

Regular Paper

The Economic Impact of Climbing in the Lander Area of Wyoming

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Abstract

The popular climbing destination of Lander, Wyoming receives nearly 37,000 climbing visits every year, with 78% of those visits coming from persons living outside of this area. Climbing tourism expenditures result in an estimated \$4.5 million in visitor spending each year. Climber demographics indicate these visitors are well-educated with 98% choosing to stay overnight on their visits. The average visit also lasts nearly a week. Climbing tourism expenditures support \$1.7 million in wages for local workers, highlighting an opportunity to increase regional tourism and its economic impact amid a rural, transitional economy.

KEYWORDS: *Economic impact, rock climbing, rural tourism, community development, outdoor recreation, transitional economies*

Introduction

Outdoor recreation represents an important part of the United States economy. Outdoor recreation users generated \$862 billion in gross output and supported 44 million jobs in the most recent national estimates (Outdoor Industry Association, 2022). Climbing alone resulted in \$12.4 billion in expenditures in 2017 with an estimated 87% of those expenditures coming directly from trips and travel to climbing destinations (American Alpine Club, 2019). Similarly, recent location-specific climbing economic impact studies (Maples & Bradley, 2021; Maples et al., 2017; Maples et al., 2019) have provided examples of climbing expenditures in rural transitional economies with declining extractive industries while also building an economic methodology for studying the expenditures and demographics of climbers. These localized studies in places such as Kentucky's Red River Gorge and West Virginia's New River Gorge indicate climbing tourism can add millions in expenditures to local economies. Likewise, researchers have also examined the economic impact of climbing in Western states attracting outdoor recreation users, including Colorado (Maples & Bradley, 2018a), Montana (Maples & Bradley, 2018b), and Utah (Maples et al., 2021).

Wyoming represents an important part of the outdoor recreation economy and includes several popular climbing destinations, such as Vedaawoo to the south, Ten Sleep to the north, Grand Teton National Park to the west, and Lander in Central Wyoming. The present study will focus on Lander, which is located in Fremont County. Today, Lander is partly famous for its recreation activities, including its popular climbing areas and the annual International Climbers'

Festival (Rehm & Maples, 2021). However, the area's history is steeped in extractive industry boom and bust cycles. For example, Lander residents long worked in the nearby Atlantic City iron ore mine, which employed over 500 workers at its apex before closing in the early 1980s (Ambler, 1985). More broadly, the state of Wyoming remains a national leader in coal production although this market too has been impacted by global changes in coal utilization (Wyoming Mining Association, 2019). This leaves open a question of how recreation, such as rock climbing, could fit into a transitional state economy amid changes in resource extraction and inherent eventual resource exhaustion. The culmination of a growing interest in tourism in Wyoming, the continued growth and visibility of climbing, and the growing literature on climbing's economic impact presents an ideal opportunity to study the economic impact of climbing in Lander. This study looks to establish several new facets of the Lander climbing community by exploring its demographics, its use patterns, its visitation patterns, and its visitors' economic impacts in a typical year.

In this study, the researchers estimate the economic impacts of climbing visitation to Lander utilizing Fremont County as the study area. Analyzing expenditures data from an online survey of persons who engaged in climbing in Lander ($n=411$) and parking visitations of nearly 37,000 climbing visits (78% of which are from visitors living outside of Fremont County), the researchers estimate climbers spend \$4.5 million in lodging, transportation, retail purchases, and food purchases in Lander and Fremont County each year. These expenditures support \$1.7 million in wages for local workers and the presence of 51 tourism-related jobs in the study area.

Literature Review

Outdoor Recreation Economies

The outdoor recreation industry is an important part of the US economy. In 2022, outdoor recreation represented \$862 billion in gross economic output in the United States, supporting the existence of 4.5 million jobs (Outdoor Industry Association, 2022). Collectively, outdoor recreation represented nearly 2% of the nation's total GDP that year and roughly 54% of the nation's population participated in this industry that year (Outdoor Industry Association, 2022). Climbing alone represented an estimated \$12.4 billion of this economy in 2019 (American Alpine Club, 2019).

