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High Economic Values from High Peaks of the West

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Introduction

The geography of the West provides many distinguishing features, including wide open spaces, extensive public lands, and the crown jewels of the National Parks System such as Yellowstone. Soaring peaks of the West like Mt. Rainier, Mt. Hood, Grand Tetons, and Pikes Peak are also towering symbols of their respective Western states. While these mountains are clearly a source of regional pride, they have also provided national inspiration for songs like “America the Beautiful” and renowned artwork like Ansel Adams’ photography and paintings by Albert Bierstadt.

The presence of these high peaks in the Sierra Nevada Mountains, the Cascades and the Rocky Mountains also serve as a symbol of the beautiful Western landscape and the high quality of life enjoyed by many residents in the West. Residents report that a contributing factor to their perceived high quality of life in Western States is the rural character of their communities, scenic beauty, and access to recreation opportunities afforded by the region (Rudzitis and Johansen 1989; Inman, McLeod and Menkhaus 2002). However, the value of mountain scenic amenities and recreational opportunities is neither limited to residents, nor passive recreational uses. These high peaks are often the highlight of a trip to the West for many visitors from the Midwest and Eastern United States. Furthermore, residents and non-residents alike aspire to rise to the physical and mental challenge to climb and summit these peaks and to gaze down on the amazing vistas below. For those living in the lowlands, climbing these peaks usually involves months of training, and is often the fulfillment of a lifetime dream. For example, according to the American Alpine Club’s 2005 report, on Mt. Rainier, the number of annual climbers has increased from 300 in the early 1950s to over 11,000 in the first half of this decade. For Alaska’s Mt. McKinley, the annual numbers rose from less than 50 in the early 1960s to over 1,200 this decade (Athearn 2005). Climbing high peaks involves significant risks to life and limb as well, testament to the high value people place on climbing them. Clearly, standing on the summit of these peaks gives an incomparable sense of accomplishment not otherwise available in our world of increasingly virtual reality.

An interesting question is whether the long distance travel, months of training, and great effort required to climb these peaks translates into a high visitor willingness to pay for visitors to these high elevation recreation areas. In other words, do high peaks yield high economic value? We attempt to answer this question using a data set of visitors to the 54 Colorado 14,000 foot peaks (otherwise known as Fourteeners), which also serve as a goal for peak baggers. In order to determine the value that recreationists and peak baggers place on the Colorado Fourteeners, we use an expenditure summary and a contingent valuation model to determine the regional expenditures and consumer surplus, respectively. Based upon our study, we draw implications and suggest these results may provide some insights regarding the high values of other high peaks of the Western United States.

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Background Information on Colorado Fourteeners

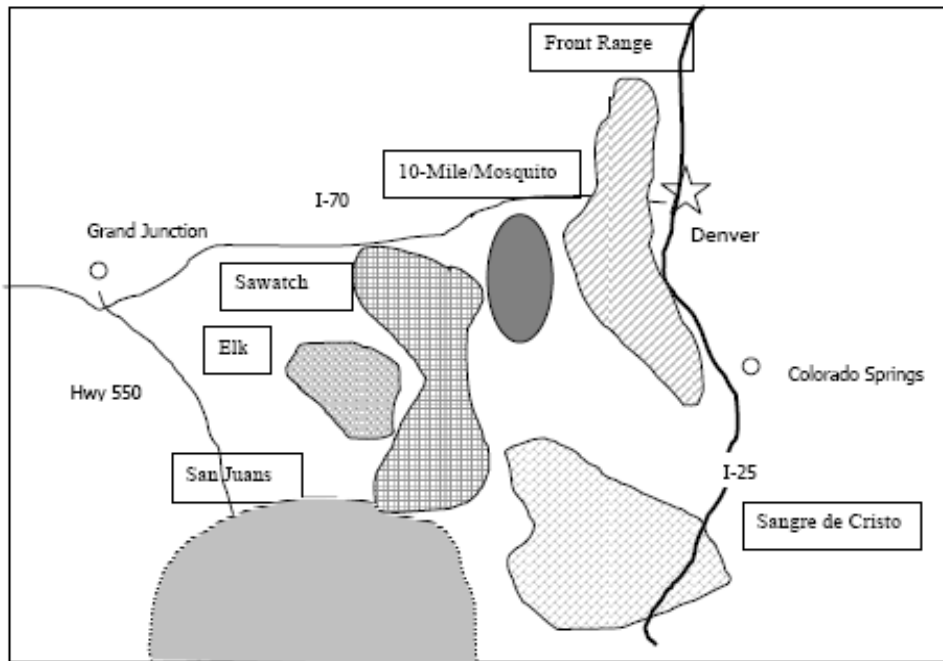
This next section describes the distinguishing features of Colorado Fourteeners, the data, methods, and results of our study. The Colorado Fourteeners are nestled in six of the state’s mountain ranges. Most of the peaks are on public lands, including wilderness areas, but several peaks are located on private lands, yielding a variety of access issues, which are summarized in Table 1.

