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Off-Road Vehicle Recreation in the West: Implications of a Wyoming Analysis

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Introduction and background

A national committee recently concluded that managers, policymakers and communities need additional research, education and outreach programs focused on outdoor recreation. The growing demand for outdoor recreation suggests such programs will help those working to manage resources for sustainable outdoor environments (USDA CSREES, 2007). One outdoor recreation activity that is growing in popularity and needs further study is off-road vehicle recreation. The term off-road vehicle (ORV) includes off-highway motorcycles and four-wheeled all-terrain vehicles also known as ATVs or "quads"[2]. ORVs have become a significant part of the recreational landscape in the past 25 years and their growth in use is a nationwide phenomenon. The industry introduced four-wheeled ATVs in the mid-1980s. ATV's are by far the predominant off-road vehicles in use today, accounting for some 88 percent of those in use. Moreover, ATV sales outnumber off-road motorcycle sales, 2.5 to 1(Cordell et al., 2005). Cordell et al. (2005) report that sales of off-highway vehicles (OHV) "more than tripled between 1995 and 2003, with 1.1 million vehicles sold in 2003. ATVs continue to account for more than 70 percent of the market" (Cordell et al, 2005).

The Western states, with their extensive public lands, are an important recreation destination for these visitors (Vanasselt and Layke, 2006). Cordell (1999) predicts OHV recreation days will continue to grow by as much as 54 percent in the Rocky Mountain region by the year 2050 (Silberman and Andereck, 2006). The combination of an affluent, aging population and low interest rates may be fueling the growth in ORV purchases and use. Hereafter OHV and ORV will be considered interchangeable or synonymous.

The increased use of ORVs in the West has brought controversy and regulation. Vanasselt and Layke (2006) recommend regulation of motorized travel as part of a broader management plan to improve conservation on BLM lands in the West. Currently, most public lands in the West have some restrictions on ORV use. Some ORV uses lead to environmental damages. However, ORVs also permit people of all ages to recreate in areas that they would not normally be physically capable of accessing.

As ORV use grows in the West, more conflicts between recreationists, land managers and environmentalists and sometimes even local communities are likely to ensue. Yet, relatively little

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[2] The United States Forest Service uses the Off-Highway Vehicle (OHV) definition which includes pickup trucks and jeeps. The State of Wyoming ORV definition excludes these vehicles. Our analysis focuses solely on ORVs defined this way.

is understood about benefits, costs and economic activity generated by ORV users. The purpose of this paper is to show the estimated potential economic impact of non-resident ORV users in Wyoming as a case analysis. Moreover, results of this research point toward the complexity of ORV use analyses.

Review of relevant literature

The first attempts to quantify outdoor recreation included national surveys, such as those done for the Outdoor Recreation Resources Review Commission. These began in 1960 with the most current data in the National Survey on Recreation and the Environment (NSRE) available as of 2007 (USDA, 2007). Motorized off-road vehicle use for recreational purposes does not appear in the early surveys. ATVs (three-wheeled) were not introduced until 1970 and recreational off-road motorcycle use was in its infancy. These surveys tended to be broad in scope focusing mainly on participation and management issues while lacking significant economic information.

Loomis et al (2006) used a survey and the travel cost method (TCM) to estimate visitor expenditures to several desirable ATV recreational sites in Colorado. Loomis estimated per day recreation expenditures at between $8.47 and $36.33, depending on the site visited. Englin et al (2006) estimated utility theoretic incomplete demand systems for four off-highway sites in North Carolina. The welfare estimates varied greatly across the specification restrictions analyzed. The authors conclude that researchers should test restrictions and impose those restrictions that best fit the data. Bowker et al. (1997) used TCM to estimate the consumer surplus of ORVs and conclude that motorized recreation is in great demand. Bowker did not estimate economic impacts, however.

Cordell et al. (2005) used data from the NSRE and focused on OHV participation, but again provided little economic data or analysis. Hazen and Sawyer (2001) estimated OHV's contribution to the Colorado economy to be between $140 million and $158 million (based upon data for both residents and non-residents).

Silberman (2003) estimated that nearly $3 billion in retail sales were generated by resident Arizona ORV users in 2002. Silberman (2003) goes on to estimate that this spending generated nearly 37,000 jobs, salaries and wages of $1.1 billion and $187 million in state tax revenues. Interestingly, Silberman (2003) did not survey non-resident users.