In recent years, researchers have completed several economic impact climbing studies in the US Mountain States/Interior West region. For example, a recent multi-activity study of outdoor recreation's economic impact in Utah's Manti-La Sal National Forest reported that climbing generated \$3.4 million in expenditures each year, supporting 49 jobs and \$1.5 million in wages (Maples et al., 2021). Similar national forest studies in Colorado's Grand Mesa, Uncompahgre, and Gunnison National Forest, and Montana's Custer Gallatin National Forest reiterated these findings. In Colorado, climbing-focused visits generated \$6.2 million each year while supporting the existence of an estimated 26 jobs (Maples & Bradley, 2018a). In Montana, climbing visits generated \$2.6 million in expenditures. These expenditures also supported 22 jobs (Maples & Bradley, 2018b).

Researchers have also examined the economic impact of climbing in rural areas with a history of extractive industries and transitional economies. Recent growth in the outdoor recreation industry (including steady post-pandemic growth) sometimes even saw this industry similar in size with longstanding but declining industries such as mining and extraction (Outdoor Industry Association, 2022). For example, a recent study in Eastern Kentucky's Red River Gorge (located within a region with longstanding Central Appalachian generational poverty) found climbers generated \$8.7 million annually, up from \$3.8 million roughly five years earlier (Maples & Bradley, 2021; Maples et al., 2017). The study included counties involved in Eastern Kentucky's

renowned coal history, largely in the washing and transportation end of the process as the coal seams dwell slightly further east of the Red River Gorge (Maples, 2021). Similarly, in 2019, a study of West Virginia's New River Gorge focused directly on an area with an extensive bituminous coal mining history (Lee, 1969; Maples et al., 2019). There, researchers found climbers supported \$12.1 million in annual expenditures, which translated into 168 jobs and \$6.3 million in wages each year. An overlapping theme with both locations was the declining size and scope of the coal industry amid global changes in coal use and the need to find a new economic replacement amid rural transitional economies (Maples, 2021). Although these economic contributions are unlikely to support an entire area's economy, they do present an additional resource for transitional economies as they adapt to economic change and consider their future economic profile.

Climbing's visibility is broadening its appeal to new markets and initiating new conversations about limiting its impacts. For example, climbing is the central focus of several mainstream movies (Free Solo, Dawn Wall, and The Alpinist, to name a few). Climbing has made its way into the public consciousness through the Olympics, which now (for the first time) includes climbing events. Moreover, the increasing prevalence of climbing gyms across the nation has created conditions for at least some users to venture into outdoor climbing (99boulders, 2018). Concomitantly, climbing organizations like Access Fund have created training programs for new outdoor climbers to limit their environmental impacts as climbing tourism increases in numerous climbing destinations across the United States (Access Fund, n.d.). Additionally, researchers have established new ways to measure climbers' environmental impacts with the intent of informing efforts to balance environmental degradation while increasing economic impacts (Maples et al., 2022; Maples et al., 2023).

Wyoming, Fremont County, and Lander Economies

US Bureau of Labor Statistics data demonstrates how Wyoming's economy has adapted and transitioned to global economic changes over recent decades. Wyoming has, since 1986, served as the leading US state for coal extraction, providing an estimated 40% of the nation's coal in 2019 (Wyoming Mining Association, 2019). In 2018, the state produced 304 million tons of coal, most of which came from the Powder River Basin in northeast Wyoming. Today, mining and timber includes roughly 15,000 jobs across the state, although this is down by nearly half since 2012 (Bureau of Labor Statistics, 2022). Note the actual employment number is likely somewhat higher as jobs related to coal (such as transportation) may be overlooked as they are reported in other sectors. Additionally, this sector grew roughly 5% during the latter days of the pandemic. In comparison, tourism plummeted during the early days of the pandemic (losing roughly 10,000 jobs almost overnight) but has since rebounded to 37,000 jobs (up 5,000 since 2012) (Bureau of Labor Statistics, 2022). Meanwhile, construction (representing roughly 23,000 jobs across the state in early 2022) has grown 11% over the last year as visitors turn into permanent residents and new homes and businesses are built in the state's economy. Manufacturing has remained steady throughout 2021 with 9,800 jobs, as has education and health services at 28,000 jobs.