Table 1. Colorado Fourteen Thousand Foot Peaks and Degree of Accessibility.

| Range | Private Peaks | Access Permitted |
|----------------------|----------------------|---|
| 10-Mile/ Mosquito | Bross | Closed |
| | Democrat | Closed |
| | Lincoln | Closed |
| | Quandary (parts) | YES--trail re-routed to avoid private land |
| | Sherman | YES--but future access debated |
| Elk | | All Public: Capitol, Castle, North Maroon, Pyramid, Snowmass, South Maroon |
| Front | | All Public: Bierstadt, Evans, Grays, Longs, Pikes, Torreys <i>Note: Evans and Pikes also have paved roads to summits</i> |
| Sangre de Cristo | Culebra | Fee for Access |
| | Crestone Group | YES--Pending access issues across private lands |
| | Little Bear Peak | YES--trail re-routed to avoid private land |
| | Mt. Lindsey | YES All Public: Blanca Peak, Crestone Peak, Crestone Needle Ellingwood Point, Humbolt Peak, Kit Carson |
| San Juan | Wilson Peak | Closed |
| | | All Public: El Diente, Eolus, Handies, Mt. Wilson, Redcloud, San Luis Sneffels, Sunlight, Sunshine, Uncompahgre, Wetterhorn Windom |
| Sawatch | | All Public: Antero, Belford, Columbia, Elbert, Harvard, Huron, LaPlata Massive, Missouri, Mt. of the Holy Cross, Oxford Princeton, Shavano, Tabeguache, Yale |

These mountain ranges are located in different regions of the state, presenting a unique set of physical characteristics, cultural dynamics, and recreational and economic opportunities. Figure 1 illustrates mountain range location, and the unique characteristics of the six mountain ranges are summarized below.

Figure 1. Colorado Fourteener Ranges.



Front Range

The Front Range peaks consist of six popular peaks extending from Estes Park and slightly west of Denver down to Colorado Springs. Due to their close proximity to the metropolitan communities, the Front Range peaks attract both Colorado tourists and urbanites. Two of these peaks can be accessed by paved roads as well as hiking trails.

10-Mile and Mosquito Gulch

The five peaks that make up this range are located from 5 to 30 miles southwest of the Breckenridge ski resort. All of the five peaks have areas that are privately owned; however, three peaks (Mounts Lincoln, Democrat, and Bross) were closed to the public in July 2005 by private landowners who expressed liability concerns about the large numbers of recreationists on the land. The 10-Mile and Mosquito Gulch peaks are situated in what was at one time the heart of the Colorado mining industry.

Sawatch

The Sawatch Range is centrally located in the state. The range consists of 15 peaks, including the well-known “Collegiate Peaks”, infamously named after several Ivy League schools. The Sawatch Range appeals to recreationists who are interested in more than just “peak bagging”. Camping and more diverse recreational opportunities like river rafting and off-road vehicle paths abound.

Elk

The Elk Mountains are located in north central Colorado, near the popular resort town of Aspen. Rugged and picturesque, these six Elk Mountain peaks attract serious rock climbers, as well as photographers and tourists from Aspen.

San Juans

The San Juan mountain range consists of 12 eclectic peaks that offer a range of recreation experiences, including off-highway vehicles, and railroad access. Located in the southwest corner of the state, the San Juans have less foot traffic than the Front Range peaks, but attract a number of out-of-state tourists. At this writing, one peak in the San Juans, Wilson Peak, is privately owned and is off limits to the public. The landowner also maintains that Wilson Peak is rich with mineral deposits.

Sangre de Cristo

The Sangres, as they are often called, are located in the south central to southeast region of the state. These 10 rugged peaks present varying levels of difficulty. One peak, Culebra, is privately owned. The most recent owner of this property, which includes a ranch, the Culebra Peak trail and summit, as well as a "Thirteener", charges admission to access the peak and the rest of the property.