Silberman and Aldereck (2006) report contingent valuation estimates from the Arizona survey conducted in 2002. Silberman and Aldereck (2006) found that eighty-nine percent of respondents indicated they participated in at least one non-OHV recreation activity on their most recent trip which was the subject of the CVM question. The authors conclude that the majority of respondents gained surplus from multiple activities on their OHV trip, and that this presented a joint benefits issue for many respondents. The authors found willingness to pay (WTP) of $119.94 for OHV users after including dummy variables to capture non-OHV recreation activities on respondents' most recent trip. While the studies reported by Silberman (2003) and Silberman and Aldereck (2006) fill an important void in the literature, they are limited to Arizona.

Moreover, Silberman (2003) does not estimate economic activity generated in the state by non-residents.

Research Methods

A mail survey was used to gather expenditure, use, location and financial information from both residents and non-residents, who had purchased a Wyoming ORV permit in the previous year (2004). Information presented in this paper will focus only on non-resident tourists (for a report on residents see Foulke et al., 2006).

The mail survey was conducted using a modified Dillman design (Dillman, 2000). The Wyoming State Trails Program (permit administrator) drew a random sample of 1,000 non-residents (with only 947 having useable addresses) as well as 1,000 resident 2004 permit holders from their database of over 32,000 total permits. A trip diary was developed and mailed to the individuals in the sample in June 2005. The purpose of the trip diary was to inform respondents of the upcoming survey and allow them to keep accurate records of their ORV activities during the most active time of the year for ORV recreation. It was hoped that when respondents received the survey later in the year, the trip diary mitigated potential recall bias in the survey. Moreover, a question was added to the survey regarding ORV use within the last 12 months to address the issue of recall bias. If respondents indicated they had not used ORV's for recreational purposes within the last 12 months, they were deleted from the sample.

The survey instrument was pre-tested, in person, by a sample of ORV riders at a motor sports store in Laramie, Wyoming in September 2005. The finalized survey instrument was then mailed in October 2005. Two weeks after the initial survey mailing, a reminder postcard was sent to the entire sample. Two weeks following the postcard reminder, a second survey was mailed to those in the sample who had not yet responded. Responses were received over a three month period, from early November, 2005 until late January, 2006. Survey forms were entered into SPSS Data Entry and subsequent statistical analyses were performed using SPSS. Data were checked for accuracy and economic impact analysis was conducted using the IMPLAN software package (MIG, 2006). Expenditures were allocated based on survey results into the appropriate IMPLAN sectors and margined where necessary.

The initial response rate from non-residents was 41.5 percent (comparable to Hazen and Sawyer (2001) and Silberman (2003)). Respondents who had not answered positively to the screener question regarding ORV use within the last 12 months were removed. This resulted in 15.1 percent of returned surveys categorized as not useable. This suggests a substantial turnover in visitor ORV permit holders. Given the overall budget constraints, phone follow-up of non-respondents was not conducted.

Table 1. ORV visitor respondents by place of residence, top ten states.

1.	Colorado	22.0%
2.	Utah	12.0%
3.	Wisconsin	11.2%
4.	Minnesota	10.0%
5.	Nebraska	7.2%
6.	Montana	6.0%
7.	California	4.8%
8.	Iowa	2.8%
9.	Michigan	2.4%
10.	South Dakota	2.4%

Results

One third of Wyoming ORV non-resident respondents came from neighboring Colorado and Utah. This is quite likely due to the close urban populations located along the Front Range in Colorado and the Wasatch Range in Utah. The next highest frequency of responses came from Wisconsin (12 percent) and Minnesota (10 percent). Table 1 shows the top ten states represented by respondents. Average one-way travel distance for visitors was 575 miles with more than 56 percent reporting having traveled over 250 miles. The above distribution indicates that distance to recreate is important, but it is not the sole factor in the decision to come to Wyoming.

Educational attainment distributions for non-resident respondents are shown with national values for comparison in Table 2 (Census [2], 2007). These values represent the highest education level obtained by non-resident respondents. Twenty-four percent had a bachelor's or post-graduate degree. Nearly 46 percent had received some post high school education, and 29 percent had achieved a high school education. In comparison with the national values, more non-resident respondents had high school degrees and some college or technical training.

Table 2. Educational attainment distribution.

	Non-resident	Percent National*
Grades 1 to 8	0%	6.60%
Some high school	3.60%	13.80%
Finished high school	25.90%	30.10%
Technical college	14.60%	4.10%
Some college	21.50%	18.10%
Associate's degree	9.70%	3.50%
Bachelor's degree	17.40%	15.80%
Post graduate degree	7.30%	7.90%

(Census [2], 2007)

Table 3. Distribution of annual household financial resources of visitor respondents.