Present-day statistics overlook an important part of Lander's and Fremont County's past economy: iron mining. The United States Geological Society Mineral Resources Data System lists over 700 known mines (both open and closed) found in Fremont County, which includes Lander, Wyoming. Arguably, it is the Atlantic City iron mine that gives the clearest sense of the impacts of boom and bust cycles in resource extraction on transitional economies. Atlantic City initially got its start as a gold mine town around 1867 and in a matter of years had a few hundred residents, several businesses, two breweries, and seven saloons (Van Pelt, 2018). However, the mines overall proved relatively unprofitable in comparison to other areas and the population declined as a boom and bust cycle concluded. Nearly a century later, a new iron mine at Atlantic

City became a major employer for people living in Lander and the surrounding area. The mine initially opened in 1962 with a planned productivity of 30 years (CLUI, n.d.; Western Mining History, n.d.). By the early 80s, Ambler notes the mining crew had largely, “blasted until Iron Mountain was gone, replaced with a 250-acre pit” (Ambler, 1985, p. 10). Its closure in 1983 left over 500 miners without work and with many choosing to move on.

The wave of layoffs and eventual permanent closure of the mine partly left Central Wyoming (and more specifically Lander) as a transitional economy after losing the estimated \$15 million U.S. Steel brought in annual payroll to the region. Community responses included a technical park and convention center alongside low-interest loans to local businesses and even a feasibility study for a local skiing destination in Lander. (By chance, today Lander is home to Beaver Creek Nordic Ski Area.) Although it would be difficult for outdoor recreation tourism to entirely replace something the size and scope of U.S. Steel, the draw of tourists indicated what other transitional economies have considered: could outdoor recreation offer some form of economic growth in a transitional, post-resource bust economy?

Recent data indicates Wyoming’s tourism industry has performed well overall in recent years. Wyoming’s tourism industry attracted around three billion visits to the state in 2020 even as the nation coped with pandemic restrictions on visitation and travel (Dean Runyan Associates, 2020). These expenditures supported over 40,000 jobs in tourism and related sectors, which indicates about 10% of jobs in the state are being supported by tourism expenditures. However, a state-wide perspective makes it difficult to understand these trends in smaller economies. As such, a deeper understanding of climbing tourism in Lander and Fremont County would provide useful and timely knowledge about tourism destinations in the state.

Methodology

Data for this study are from an online survey of rock climbers visiting the Lander climbing region in 2020 and/or 2021. The survey collected data on climber use patterns (climbing type, days per year spent climbing in Lander, approximate year started climbing), economic use patterns (year of last visit, length of last visit, lodging for last visit, group size for last visit, and specific expenditures across 13 categories), and common demographics (residence location, zip code, sex, education, personal annual income, race, and age). The questions on expenditures included 13 specific items asking for the respondent’s expenditures on lodging (hotel, cabin, and tenting), food purchases (fast food, dine-in food, grocery store purchases, and convenience store purchases), travel (gasoline, taxis) and retail/service purchases (general retail, outdoor recreation retail such as climbing gear, gear rentals, and climbing guide services).

The survey was distributed in 2021 using a convenience sample approach. The online survey link was released nationally using the Access Fund’s social media blasts and regionally through the Central Wyoming Climbers’ Alliance (WyoClimbers) social media. A convenience sample is appropriate for this scenario, as the exact size of the climbing population visiting this region was, prior to this study, unknown (Maples et al., 2019). In all, 411 people acknowledged the survey by clicking the provided link and giving consent to continue. Their responses are reported up until the moment they either completed the survey or discontinued the survey.

Additional steps are needed when preparing economic expenditure data for analysis and these steps are outlined in the Forest Service methodology (Rosenberger et al., 2017; White, 2017) and utilized in recent climbing studies (Maples & Bradley, 2021; Maples et al., 2019). First, expenditures are separated into two categories: visitors to Fremont County (persons living outside of Fremont County) and residents of Fremont County. Note that economic impact is represented by new expenditures created in a study area. As such, only visitor expenditures would be considered as economic impact. Residents are treated as redirected expenditures, where funds are moved from one area to another but already exist within the economy being studied. This is not to belittle or reduce the importance of residents’ contributions to the economy but rather to

define expenditures as being new or already in the study area's economy. As such, economic impact estimates in this study focus only on visitors, while resident expenditures are not analyzed.

Next, visitor respondents are examined to ensure their expenditures are typical compared to other responses. The end goal of summarizing mean visitor expenditures is to establish what a typical visit to Lander to climb would look like. As such, the methodology calls for excluding visitor respondents who report groups (larger than eight persons) and/or staying for abnormal lengths of time (here and in other recent studies, over 30 days) (Maples et al., 2019; White, 2017). After adjusting respondent expenditures for group size (expenditure/group size), the researchers then summarized each category (e.g., gasoline, tenting, fast food purchases). In the case of lodging, only people indicating they used that type of lodging (e.g., they stayed in a hotel) are included to give a clearer picture of typical expenditures. For all other variables, all cases are included as these are typical day expenses.