Data Sources

Approximately 840 mail-back surveys were distributed during the summer of 2006 in a stratified sample of Fourteener peaks throughout Colorado. The stratification follows the grouping of peaks and the mountain ranges listed above. Input from several non-profit organizations such as the Colorado Fourteeners Initiative and the Colorado Mountain Club ensured that survey peaks properly represented the mountain ranges, in both terrain and visitor use patterns. We approached hikers and other visitors at the trailhead and in the parking lot at the conclusion of their recreation activity. After providing the visitors with the Fourteener survey packet, and a postage paid return envelope, we collected follow-up information for survey mailings to non-respondents. In total 520 surveys have been returned, for a response rate of 62%.

Results

The importance of these Fourteeners as a trip destination is evident from the fact that more than two-thirds of visitors had these peaks as the sole or primary purpose of their trip from home, and 23% had it as one of many equally important trip purposes. In the authors' experience from conducting numerous recreation surveys over the past two decades, this is a high percentage of primary purpose and equal purpose trips. In addition, one-third of the visitors to these peaks were from out of state.

Table 2 provides estimates of visitor expenditures shown by per group-per trip, per group-per day, and per person-per day, respectively. We asked individuals to report group expenditures for the entire state of Colorado. We then we divided by the number of people in the group to determine individual expenditure data and then by average length of stay to put it on a day basis.

Table 2. Fourteener Visitor Expenditure Patterns in Colorado.

| Categories | Per Group - per Trip | Per Group - per Day | Per Person - per Day |
|--------------------|---------------------------------|--------------------------------|---------------------------------|
| Camping | \$5.15 | \$2.58 | \$1.54 |
| Equipment Rental | \$7.79 | \$3.90 | \$2.34 |
| Equipment Purchase | \$44.98 | \$22.49 | \$13.48 |
| Groceries | \$36.91 | \$18.45 | \$11.06 |
| Restaurant Food | \$72.35 | \$36.18 | \$21.69 |
| Gasoline | \$55.38 | \$27.69 | \$16.60 |
| Hotel | \$95.39 | \$47.69 | \$28.60 |
| Supplies | \$8.41 | \$4.20 | \$2.52 |
| Car Rental | \$31.21 | \$15.60 | \$9.35 |
| Total | \$357.56 | \$178.78 | \$107.18 |

This is a substantial amount of spending by visitors, and averages about twice the per person expenditures on National Forest land according to the U.S. Forest Service National Visitor Use Monitoring data (<http://www.fs.fed.us/recreation/programs/nvum/>). The per party expenditures are about one and half times larger than the typical National Park Service overnight visitor (Stynes 2006). The median time spent hiking the Fourteeners is about six hours, with the average being 13.4 hours. We observed that the mean is pulled upward by several very large observations, which may be the result of individuals extending their days to summit several peaks during a day, or even an overnight while on the trail. Another fact to consider is that while most Fourteeners are day trips, many trips require an overnight stay the night before to allow for an early morning trailhead departure (e.g., 5:00 am) in order to be off the summit prior to the afternoon lightning storms. Hence, many Front Range Fourteeners that are within two hours of Denver still require an overnight stay. Furthermore, Fourteeners located in the San Juan Range in southwestern Colorado or the Sangre de Cristos in southern Colorado frequently require two-night stays for non-local residents. Thus our sample average overall length of trip from home is 1.6 days.

Unfortunately the U.S. Forest Service does not keep visitor statistics on the number of Fourteener hikers, and so we are unable to expand our sample expenditures to an annual total.

Net Willingness to Pay Analysis Using Contingent Valuation (CVM)

In order to estimate net WTP we utilize the contingent valuation method, a technique that creates a simulated market for the good in question. Most contingent valuation surveys now use a willingness to pay question format called dichotomous choice. The dichotomous choice format has the advantage of mimicking price taking behavior in the market. In our implementation of the dichotomous choice question, respondents were asked whether they would pay a predetermined increase in trip cost. While the predetermined amount is fixed for the respondent, it varies across the sample of respondents. This allows the analyst to trace out a quasi-demand function relating the probability a person will pay the dollar amount they are asked to pay. Hanemann (1984) views the respondent as evaluating the difference in utility associated with the status quo versus paying some amount (\$X) to have access. If the difference in utility is positive for access, the individual is expected to respond "Yes". If the

difference in utility is distributed logistically, a logit model can be used to estimate the parameters and allow for calculation of WTP.

