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Community Economic Contributions from Recreational Trails Usage on Public Lands: Implications from a Comprehensive Wyoming Case Study¹

Amy M. Nagler, Christopher T. Bastian, David T. Taylor, and Thomas K. Foulke²

Introduction

Many rural economies in the West are dependent on tourism dollars generated by outdoor recreation on public lands. Controversy and conflict has arisen between groups concerned with preservation versus recreational use on public lands (Wilson 2008). The largest controversy surrounds increased motorized recreation and environmental damages (Barton and Holmes 2007; Deisenroth, Loomis, and Bond 2009; Groom et al. 2007; Havlick 2002). Others have expressed concerns with activities such as hiking and climbing and the potential for negative ecological effects (Lohman 2010). Public lands agencies are faced with decisions related to managing recreational use, trail provision or maintenance, and the potential for environmental damage. Such decisions may affect local economies. While studies regarding the economic impacts, contributions, and non-market values for recreation are found in the literature, most of these studies are use or area specific (Bergstrom et al. 1990; Bowker, Bergstrom, and Gill 2007; Cordell et al. 1990; Diesenroth, Loomis, and Bond 2009; Jakus et al. 2010; Keske and Loomis 2008; Pollock et al. 2012). There is a paucity of published research that provides a broad, regional analysis of the economic contributions of recreational trails usage on public lands.

We provide a more comprehensive assessment of the potential economic contributions of recreational trail usage on public lands than has been previously reported, using Wyoming as a case analysis. The research objective is achieved by providing a broad look at seasonal motorized and nonmotorized recreational trails usage and associated spending across Wyoming. This dataset is unique in that it allows for a statewide investigation of multiple trail types, uses, and use seasons. Relative economic importance of the activities can be compared.

This paper presents a brief description of methods used to collect information and data, an overview highlighting relevant results, and a summary of economic contribution estimates. Discussion focuses on potential implications for policy makers, local decision makers, and economic researchers in light of increasing controversies regarding recreational usage versus the provision of ecosystem services from public lands (Jakus et al. 2010; Lohman 2010; Torell et al. 2013).

Methods

A variety of methods were employed to inventory Wyoming's recreational trails, gather information regarding usage and expenditure associated with trail use, as well as to estimate

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² The authors are, respectively, Research Associate, Department of Agricultural and Applied Economics, University of Wyoming; Associate Professor, Department of Agricultural and Applied Economics, University of Wyoming; Professor, Department of Agricultural and Applied Economics, University of Wyoming; and Senior Research Scientist, Department of Agricultural and Applied Economics, University of Wyoming. Amy Nagler is the corresponding author, anagler@uwyo.edu.

the economic contributions associated with trail use. Inventory, survey, and economic analysis methods are summarized below.

Wyoming Trail Inventory Updates

In order to quantify and describe recreational trails available for public use in Wyoming, a 2013 inventory of Wyoming trails was conducted as an update and extension of a 1998 Wyoming Statewide Trails Inventory (Pindell et al. 1999). The inventory includes routes, trails, walkways, and pathways with public access, intended, managed, or designated for motorized and/or nonmotorized recreational use. Additional and updated trail descriptions were acquired via email, telephone, internet resources, and personal interviews with officials across all agencies and organizations potentially administering trails in Wyoming between March 2012 and March 2013. Information gathered included a range of trail characteristics, location, administration, and usage to accompany each listing.

Motorized Recreational Trail User Survey Process

A survey process for snowmobile and ORV Wyoming trail users was designed to collect information on trail usage, expenditure information, and user satisfaction. Surveys were generally comparable to earlier studies (Foulke et al. 2006; McManus, Coupal, and Taylor 2001) to facilitate comparisons over time. A combination of mail and electronic survey instruments followed a Dillman survey design (Dillman 2007).

The Wyoming State Trails Program (WSTP) manages and maintains a snowmobile trail system on public lands in the state as well as partnering with public land agencies, enrolling ORV trails, and providing trail information and maintenance, with trail users required to pay registration fees (WSTP 2013). Sample pools of residents and nonresidents were chosen randomly from the total WSTP registration databases. Snowmobile permit holders selected in the sample were sent a series of mailings in the spring of 2012. ORV permit holder surveys were mailed in two waves, in the fall of 2012 and winter of 2013, in order to capture seasonal differences. Respondents could fill out either a web-based or paper copy of the survey. A total of 361 resident and 414 nonresident snowmobile surveys were returned, representing 34 and 38 percent response rates, respectively. A total of 498 resident and 546 nonresident surveys were returned from the ORV survey, representing 40 and 44 percent response rates, respectively. A related intercept survey of snowmobile outfitter clients, conducted at vendor locations, collected 113 surveys which contribute to the economic analysis presented below.