After establishing the mean expenditures, the researchers then identified cases more than three standard deviations above the mean and removed those cases. This further reduces the chance of abnormally high expenditures overestimating the mean expenditures for, again, a typical visit (Maples & Bradley, 2021; Maples et al., 2019). Note this keeps cases more than three deviations below the mean (e.g., \$0), as these are often cases where no expenditures are made. As a final check, any retail expenditures over \$500 are removed in adhering to USFS methodology reducing overestimations (White, 2017). The researchers then established a new set of mean expenditures for each category designed to provide a typical expenditure pattern for any climbing visitor to the Lander area on a typical trip. These expenditures are later modeled in IMPLAN, which is described further in the results.

Table 1 summarizes several demographic and economic measures of Fremont County, as well as the City of Lander. Fremont County is in Central Wyoming and is the fifth-most populous of Wyoming's 23 counties. It includes the cities of Lander and Riverton. Fremont County includes the entire Riverton Micropolitan Statistical Area. Fremont includes over 39,000 residents and over 14,000 households. The median income is around \$54,000 per year with almost one in four residents holding a bachelor or higher degree and only 15% of residents experiencing poverty. In comparison, Lander, Fremont's County seat, includes over 7,500 residents in an estimated 2,980 households. Overall, Lander has slightly higher educational attainment (39.2% versus Fremont County's 24.8%) and median income (a difference of roughly \$3,600).

Climber Visitation and Use Patterns

Demographics

Table 2 summarizes core demographic variables of interest in the survey, including sex, age, education, and income. Note that all variables except age have been dichotomously coded, which means a score of 1 equals the presence of the trait being studied and a 0 equals the absence of this trait. As a result, the means in the table can be interpreted as percentages of cases with a score of 1. For example, 32% of respondents (mean of .32) indicated being female. The average respondent age is 36; however, this figure may not be exactly representative, as persons under 18 could not participate in the study. Further, Lander climbers are well-educated: 46% indicated having a bachelor's degree, while another 29% indicated having advanced degrees such as PhDs, JDs, MDs, and numerous master's degrees. Additionally, 13% of climbers in the study reported incomes of \$50k or greater, with just under one in four indicating six-figure personal incomes.

Climbers on average hold over a decade of climbing experience with an average first year of climbing being 2005. Additionally, 20% of respondents own their own business; of these individuals, 41% are businesses in the outdoor recreation sector. Further, another 30% of respondents work in a profession relating to outdoor recreation. This type of professionalization indicates that the group surveyed are not general hobbyists, but rather dedicated to the climbing com-

munity. Overall, the findings of this table replicate the findings found in climbing studies summarized earlier in this table: most climbers are well-educated professionals in their 20s and 30s and often run their own business.

Table 1*Descriptive Statistics on Fremont County and Lander, Wyoming*

Variable	Fremont County	Lander
Population Estimate	39,336 (in 2021)	7,546 (in 2020)
Households, 2016-2020 mean	14,834	2,980
Percent with four-year degree or higher, 2016-2020 mean	24.8%	39.2%
Median household income, 2016-2020 mean	\$54,291	\$57,938
Poverty rate, 2020	15.0%	9.3%
Total Employment, 2020	9,889	*
Total Employer Establishments, 2020	1,243	*

Source: US Census QuickFacts, *Data redacted by Census Bureau

Table 2*Respondent Demographics* and Use Patterns*

Variable	n	Min	Max	Mean	SD
Respondent sex (1=Female, 0=Male)	319	0	1	0.32	0.46
Respondent age	324	18	75	36.50	12.38
Has bachelor's college degree	331	0	1	0.46	0.49
Has advanced degree	331	0	1	0.29	0.45
Personal income greater than \$50K	332	0	1	0.13	0.34
Personal income greater than \$99K	332	0	1	0.21	0.41
Owens own business	320	0	1	0.20	0.40
Business is in outdoor recreation	61	0	1	0.41	0.49
Works in profession related to outdoor recreation	314	0	1	0.30	0.45
Trad climbing	411	0	1	0.16	0.37
Sport climbing	411	0	1	0.36	0.48
Bouldering	411	0	1	0.23	0.42
Ice climbing	411	0	1	0.05	0.22
Gym climbing	411	0	1	0.13	0.34
Mixed climbing	411	0	1	0.03	0.19
Top roping	411	0	1	0.11	0.31
Other type of climbing*	411	0	1	0.04	0.19
Respondent's first year climbing	368	1958	2020	2005	12.25
Respondent first began climbing outdoors	371	0	1	0.41	0.49
Days per year climbing outdoors in Lander	375	0	365	28.12	46.95
Days spent climbing in a gym, any state	375	0	365	73.30	70.61
Respondent lives outside Fremont County	371	0	1	0.80	0.39
Has visited Lander before, visitors only	225	0	1	0.72	0.45
Group size climbing, visitors only	152	1	7	1.80	1.03
Stayed overnight	262	0	1	0.98	0.15
Length of stay, visitors only	248	1	40	6.85	6.96
Decrease in spending due to COVID-19	137	0	1	0.80	0.39