The cumulative logistic distribution function is as follows:

$$(1) \quad \text{Prob}(Y=1) = [\exp(\beta X_i)] / [1 + \exp(\beta X_i)].$$

β is the set of parameters that reflect the impact of changes in the independent variables, X_i , on the probability of agreeing to pay, which is the binary dependent variable, $Y=1$ if Yes, and $Y=0$ if the response is No. From the cumulative distribution function, we can develop the odds ratio of paying for access ($Y=1$) or not ($Y=0$):

$$(2) \quad [\text{Prob}(Y=1)] / [1 - \text{Prob}(Y=1)] = \exp(\beta X_i).$$

By taking the log of the odds ratio, we obtain the logit model:

$$(3) \quad L = \ln \{[\text{Prob}(Y=1)] / [1 - \text{Prob}(Y=1)]\} = \beta_0 + \beta_i X_i$$

The log of the odds ratio is linear in the coefficients and the independent variables. Mean willingness to pay is calculated applying Hanemann's formula (1989) for the mean:

$$(4) \quad \text{Mean WTP} = (\ln(1+\exp(B_0)))/|\beta_1|.$$

Table 2 provides the results of a simple logit model in Equation (3). While non-bid independent variables are often included in these logit models as independent variables, since these coefficients are typically multiplied by their respective means, and then added to the constant term, a simple logit usually gives the same mean WTP as a more complex one.

Table 2. Simple Logit Dichotomous Choice CVM Model for Fourteener Visitors.

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|-----------------------|--------------------|----------------------|--------------------|--------------|
| Constant | 1.1322 | 0.1357 | 8.342 | 0.0000 |
| Bid Amount | -0.0046 | 0.0005 | -8.264 | 0.0000 |
| Mean dependent var | 0.567 | McFadden R-squared | | 0.1623 |
| Log likelihood | -276.288 | LR statistic (1 df) | | 107.094 |
| Restr. log likelihood | -329.835 | Probability(LR stat) | | 0.0000 |
| Obs with Dep=0 | 209 | Total obs | | 482 |
| Obs with Dep=1 | 273 | | | |

As shown by the p-value this simple logit model has a highly significant bid coefficient. The negative sign is in accordance with economic theory, in that the higher the dollar amount the visitor was asked to pay the less likely they will pay. This suggests some internal validity of the dichotomous choice CVM responses. Nonetheless, there is always the potential for hypothetical bias in any stated choice question. It is less likely when asking recreation use values, as Carson et al. (1996) multiple Travel Cost Method-CVM comparisons show. There also could be some unknown amount of protest responses as well, due to U.S. Forest Service exploration of

instituting entrance fees to popular Fourteeners. Using equation (4) and the coefficients in Table 2, the mean WTP per trip was calculated at \$307, with a median of \$246. The 90% confidence interval on mean WTP is \$266 to \$361 per trip.

Compared to typical values in the recreation economics literature, the \$307 willingness to pay value is fairly large, even compared to more specialized activities such as rock climbing. The most similar climbing study is one in Colorado by Ekstrand (1994). He asked rock climbers at Eldorado Canyon outside of Boulder what they would pay to do similar climbs but in remote wilderness locations. His value of \$27.95 per day in 1991 is equivalent to \$40 in 2006, the year of our data. Grijalva and Berrens (2003) also estimated a value of rock climbing in Texas at between \$47 and \$56 per day trip. More comparable is the study by Grijalva et al. (2002) that involves climbing in wilderness areas, where they found a WTP of only \$20 to \$25 per person to avoid closing climbing sites in several National Forest, National Park and Bureau of Land Management wilderness areas.

While our consumer surplus values are strikingly high compared to other recreation studies, there is some validation of a high WTP using other information from Culebra Peak, one Fourteener that is contained entirely on private land. The private landowners charge a \$150 per person access fee for Culebra. While this is about half our estimate of maximum WTP, the fact our consumer surplus is larger than a uniform access fee charged by a private land owner is sensible, since only a perfectly price discriminating monopolist could extract all the consumer surplus from hikers. Based on our median WTP, half the hikers would pay \$246 or more of an entrance fee, but half would not. Of course it would be desirable to expand our study to include this privately owned peak, but private ownership makes it difficult to access visitation data.

In summary, this is the first study to quantify the value to visitors from hiking Colorado Fourteeners, and the regional expenditures resulting from these excursions. The consumer surplus value indicates that indeed hikers place a high value on the Fourteeners of Colorado—even more so than other mountain-related recreation activities. Climbing Fourteeners is a high value activity, both when it comes to per-dollar visitor expenditures and consumer surplus. While the Colorado Fourteeners might present a unique list of peaks to “conquer”, increases in visitor use of high western peaks suggest that recreationists may place a high value on accessing these summits, as well. Hence, it is very possible that some of the benefit estimates from the Colorado peaks may transfer to other western summits like Mt. Whitney and Mt. Shasta. While high peaks clearly provide high value to recreationists, how westerners manage these national treasures will likely become the focus for future recreation management as some of these peaks are close to being loved to death.

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