Economic Contribution Estimation

An economic contributions analysis was conducted incorporating descriptive information from both snowmobile and ORV surveys as well as estimates of economic contributions to the state obtained from a 2011 IMPLAN model. IMPLAN is a regional modeling system capable of providing economic resolution down to the county level that is commonly used for economic contribution analysis (MIG 2012). No modifications were made to the IMPLAN model for the analysis presented here.

An economic contribution analysis of nonmotorized trail usage was conducted using US Forest Service data on visitor trail use and expenditure. Unlike motorized trail use, there are generally no permits associated with nonmotorized trail use. As a result no centralized database exists with contact information that can be used to survey nonmotorized trail users to determine trail use and associated expenditures. Due to the disbursed nature of trails and the time-consuming and expensive process of intercept sampling at trail sites, information on the economic contributions of nonmotorized trail use was estimated using available National Visitor use

Monitoring (NVUM) data collected on four National Forests primarily located in Wyoming (USFS 2013).

Results

A series of reports provide detail on methods used to collect information as well as complete descriptions of the trail inventory (Nagler et al. 2013b), snowmobile survey (Nagler et al. 2012), ORV survey (Nagler et al. 2013a), and nonmotorized economic analysis (Taylor et al. 2013) outcomes. The selection of results presented below is intended to give an overview highlighting this comprehensive set of information, data, and analysis.

2013 Wyoming Trail Inventory

The 2013 Wyoming Trail Inventory represents a comprehensive description of trails in Wyoming. A total of 2,160 trails in Wyoming identified by federal, tribal, state, and local agencies and private organizations are described in the inventory totaling 10,472 miles (table 1). The majority of trails in Wyoming are administered by the US Forest Service. Combined, federal agencies manage 92 percent of total trail miles in Wyoming.

Table 1. Number and miles of trails in Wyoming by administering agency

Administering agency	Number of trails	Percent of total	Miles of trails	Percent of total
Federal	1,755	81%	9,605 miles	92%
US Forest Service	1,399	65%	7,610 miles	73%
National Park Service	284	13%	1,474 miles	14%
Bureau of Land Management	71	3%	520 miles	5%
US Fish and Wildlife service	1	<1%	1 mile	<1%
Wind River Indian Reservation	39	2%	131 miles	1%
State	244	11%	127 miles	1%
Wyoming State Parks, Historic Sites and Trails	236	11%	115 miles	1%
Wyoming Game and Fish	5	<1%	6 miles	<1%
Wyoming Department of Transportation	3	<1%	6 miles	<1%
Local	111	5%	495 miles	5%
Municipal agencies	86	4%	393 miles	4%
County agencies	25	1%	102 miles	1%
Private	11	<1%	112 miles	1%
All Wyoming agencies	2,160 trails	100%	10,472 miles	100%

Although specific-use trails are listed (groomed skate ski trails, for example) in most cases trails have more than one allowed or designated use. The majority of trails listed are for nonmotorized pedestrian use, about half include for cross-country ski, snowshoe, backpacking, and equestrian use, and just over a third include bicycle riding as a designated use. A quarter of trails listed by Wyoming agencies include motorized use designations with 11 percent designated for snowmobile riding and 18 percent for ORV uses.

Motorized Recreational Trail User Survey Highlights

Results are presented from Wyoming snowmobile and ORV trail user surveys highlighting motorized trail user characteristics, expenditure information, and management opinions. Table 2 includes a summary of responses to selected questions from Wyoming residents and nonresident respondents.

Table 2. Motorized trail user survey response highlights

Survey request	Snowmobile		ORV	
	Resident	Nonresident	Resident	Nonresident
Gender	89% male	96% male	90% male	90% male
Average age	50 years	44 years	55 years	52 years
Employed full time	72%	80%	61%	70%
Some college or technical school or more education	76%	80%	71%	75%
Household income \$50,000 or more	79%	84%	74%	83%
Average expenditure per person/per day in WY	\$98	\$160	\$41	\$61
Average annual expend. per person in Wyoming	\$3,367	\$625	\$1,789	\$231
Overall satisfaction or dissatisfaction with recreational riding in Wyoming*	4.2	4.4	3.7	4.3
Support trailhead parking fee for improvements	27%	43%	28%	34%
Strongly support or support wheeled ATVs sharing snowmobile trails if fee helps pay for grooming	31%	25%	43%	41%

* Very Satisfied = 5; Satisfied = 4; Neutral = 3; Dissatisfied = 2; Very Dissatisfied = 1.