*Although not reported in the table, the bulk of the sample indicated being white.

Respondent Climber Profile, Climbing Interest, and Economic Visitation Patterns

The second half of Table 2 describes the profile of an average climber in the Lander area. The researchers asked respondents to indicate all kinds of climbing in which they engage at any location and respondents could check all that apply. Roughly 36% indicated engaging in sport climbing while 23% engaged in bouldering. The survey also asked respondents to talk about their early climbing experiences. On average, respondents began climbing in 2005, although this may be slightly impacted by excluding persons under age 18 from the study. In all, 41% indicated they first started climbing outdoors instead of indoors, noting a common trend of transitioning out of climbing gyms and into the outdoor crag. Respondents were also asked about their visitation frequency to Lander and to climbing gyms in any location. Climbers reported spending an average of 73 days yearly gym climbing and 28 days in Lander.

Table 2 also begins establishing new knowledge about the economic impact expenditure patterns of climbers in Lander. First, 80% of respondents indicated they lived outside of Lander and Fremont County. Recall Fremont County forms our study area for this study, so persons living beyond that area would be defined as visitors to the area. Next, 72% noted having visited Lander at least once before their most recent visit. The group size was an average of 1.8 climbers (which is typical of other studies, see Maples & Bradley, 2021) and 98% reported staying overnight as part of their visit. Visits ranged from 1 to 40 days. Repeat visitors were also asked if the pandemic altered their typical expenditures compared to past visits. In all, 80% indicated their expenditures decreased due to pandemic closures and the like.

Visitation

Estimating visitation (or how many climbers visit a specific study area) is a central part of understanding how climbers generate economic impact in the study area. Before this study, no known estimates of the number of climbing visits to Lander/Fremont County existed. As such, part of this study included establishing this number. Unfortunately, funds were not available for an in-depth car counting study. As a viable alternative, the researchers collaborated with WyoClimbers to determine parking capacities and percentages of parking spots used each day of the year to create a first estimate of climbing visitation to Lander.

Estimating visitation began with a listing of all known parking areas frequented by climbers in Lander for climbing purposes. These lots are locations near crags where all or nearly all parking would be climbing-related. These areas were organized into an Excel file. Next, the maximum parking capacity was established for each car by WyoClimbers based on their familiarity with each lot. The researchers then worked in tandem with WyoClimbers' executive team to determine what capacity of the lot would be filled on a typical day throughout the climbing season. This included onsite lot counts by WyoClimbers to establish reference points, as well as in-depth discussions and focus groups regarding climbing visitation patterns.

Table 3 includes three estimates of visitation: total cars, total climbers, and total climbers visiting Lander who reside beyond the study area. Researchers estimated over 20,000 cars are parked in climbing areas with climbing as their central purpose being there. When multiplied by the mean group size of 1.8, again a typical mean visitor group size compared to past climbing studies, this equates to over 36,000 annual climber visits to the region. Note this allows for people to visit more than once, as is normal for climbing areas, and is not an estimate of unique individual climbers. When excluding visits from the 20% of respondents who reported living inside of Fremont County, the researchers estimate this results in 29,556 visits each year from persons living outside of Fremont County. This is the visitation number used later in creating economic impact estimates.