	Percent
Under $5,000	0.4%
$5,000 to $9,999	0.8%
$10,000 to $19,999	0.0%
$20,000 to $29,999	5.4%
$30,000 to $39,999	10.0%
$40,000 to $49,999	9.2%
$50,000 to $59,999	12.1%
$60,000 to $69,999	7.5%
$70,000 to $99,999	26.8%
$100,000 to $149,000	17.6%
$150,000 to $199,999	5.0%
Over $200,000	5.0%

Values for bachelor's and post graduate degrees were very similar to national levels. Table 3 shows the distribution of annual household financial resources. Frequency of non-resident respondents indicating income of between $50,000 and $149,999 totaled 64 percent. Those at the high end of the spectrum, respondents reporting *more than* $149,999 income totaled 10 percent. Respondents reporting *less than* $50,000 accounted for almost 26 percent. In comparison, median annual income for the nation was $46,071 in 2005 (Census [1], 2007). This indicates that ORV respondents were broadly distributed but with concentrations at relatively higher than national median household income levels. Tables 2 and 3 suggest that non-resident ORV recreationists coming to Wyoming tend to be relatively more educated and more affluent than the national population. This seems reasonable in that there may be considerable investment in ORVs, trailers and other equipment necessary to participate in this activity in Wyoming.

Table 4. Primary purpose of all ORV trips taken during 2005.

ORV Riding	37.1%
Camping	8.1%
Fishing	8.2%
Hunting	39.1%
Other Recreation	7.5%
Total	100.0%

Respondents were asked to list all the trips taken in Wyoming in 2005 based on their trip diary information. The average number of trips taken by non-residents to Wyoming was 10.5. Respondents were then asked how many of the total trips were taken primarily for ORV riding and then how many trips were taken where ORVs were used for transportation for another recreation activity. Table 4 indicates that only 37.1 percent of the total trips taken by non-residents were primarily for ORV riding. The other 62.9 percent of the trips were taken for other purposes such as camping, hunting or fishing and ORVs were a mode of transportation. This

percentage is not as high as that reported by Silberman and Aldereck (2006) It does suggest that the majority of non-resident ORV users were on joint purpose trips and received benefits from multiple recreation activities.

Table 5. Most recent trip expenditures–visitors.

	Total	***Wyoming***
Gasoline	$331.24	$147.74
Restaurant and bars	$137.12	$97.59
Groceries and liquor	$131.03	$86.20
Overnight accommodations	$121.23	$77.00
ORV guides/tour packages	$2.78	$2.71
Day user fees & donations	$11.28	$10.32
Oil/repairs/maintenance	$27.99	$16.22
Retail items	$79.32	$54.24
Entertainment	$29.17	$21.61
Other expenses	$93.14	$85.70
Total for trip	**$964.30**	**$599.33**
Per person per trip	$351.93	$218.73
Per person per day	$35.26	$26.81
Per person per ORV day (6.9 days)	$51.00	$31.70

Table 5 illustrates expenditures during non-resident visitors' most recent ORV trip to Wyoming. The traveling party spent an average of $964.30 while on the trip, with $599.33 (62 percent) being spent specifically in Wyoming. The largest categories of spending were: 1) Gasoline (includes both passenger vehicle and ORV) 2) Restaurants and bars 3) Groceries and liquor and 4) Overnight accommodations. The majority of all spending category amounts were made in Wyoming, except for gasoline (45 percent). This likely reflects the relatively long distances traveled to get to Wyoming transporting ORVs. Almost all trips involved an overnight stay.

Expenditures were based on an average of 2.7 individuals per trip, according to respondents. This resulted in an estimate of $351.93 per person per trip, with $218.72 being spent in Wyoming (Table 5). Based on the average total trip length, the average total trip expenditure was estimated to be $35.26 per person per day. Based on the average number of days in Wyoming (8.16 days) per person, per day trip expenditures in Wyoming were $26.81. Per person per ORV-day expenditures were based on the number of days of actual ORV use during the trip (6.9 days). This expenditure per ORV-day was used in the economic impact analysis.

Table 6. Mean annual expenditures–visitors.