Information on demographic characteristics of respondents is important to understanding demand for motorized trail recreation and any important differences in trail users relative to the general population. While registered users surveyed may not be representative of all users, respondents to both motorized trail surveys reported distinct demographic characteristics. The average respondent was male, 45 to 55 years old, employed full time, with some college or technical education, and a reported household income of \$50,000 or more (table 2).

Trip expenditures reported per person, per day spent in Wyoming varied from \$160 for nonresident snowmobilers to \$41 for resident ORV riders. Overall, snowmobile riders spent more per day on their most recent trip and nonresident riders spent more than residents (table 2). In addition to trip expenditures associated with recreational riding on Wyoming trails, information was collected on annual expenditures spent in Wyoming to purchase, maintain, and outfit recreational vehicles. Not surprisingly, resident riders spent more in-state than nonresidents, totaling \$3,367 per snowmobiler and \$1,789 per ORV rider. Nonresident annual expenses paid in Wyoming totaled \$625 per snowmobiler and \$231 per ORV rider (table 2).

Annual and trip expenditures reported were incorporated into economic contributions of Wyoming's motorized trail programs summarized below.

Overall, riders reported a high level of satisfaction regarding their experience in Wyoming with average responses of "very satisfied" to "satisfied" for all groups surveyed. Riders, however, generally were not supportive of increased fees to pay for trailhead improvements or wheeled ATVs sharing snowmobile trails with fees paying for grooming services (table 2).

Sixty percent of nonresident visitors coming to snowmobile on Wyoming trails were from Minnesota (21 percent), Colorado (16 percent), Iowa (13 percent), and South Dakota (12 percent). A similar proportion of nonresident ORV users traveled from Colorado (18 percent), Montana (18 percent), Utah (15 percent), and Nebraska (7 percent).

Comparison of Economic Contributions

A summary economic analysis first compares expenditure estimates from resident and nonresident motorized and nonmotorized trail users. Total state expenditures are estimated for motorized trail users based on survey results. Nonmotorized expenditures are estimated using US Forest Service NVUM data. Nonresident expenditures represent new money to the Wyoming economy; resident expenditures may be regionally important to local economies. This analysis considers the gross economic activity in the state's economy that can be attributed to the state's motorized trail program. The analysis does not consider the net economic activity associated with the program. Expenditures associated with motorized and nonmotorized trail use in Wyoming is presented in table 3.

For the 2011-2012 season a total of 33,851 snowmobiles and 56,137 ORVs were registered with the Wyoming State Trails Program. Roughly half of snowmobiles were registered by Wyoming residents, half by nonresidents, with an additional 2 percent registered by commercial outfitters. Resident ORV registrations accounted for 80 percent of the total with only 20 percent registered by nonresident riders (table 3).

Combining survey estimates of the average annual days riding in Wyoming per registered recreational vehicle with the number of registrations results in total annual visitor days reported for motorized users. Visitor days for nonmotorized users reported from US Forest Service NVUM data are individual visits with no specified length of time. Expenditures per day of recreational trail use, reported from motorized survey and nonmotorized NVUM data, vary from about \$12/day for non-primary nonmotorized users to \$257/day for snowmobile outfitter clients, impacting total trip expenditures. Total trip expenditures (combining visitor days with trip expenditures) are highest overall for ORV trail users (\$123 million), the majority of which (\$105 million) is contributed by Wyoming residents. Estimated total trip expenditures for all snowmobile trail users is \$83 million with resident and nonresident users each contributing about \$30 million and outfitter clients about \$20 million. Nonmotorized trail user estimated trip expenditures are \$52 million, with \$37 million from nonresident users (table 3).³

³ Direct spending associated with downhill resort skiing and snowboarding in Wyoming, estimated from US Forest Service NVUM data was \$84.2 million in 2011-2012. Of the four national forests primarily located in Wyoming, only three had downhill ski areas at the time of the NVUM surveys. Resorts on the Bridger-Teton National Forest accounted for 97 percent of this total. This spending was not on designated trails and is not included in our contributions estimates in this paper.