Expenditures

Table 4 summarizes visitor climber expenditures in this study. Note lodging means (tents, cabins, and hotels) are only estimated for persons using that type of lodging, while all other measures include all cases. Note also all the means in this table have been cleaned (see methodology) to limit the risk of overestimation. Groceries (\$25), full-service restaurants (i.e., restaurants using wait staff, \$22), and gasoline (\$21) are the biggest typical vis expenditures. In lodging, cabins are by far the biggest expenditure category at over \$543, however, nearly all climbers reported using camping, which averaged \$5.89 per trip. Additionally, both the hotel (\$108) and cabin (\$543) mean expenditures have low responses due to low rates of use, meaning these two means should be treated with caution. Note this area also has free dispersed camping in some areas which means climbers may simply choose to camp for free; note persons camping and reporting \$0 in tenting expenditures are included in these mean results. When added together, the expenditures in Table 5 result in climbers annually spending \$4.5 million while climbing in Lander, Wyoming.

Table 3
Climbing Visitation Patterns to Lander, Wyoming in a Typical Estimated Year

	Total Cars	Total Climbers	Visiting Climbers
January	688.16	1,238.69	990.950
February	559.36	1,006.85	805.478
March	717.6	1,291.68	1,033.34
April	833.52	1,500.34	1,200.268
May	880.91	1,585.64	1,268.510
June	1884.35	3,391.83	2,713.46
July	3849.2	6,928.56	5,542.84
August	3803.26	6,845.87	5,476.694
September	3024.3	5,443.74	4,354.99
October	2306.4	4,151.52	3,321.21
November	1343.2	2,417.76	1,934.20
December	634.8	1,142.64	914.11
TOTAL	20,525.06	36,945.11	29,556.09

The researchers also examined expenditures beyond the study area but still in Wyoming to help determine how spending might vary between the study area and its surrounding area. Expenditures beyond the study area often include the costs of traveling to the study area (most often purchasing gasoline and supplies) but can also help indicate services and goods unavailable in the study area. In this case, climbers reported spending an additional \$1.1 million outside of Fremont County but still in Wyoming as a result of visiting Lander to climb. Expenditures are largely focused on rental cabins and rental houses (an average of \$86 per visit for persons using this kind of lodging), tenting (\$18 per visit for persons using this kind of lodging), and \$8 per visit on gasoline. Note these expenditures beyond the study area are not included in later economic impact estimates.

Table 4
Per Person Visitor Expenditures Inside the Study Area Per Trip

Variable	<i>n</i>	Mean	SD	Min	Max	Amount Spent
Hotel Lodging*	8	\$108.33	70.86	25	240	\$313,723.68
Cabin Lodging*	13	\$543.30	524.65	28	1500	\$1,573,396.80
Tent Lodging*	101	\$5.89	15.24	0	80	\$136,477.19
Limited-service Restaurants (fast-food)	236	\$1.88	5.08	0	25	\$55,565.28
Full-service Restaurants (Dine-in food)	238	\$22.41	36.48	0	175	\$662,349.96
Convenience Store Food	233	\$0.86	2.46	0	15	\$25,418.16
Groceries	238	\$25.20	48.66	0	250	\$744,811.20
Retail, General^	239	\$6.15	20.94	0	180	\$181,769.40
Recreation Gear Purchases^	238	\$7.89	19.11	0	100	\$233,196.84
Gasoline	235	\$21.64	29.56	0	120	\$639,591.84
Total	-	-	-	-	-	\$4,566,300.35

*Lodging expenditures utilized 98% of visits (28,964) as overnight visits with 80% assigned to tenting and 10% each assigned to cabin and lodging. All other categories utilized a visitation estimate of 29,556

^ Per FS methodology, only 1/5 of retail purchases are analyzed as goods can be used beyond the visit.

Research note 1: Guides, rental gear, and taxis/transporters are not listed here as mean expenditures are effectively \$0 as these services/purchases are not typically used in this study area.

Economic Impact Terminology

In the coming pages, the research team employs IMPLAN, a leading economic impact estimator, to create economic impact estimates for what visiting climbers contributed to the Lander area's economy during a typical year. IMPLAN (or Impacts for Planning) uses input-output modeling to establish economic impact by exploring what happens when climbers spend money in specific sectors (such as food, lodging, and retail). Input-output analysis examines how expenditures from an activity may generate changes in an entire economy. This includes exploring the initial expenditures from the activity being studied (direct impacts), the resulting spending patterns between industries (indirect impacts), and household spending patterns created by those initial expenditures (induced impacts).