	Average **Total**	***Average*** **Wyoming**
New/Used ORV	$2,471.83	$469.39
ORV trailers	$646.36	$21.86
Safety equipment	$63.91	$8.30
Clothing	$43.93	$5.47
Accessories	$81.95	$10.19
Annual repairs	$144.38	$25.21
Registration/license/permit	$74.91	$26.24
Club dues	$4.96	$1.70
ORV mag. subscriptions	$3.48	$0.00
ORV storage costs	$34.85	$2.35
Other	$60.36	$24.71
Total	**$3,630.92**	**$595.42**
Per Person	$1,665.56	$273.13
Per ORV	$1,482.01	$243.03

Table 6 summarizes annual ORV expenditures. Visitors reported spending an average of $3,631 on their ORVs during the past 12 months. The largest categories of expenditures were: 1) Purchasing of new/used ORVs, 2) Purchasing ORV trailers, and 3) Annual repairs. As these were non-resident respondents, most of these expenditures (84 percent) were made outside of Wyoming. However, $595 of these annual expenditures were made in Wyoming. On a per person basis, annual ORV expenditures averaged to $1,666 with $273 being spent in Wyoming. On a per ORV basis, ORV expenditures averaged $1,482 with $243 being spent in Wyoming. This average ORV expenditure in Wyoming is comparable to the average ORV expenditure reported by residents (Foulke et al, 2006).

Economic contribution of visiting ORV riders

Because visitor expenditures represent new money to the Wyoming economy it is appropriate to consider the economic impact of the spending by non-resident ORV riders (Crompton, 2001). Visitor ORV rider spending is important because it creates additional jobs and income for Wyoming residents. A 2003 Wyoming IMPLAN model was used to estimate the economic impact of visitor spending (MIG, 2006).

Table 7 summarizes the economic contribution of visitor ORV riders to Wyoming's economy. Based on the 11,071 registered visitor ORVs in the current year (2005), survey estimates of 1.4 people per ORV, and a reported average of 11.6 days of ORV riding in Wyoming it is estimated that total recreation use for visitor registered ORV's in Wyoming was nearly 180,000 use-days representing an estimated $5.7 million in total visitor ORV trip expenditures in Wyoming. The survey results also indicate that visitors spend an average of approximately $243 per year in Wyoming on each ORV for equipment and other fixed expenditures. This yields an additional estimated $2.7 million in total visitor ORV annual expenditures in Wyoming for 2005. Combining

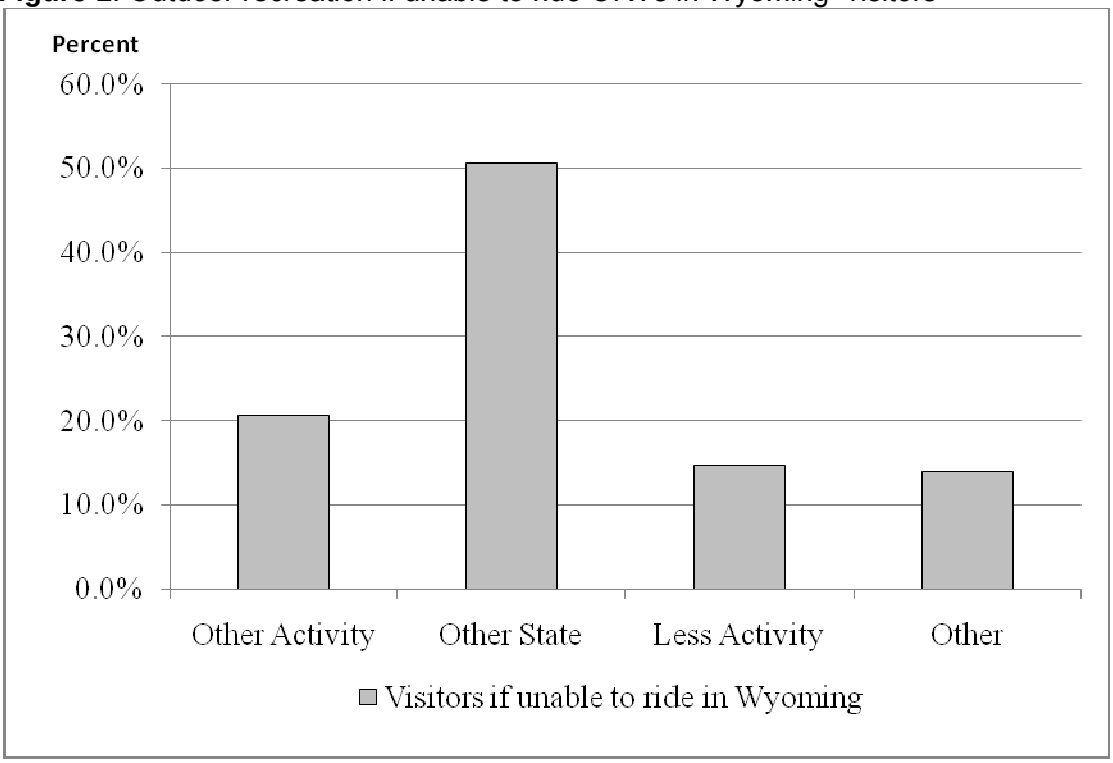
trip and annual expenditures indicates that visitors spent a total of $8.4 million to recreate on ORVs in Wyoming during 2005. These expenditures generated an estimated 127 jobs and $3.3 million in labor earnings.