Annual amounts spent in Wyoming to purchase, outfit, and maintain recreational trail vehicles are reported for motorized trail users. Multiplying this by the number of registered machines results in estimated total annual expenditures for Wyoming of \$64 million for snowmobile and \$83 million for ORV trail users. Total estimated expenditures in Wyoming related to recreational trail use for motorized users, which combines trip and annual expenses, is \$145 million for snowmobile, and \$206 million for ORV trail users (table 3).

Registrations, trail use, and value contributed by Wyoming residents versus nonresidents was different for snowmobile and ORV users. Resident snowmobilers reported nearly twice as many days of trail riding per season. This, coupled with annual expenditures in Wyoming, roughly five times that for nonresidents, results in residents contributing 57 percent of all snowmobile expenditures in the state. Higher trip expenditures accounted for more of the total nonresident and commercial contribution, which combined accounted for nearly half (43 percent) of totals spent by snowmobile trail users in Wyoming.

Table 3. Motorized and nonmotorized trail use expenditures in Wyoming

Measure	Snowmobile				ORV			Nonmotorized*			
	Resident	Non-resident	Commercial	Total Snowmbl.	Resident	Non-resident	Total ORV	Local	Non-local	Non-primary†	Total Nonmtr.
Registered machines	15,781	17,370	700	33,851	44,910	11,227	56,137	N.A.	N.A.	N.A.	
<i>Percent of total</i>	47%	51%	2%	100%	80%	20%	100%				
Ave. days in WY per machine‡	20.1	11.0	118.0	17.4	57.9	26.3	51.6				
Total visitor days in WY§	316,725	190,202	82,620	589,546	2,599,592	295,730	2,895,322	718,211	245,739	129,378	1,093,328
<i>Percent of total</i>	54%	32%	14%	100%	90%	10%	100%	66%	22%	12%	100%
Expenditures per day in WY	\$98.29	\$159.80	\$257.32	\$140.42	\$40.54	\$60.61	\$42.59	\$18.91	\$149.47	\$11.93	\$47.43
Total trip expend. in WY (\$ million)	\$31.1m	\$30.4m	\$21.3m	\$82.8m	\$105.4m	\$17.9m	\$123.3m	\$13.6m	\$36.7m	\$1.5m	\$51.9m
<i>Percent of total</i>	38%	37%	26%	100%	85%	15%	100%	26%	71%	3%	100%
Annual expend. per machine in WY	\$3,367	\$625	N.A.	\$1,930	\$1,789	\$231	\$1,477				
Total annual expend. in WY (\$ million)	\$53.1m	\$10.6m	N.A.	\$64.0m	\$80.3m	\$2.6m	\$82.9m				
Total expend. in WY (\$ million)	\$84.3m	\$41.2m	\$21.3m	\$146.8m	\$185.7m	\$20.5m	\$206.2m				
<i>Percent of total</i>	57%	28%	14%	100%	90%	10%	100%				

* Nonmotorized recreation represents only use on Shoshone, Bridger-Teton, Bighorn, and Medicine Bow-Routt National Forest Service trails in Wyoming.

† Defined as individuals who were recreating on a national forest but indicated that recreating on the national forest was not the primary purpose of the trip.

‡ In some cases there may be more than one rider per machine.

§ Nonmotorized recreation use is measured in terms of visits with no specific length of time rather than visitor days.

Table 4 summarizes the estimated economic contributions to the Wyoming economy of motorized and nonmotorized recreational trail users' expenditures reported above. Estimates are obtained from a 2011 IMPLAN model of the Wyoming state economy.

Table 4. Economic contribution of motorized and nonmotorized trail use in Wyoming (\$ million)

Indicator	Snowmobile	ORV	USFS Nonmotorized	Combined
<u>Output</u>				
Direct	\$146.8m	\$206.2m	\$51.9m	\$404.9m
Secondary	\$29.0m	\$38.0m	\$16.0m	\$83.0m
Total	\$175.8m	\$244.2m	\$67.9m	\$487.9m
<u>Employment*</u>				
Direct	1,005	1,170	477	2,652
Secondary	264	298	123	686
Total	1,269	1,469	600	3,338
<u>Labor income†</u>				
Direct	\$26.2m	\$37.0m	\$12.4m	\$75.7m
Secondary	\$9.1m	\$12.5m	\$5.3m	\$27.0m
Total	\$35.3m	\$49.5m	\$17.8m	\$102.6m
<u>State and local government‡</u>				
Direct	\$6.2m	\$8.1m	\$2.6m	\$16.8m
Secondary	\$1.2m	\$1.5m	\$0.8m	\$3.5m
Total	\$7.4m	\$9.6m	\$3.4m	\$20.4m

* Annual equivalent income generated for employees.