IMPLAN output examines economic impact using three common ideas: labor income, value added, and output. Labor income includes employee compensation and proprietor income. Value added, which can be considered a measure of gross domestic product, includes labor income plus taxes on production and imports and other property income. Output includes both labor income and value added plus intermediate inputs. Studies may also provide estimates of jobs supported by the expenditures being studied when the inputs continue to occur each year. Note labor income, value added, output, and job measures can also be broken down by direct, indirect, induced, and total economic impacts as is done in the present study. Input-output models do have important assumptions and limitations. These include having no constraints on supplies

in the model (such as no shortages of a product or service), no price changes in the model due to changes in demand, constant industry by-product coefficients (where production patterns do not change regardless of production levels) and fixed industry inputs (no changes to goods and services required for production), and constant returns to scale (input requirements stay the same regardless of production).

Economic Impact Analysis

This analysis follows approaches used in prior peer-reviewed research and Forest Service studies, such as White (2017). Recall the researchers are conscious of ensuring the resulting economic impact results are conservative and valuable to the Lander community. Cases with disproportionately long stays or large group sizes (greater than eight) have been excluded and instances of unusually high expenditures have been listed as missing data. Retail purchases are also margined to give a more nuanced perspective on their impact. This prevents overestimating how much of these purchases remain inside the analysis. Additionally, as retail expenditures can be used outside the area where they are purchased, only 1/5 of the average retail and recreation retail expenditures are modeled in the economic impact estimates.

Economic Impact Summary

The researchers placed the total expenditures from Table 4 into IMPLAN for economic impact analysis. For analysis, the researchers used the visitation estimate of 29,556 from Table 3. For lodging, visitation was adjusted to 98% of this number (28,964) based on the survey's findings that 98% of visitors stayed overnight (see Table 3). Then, 10% of these adjusted visits were applied to both hotel and cabin rentals while 80% was applied to tenting. As noted in Table 5, this results in \$4.5 million in annual total expenditures generated by visitors living outside the study area who come to Lander to climb.

Table 5 details the economic impact and tax impacts of climbing visitation to Lander using Fremont County as the study area. Climbing's \$4.5 million in annual expenditures generated \$1.7 million in labor income (a conservative estimate of economic impact) and supported the presence of an estimated 51 jobs in the study area. Note these represent expenditures centrally dependent on climbing visitation to Lander. Table 6 also summarizes taxation generated by climbing visitors to Fremont County. In all, climbing expenditures contributed \$90,371 in county taxes, \$193,173 in state taxes, and \$426,572 in federal taxes. This equates to \$710,117 in taxes generated each year by climbing expenditures.

Table 6 details how climber visitor expenditures shape employment patterns in the region. As noted previously, climber expenditures support the presence of an estimated 51 jobs in Fremont County. These primarily fall across five categories, wherein the greatest impact is in the other accommodation sector. This sector includes cabin rentals as well as campgrounds.

Table 5
Economic Impact Summary

Impact	Jobs	Labor Income	Value Added	Output	Total Taxes
Direct	41.24	\$1,405,074.14	\$2,054,895.22	\$3,168,124.94	\$534,720.08
Indirect	4.72	\$176,353.28	\$299,506.00	\$678,343.86	\$66,536.55
Induced	5.81	\$213,066.42	\$443,778.03	\$827,415.06	\$108,861.17
Totals	51.77	\$1,794,493.84	\$2,798,179.25	\$4,673,883.86	\$710,117.80

Table 6
Job Sectors Impacted by Climbing Expenditures

Employment Sector	Direct	Indirect	Induced	Total
508 - Other accommodations	19.86	0.00	0.00	19.86
509 - Full-service restaurants	11.87	0.08	0.35	12.29
507 - Hotels and motels, including casino hotels	3.61	0.00	0.00	3.61
406 - Retail - Food and beverage stores	3.33	0.01	0.16	3.51
408 - Retail - Gasoline stores	1.27	0.00	0.05	1.33

The second greatest is in full-service restaurants, which include waitstaff and cooks. Hotels are third, while retail purchases at gas stations (snacks and gasoline) are fourth and fifth, respectively.

Discussion

Lander receives nearly 37,000 climbing-focused visits each year. Roughly 80% of these visits come from persons living outside of Fremont County which functions as the study area for this study. To review, climbing results in a \$4.5 million influx of purchasing per year in Fremont County. The highest expenditures in the study area are related to lodging, such as hotels and cabins, while other expenditures are often related to food and fuel. These expenditures, in turn, support \$1.7 million in wages for local workers. Additionally (and separate from the economic impact modeling), climbers also spend an additional \$1.1 million in Wyoming but outside Fremont County while traveling to and from Lander.

