge area is obviously not as large and diverse as that of the entire commonwealth. Many goods and services found inside the Gorge either rely on outside resources or suppliers, creating a pipeline for dollars leaving the community. Although leakage exists at the state level, it is certainly not as significant as it is with a rural community such as the Red River Gorge.

It is interesting to note that the average expenditure per climber per year result (\$666.09 – calculated by the average of all individual survey results from Equation 2) was consistent with Grijalva's economic expenditure research. Her report indicated average annual expenditures per climber ranged from \$477 to \$1,000 for the entire year (Grijalva, 2000). Climbers surveyed at the Red River Gorge for this study appeared to be very typical in terms of spending habits.

Summary of study

As the number of climbing participants increase in the United States, land managers overseeing climbing resources will be forced to deal with the increased impacts from the sport, socially, environmentally, and economically. Learning how to respond to the challenges of climbing management involves understanding the effects of the sport on the surrounding communities and resources. This study was directed toward providing information on the economic impact of rock climbing at the Red River Gorge, Kentucky, on the towns and counties neighboring the Gorge.

Based on previous research on economic effects, an in-person questionnaire was developed and distributed in person to climbers at the Red River Gorge and local climbing gyms (Crompton, 2001). The researcher requested information from the participant regarding the current/most recent trip to the Gorge area. Beginning with home zip code, the questions covered the size of the participant's immediate group and length of current/most recent trip. Most importantly, participants recorded per group expenditures in eight expense categories and differentiated between those paid inside the Gorge area and those outside the area but in Kentucky. Questions such as level of experience, ages of group members, and time spent at the Gorge per year, were asked but were not crucial to the impact study.

Of the 141 responses collected, 135 were deemed usable and subjected to further scrutiny. Although Kentucky held the largest total for one state (33 responses), out-of-state climbers completed 80% of the surveys. Visitors were from a variety of locations including Canada, California, Massachusetts, and Washington. Climbers reported making more than five trips per year averaging 17.9 days in the Gorge area with an average trip length of 3.5 days.

Expenditure data inside the Gorge were significantly higher than those outside. Climbers indicated spending \$25,563.50 (\$19.95 per climber per day) inside the Gorge during the survey period and only \$7,644.95 (\$8.22 per climber per day) outside the Gorge but in Kentucky. Applying two equations to the data allowed the researcher to calculate an average per climber per year expenditure of \$666.09.

IMPLAN analysis conducted by the Forest Service using the data collected in this study reported a total economic effect in the state of Kentucky of \$827,589.00 based on \$1 million annual climber expenditure. This figure refers to the Gross Commonwealth Product of Kentucky and is similar to the Gross National Product (GNP). The impact inside the Red River Gorge area

was \$307,318.00. Outside the Gorge area but in Kentucky, climbing expenditures had an effect of \$520,271.00.

These figures are better understood in the context of the separate measures constructed by IMPLAN; that is, for every \$1 million dollars that rock climbers spend inside the Red River Gorge area per year, 13.9 jobs are created. For every \$1 million dollars spent outside the area, 13.7 jobs are created. Similarly, for every \$1 million spent inside the Gorge area, \$185,455.00 is recycled to local employees and business owners as Labor Income and \$309,222.00 is returned for every \$1 million spent outside the area but in Kentucky. The difference inside and outside the Gorge area is due largely to the level of leakage that occurs in a rural economy such as that surrounding the Gorge area. Much of the money that is spent inside the Red River Gorge area leaves the community as the business owners must purchase replacement goods and services from outside the area. On a personal level, the Employee Compensation measure results were \$153,133 in personal income for each \$1 million spent inside the area, \$277,281 in personal income outside the area. Viewing the results in this manner allows for a clearer picture of the actual impact of rock climbers on the communities surrounding the Red River Gorge area.

Conclusions

It is important to note that the impact analysis was conducted assuming an annual climber expenditure of \$1 million in Kentucky. This estimate was a conservative one but was used because of the lack of reliable research to verify any larger amount. The annual expenditure calculation is dependent on valid visitors per year data, which did not exist at the time of this project. Obviously, having such data in hand would greatly increase the accuracy of the impact numbers generated by this study. Using the visitor data detailed in Table 4.4, the total economic impact inside the Gorge area could be as high as \$1.02 million per year. However, the impact

results are valid and report a definite economic impact from the sport of rock climbing in the economies of Powell, Wolfe, and Menifee counties. The significance of that impact could be easily seen in a comparison of rock climbing results with other recreational activities occurring in the Red River Gorge such as hiking, canoeing, and fishing. Without other similar studies to provide perspective, the results must stand alone.

Implications

Perhaps most relevant to local resource managers and business owners is the annual expenditure per climber per year in the state of Kentucky (\$666.09). As yet, this financial resource is untapped and comes from little if any commercial promotion of the climbing areas in the state. Thousands of climbers visit the state each year just for climbing despite of the lack of publicity and tourism promotion of the area, and most spend a considerable amount of money. The natural conclusion and implication of this research involves re-evaluating the marketing strategies currently in place in order to increase the climbing traffic at areas around the state. There are multiple ways for local businesses to claim a portion of the money spent by climbers each year. Most strategies involve advertising more effectively and creating awareness among climbers about locations where they may want to spend their money. The opportunities for climbing promotion are abundant. Several communities in other areas have created climbing festivals and events in conjunction with climbing advocacy groups, bringing thousands of climbers into an area for a week or weekend. The Ouray Ice Climbing Festival in Ouray, Colorado, the Phoenix Bouldering Competition in Arizona, and others have proven to be manageable and positive experiences for both the visiting climbers and the host communities. The advantages to such an event include greater publicity for the climbing resource and subsequent increased annual traffic. Both of these result in an increase in economic benefits.

It is interesting to note that the Kentucky State Parks Department has banned rock climbing and rappelling from any park lands. Several parks contain incredible resources for climbing. Natural Bridge State Resort Park, Cumberland Falls State Resort Park, Lake Malone State Resort Park, and Pennyrile Forest State Resort Park are some of the parks with climbing resources. Based upon the data collected in this research, this ban could be shutting the door on a significant financial resource for the local communities surrounding these parks as well as ostracizing a significant recreational user group. The philosophy towards climbing management in the state of Kentucky should be discussed and must evolve in order to meet the needs of the Kentucky community and increase recreational opportunities for citizens.

Recommendations for further research

The opportunities for additional studies in this area are many. The first obvious need is to gather valid recreational visitors per year data for each activity group at the Red River Gorge. The results of this study could be taken further, i.e., developing the actual impact of climbing in all sectors, if a number of climbing visits per year could be established. The entire project could be conducted on a statewide level, intercepting climbers at climbing areas across the state. The resulting information could provide a complete picture of the impact rock climbing has on the entire state economy, rather than just the impact in the Red River Gorge area.

The entire study should be repeated, collecting data over a year in varying time periods such as two months in each season. This method would provide a larger sample size and a more accurate picture of climber expenditures. In consideration of IMPLAN, a few adjustments should be made to the survey instrument, aligning the expense categories with the software database prior to data collection. This step would remove any questions and problems with bridging the data into appropriate category for analysis. With additional analysis, the data

collected could provide a more complete user profile of climbers in regard to age, experience, and actual travel distances. These data may also be applicable to additional methods of determining impact or value.

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