† All forms of employment wages and benefits.

‡ Taxes and fees.

Estimates for total economic output combine direct contributions, reported as total expenditures in table 3, with secondary economic activity estimated through the IMPLAN model. It is important to note differences in source data as well as the absence of annual expenditures for nonmotorized users when comparing expenditure estimates.

Total estimated economic output was greatest for ORV users (\$244 million). Total economic output for snowmobile users is estimated at \$176 million. USFS nonmotorized trail users generated a total estimated economic output of \$68 million in the Wyoming economy. The estimated economic contribution for all motorized and nonmotorized US Forest Service recreational trail users to the state economy is \$488 million. The IMPLAN model estimates that this economic activity supports the equivalent of nearly 1,269 annual jobs related to snowmobile trail use, 1,469 jobs related to ORV, and 600 jobs related to nonmotorized recreational trail use in the Wyoming economy. Combined, these jobs contribute \$103 million in labor income and state and local government revenue of \$20 million in Wyoming (table 4).

Summary and Discussion

The comprehensive set of information, data, and analysis on recreational trail use in the state of Wyoming summarized above indicate that more than 10,000 miles of trails available for both motorized and nonmotorized use not only provide access to recreate and enjoy public lands but contribute to the state's economy. Total expenditures for snowmobile, ORV, and nonmotorized trail users are estimated to be \$405 million, generating \$488 million in direct and indirect economic output, \$103 million in labor income, and \$20 million in state and local government revenue to the Wyoming economy. This suggests that recreational trails usage is a significant

contributor to state and local economies. Comparing these values to direct travel spending by all resident and nonresident visitors, estimated to be \$3.1 billion in 2012 (Dean Runyan Associates 2013), indicates that trail use accounts for roughly 13 percent of all travel spending within the state.

Not surprisingly, the trails inventory indicates that the majority (92 percent) of trail opportunities are located on federal public lands for Wyoming. This is likely not uncommon for Western states. As federal budgets decline and more emphasis is placed on the provision of ecosystem services or mitigation of environmental damages from recreation, our analyses suggest there is potential for significant declines in economic contributions from motorized trail use. This potential decline in motorized trail emphasis is perhaps evidenced in changes in trail miles in the state since the last inventory. Comparing the 2013 Wyoming Statewide Trails Inventory to 1998 listings reveals an overall increase in trail miles in Wyoming, primarily mountain bike trail systems and municipal nonmotorized trails managed by state and local agencies. Development of nonmotorized trails systems often in or near cities and towns are an indication that outdoor trail recreation is important to Wyoming residents and visitors, but they likely tend to generate less economic contributions per mile developed. Nonmotorized trail use is important but represents a smaller proportion on US Forest Service lands. Nonmotorized use varies by forest, accounting for between 29, 27, and 23 percent of visits to Bridger-Teton, Medicine Bow-Routt, and Shoshone Forests, respectively, but only 9 percent to the Bighorn National Forest.

While Wyoming residents benefit from proximity to trails and spend more in-state to purchase and maintain snowmobiles and ORVs, Wyoming's low population and popularity as a tourist destination balance out resident contributions for snowmobilers. Likewise, non-local visitor use of nonmotorized National Forest trails contributed 71 percent of total reported expenditures. Resident ORV riders on the other hand contribute 90 percent of total ORV trip and annual expenditures reported. A high proportion of ORV registrations, higher number of days on the trail, and higher in-state annual expenditures all contribute to resident ORV riders' economic contribution.

Overall, the expenditures data and economic contributions analysis indicate that motorized recreation generates the biggest contributions to the Wyoming economy, and the vast majority of trails reside on federal lands. Yet, motorized recreation seems to garner the most criticism from both government officials and environmental groups. This suggests that economic contributions from these activities are likely at the greatest risk as decision makers search for ways to address environmental concerns. There may be a larger role for state and local agencies regarding trail development or marketing of alternative tourism opportunities to mitigate potential declines in economic contributions. As these controversies grow, economists will likely need to provide more studies associated with the benefits, costs, and economic impacts associated with changes in recreation regulations, motorized versus nonmotorized recreation, or trail provision.

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