Although rock climbing is unlikely to fully replace extractive industries in the region, it represents a useful tool in a transitional economy. For example, tourism is less susceptible to boom and bust cycles, particularly outdoor recreation (Maples, 2021). Once established and generally maintained by users, climbing destinations (and likely other forms of outdoor recreation) continue to operate regardless of broader economic (and even pandemic) trends. As long as outdoor recreation users have access to an area, they create economic impacts without much need for oversight.

That said, it is difficult to compare the jobs created by outdoor recreation economies to those of extractive industries in terms of wages and household spending. For example, one benefit of coal mining is that, despite its physical difficulty and personal risks, it can provide a livable wage for households. Tourism jobs, on the other hand, are poor fits for this gap in the economy. The present study indicates the jobs supported by outdoor recreation are frequently minimum-wage jobs such as retail clerks or hotel room cleaning. A more satisfactory option would be to add outdoor recreation manufacturing jobs to the region by producing, for example, climbing gear that is made by residents of Lander. This is something that should be examined in future studies as it could further benefit the people of Fremont County and its economy rather than focusing solely on tourism service jobs.

One benefit of climbing tourism is the demographic is well-educated and concomitantly working in higher-income careers. This rejects a long-standing myth that refers to climbers as so-called dirtbags as espoused in the history of climbing destinations like Yosemite, where climbers sometimes skirted rules in search of limiting daily expenses (Taylor, 2010). The recent changes in remote work opportunities have also provided options for climbers to travel to climbing destinations while working in the region (Bieser et al., 2021). This creates the options for both long-term spending, such as extended cabin rentals and additional meal purchases. However, a burgeoning issue with remote work is outdoor recreation users also may consider

moving to live closer to outdoor recreation areas they value. This is a phenomenon to be further studied among outdoor recreation users.

Differences between spending patterns inside and outside the study area by survey respondents hint visitors are finding most of their demands inside Fremont County. Lodging may be one exception, as this was one expenditure frequently utilized beyond the county line. Identifying disconnects between climber needs/wants and services provided help attract more expenditures into the study area. Another common example is to examine services like groceries, as climbers may be apt to stop beyond the county line to purchase supplies prior to their visit. It would also be beneficial for those interested in developing local tourism to have conversations with climbing organizations throughout the state to better understand climbers' unique tourism needs and identify cases where local business owners could fulfill those needs.

A notable issue in all outdoor recreation communities is addressing their use impacts on the areas where they recreate, such as trail impacts, and ensuring users pack out trash and even feces in arid climates where it cannot biodegrade. Leave No Trace represents a nationally accepted approach to minimizing user impacts through seven common sense approaches that address everything from planning ahead to packing out all waste and gear. Rock climbing also has the advantage of recent studies exploring the unique environmental impacts of climbing use patterns (Maples et al., 2022; Maples et al., 2023; Sharp et al., 2020). It would be valuable to have future studies explore climber impacts both in Lander and other climbing destinations. Additionally, national climbing organizations should continue to aid local climbing organizations in educating climbers on techniques to minimize their impacts.

Limitations and Future Studies

The study leaves open future research opportunities which could address the limitations of economic impact studies and questions left unanswered by this study. First, economic impact studies have instances where better data or more nuanced information could provide more detail in understanding how the activity being studied creates economic impact in the region. For example, economic impact studies are snapshot estimates of a particular activity at a single moment in time. It follows that the results in this study can be best understood as a scientific estimate of what expenditures would generally look like in a typical year barring major changes to the study area's economy and its related activities. This leaves the door open for future studies which could examine major changes which may happen in this study area, including the growth of the climbing community and its use in the region.

Economic impact studies are also limited in their ability to demonstrate directly observable activities in the study area. For example, if IMPLAN estimates expenditures create \$1,000 in induced expenditures, observing or pinpointing that sum in the economy is not possible. Rather, these models operate on predictions of what would happen given the data available.

This study also does not examine the cost-benefits of visiting Lander versus another climbing destination in Wyoming or how policies or greater trends might shape visitation. Cost-benefit studies relate how expenditures required to trigger a specific activity relate to specific quantitative benefits of the activity occurring. This would present an excellent opportunity to examine the various costs versus benefits of visiting climbing destinations across the state and also measure what attracts climbers to each destination alongside barriers which limit visitation. This study also does not attempt to account for changes created by the recent global pandemic. Pandemic conditions may have limited one activity (such as hotel use) in favor of another (camping, for example). Although not addressed here, this would be an interesting point for future research.

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