Table 7. Economic contribution of visitor ORV riders in Wyoming.

	Based on Registrations
Estimated Expenditures	
Total visitor user-days	179,793
Daily trip expenditures in Wyoming	$31.70
Total visitor trip expenditures	$5,699,533
Number of visitor ORVs	11,071
Annual expenditures in Wyoming	$243.03
Total visitor annual expenditures	$2,690,569
Total visitor expenditures in WY	$8,390,102
Economic Impact	
Number of jobs	127
Earnings	$3,305,819
State & Local Government Revenue	
Sales tax revenue @ 5.2%	$302,031
Gas tax revenue @ $0.14 Per Gallon	$49,029
Lodging tax collections @ 2.0%	$14,645
Registration fee @ $15.00	$166,065
Total government revenue	$531,770

It was also asked what visitors might do, if for some reason, they were no longer able to ride ORVs in Wyoming. This could be an issue as there is growing pressure on land managers, particularly in the USFS and BLM to limit ORV usage on public lands. Already, most national forests have restrictions that require ORVs to stay on specific trails or roads. Fifty-one percent of visitors said that they would go to some other state to ride ORVs versus only 24 percent of residents (Figure 1). Additionally, 15 percent said that they would decrease overall participation in outdoor recreational activities, meaning that there could be an overall loss of approximately 51 percent of non-resident ORV recreational users, with another 15 percent reducing visits to Wyoming. From a travel and tourism perspective, this could translate into lost tourists and tourism dollars, representing approximately half of the expenditures and impacts from non-residents estimated for 2005.

Figure 1. Outdoor recreation if unable to ride ORVs in Wyoming–visitors



Summary and conclusions

Off-road vehicles have become a significant part of outdoor recreational activity in the past 25 years. Nearly half of Wyoming consists of public lands (49 percent) on which ORV users desire to recreate. The authors conducted a broad-based survey to try and understand ORV use and users in Wyoming. Specifically, this research focused on non-resident expenditure patterns and the associated economic impacts with implications for policy change.

Total non-resident ORV user expenditures in Wyoming in 2005 are estimated to be $8.4 million. Moreover, this created an estimated 127 jobs and labor earnings totaling $3.3 million. This suggests ORV recreation is significant to Wyoming's tourism economy.

The results here indicate that the majority of ORV trips were joint purpose in nature. This has important implications for benefit estimates as well as economic impact estimates. These results indicate that future analyses must consider potential joint purpose trips of ORV users. Our results also indicate that regulation of ORVs may also impact recreation benefits generated by other activities such as hunting, fishing and camping, given the number of joint purpose trips taken by respondents. Thus, an inescapable conclusion of this study is that ORVs are multiple-use vehicles that cross several activity boundaries, including camping, hunting and fishing. Any new regulations regarding their use will potentially have spillover effects and therefore, regulators should be cautious in their approach to new regulations as unintended economic consequences may result.

Better understanding of these joint-benefit relationships should be an issue for further research. For example, benefits estimates which determine the surplus associated with ORV use versus other uses on the trip could be used to determine the ratio of economic impacts associated with ORVs versus other activities. Moreover, estimates of surplus for hunting and fishing trips should address ORV use or risk inflating the benefits estimates for such activities.

The longer term effects of sustained higher fuel prices on ORV user's behavior and decision making are unknown. Rising fuels costs may impact both benefits received by recreators enjoying multiple ORV based activities and economies dependent on tourism using ORVs. Our survey was conducted right after Hurricane Katrina in October, 2005 when there had been an unprecedented $3 per gallon spike in gasoline prices. The results of a question on change of use by ORV riders showed a limited but measurable effect on ORV usage in the short run, but current fuel price levels may be having a larger impact at this time.

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