

Economic Impacts of Non-motorized (Quiet) Recreation on the Wallowa-Whitman National Forest



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Executive Summary

The Wallowa-Whitman and other national forests are undergoing Travel Management planning processes that will designate specific routes and areas of the forest where motorized recreation will be allowed. Recreation's economic impacts often are part of the broader discussion of recreation access, and this report provides estimates of the current economic impact of "quiet" (non-motorized) recreation on the Wallowa-Whitman National Forest (WWNF), located in northeast Oregon.

Four models are used to generate estimates:

- Inclusive, All Visitors
- Inclusive, No Locals
- Restrictive, All Visitors
- Restrictive, No Locals

The "inclusive" models cover the broadest range of activities and thus generate higher estimates than the restrictive models. The "all visitors" models include expenditure by local residents. The Inclusive, All Visitors model leads to the highest estimates, while the Restrictive, No Locals model leads to the lowest.

Quiet recreation on the WWNF generates from \$2.9 to \$5.4 million per year in labor income, depending on the model. In turn, this income is associated with 137 to 252 jobs (part and full-time combined). The visitor expenditure resulting from all types of recreation on the WWNF represents a modest proportion of the overall regional economy. However:

- WWNF visitor expenditure is more important in individual communities, such as Enterprise and Joseph.
- WWNF visitor expenditure is more important for individual sectors, notably accommodation and food service.
- Quiet recreation is responsible for the majority of all recreation expenditure on the WWNF.

1. Introduction

The Wallowa-Whitman and other national forests are undergoing Travel Management planning processes that will designate specific routes and areas of the forest where motorized recreation will be allowed.¹ Although the ecological and experiential impacts of motorized recreation are the catalyst for Travel Management, economic impacts often are part of the broader discussion of recreation access. Economic impact analyses exist for motorized recreation in various states. This report presents analyses of these impacts for "quiet" (non-motorized) recreation on the Wallowa-Whitman National Forest (WWNF), located in northeast Oregon.

Access changes resulting from Travel Management on the WWNF are not yet known, nor is there data on how such changes will affect the behavior of either motorized or non-motorized recreationists. Therefore, the data presented here represent impacts from **current** patterns of quiet recreation on the WWNF, not from **changes** caused by Travel Management.

¹ See <http://www.fs.fed.us/r6/w-w/recreation/ohv/ohv-rule.shtml> for more information.

This analysis generally follows the approach used by the U.S. Forest Service in their Travel Management Economic Contribution Application (TMECA) tool; substantial deviations from that approach are noted below.

The study region is defined as Baker, Grant, Umatilla, Union, and Wallowa counties. Results are presented for the following economic variables:

- **Output** or sales.
- **Labor income**, which includes employee compensation (including wages, salaries, and benefits) and proprietary income (including self-employment income).
- **Employment**, which includes both full-time and part-time jobs (it is not full-time equivalents).

Results generally are grouped into broad categories based on the 2-digit NAICS classification.² Except where noted, monetary figures are inflation adjusted to their 2008 equivalent.

As illustrated in Table 1.1, the study region is largely rural, with Pendleton being the most populous community (just over 17,000 residents).

County	County population	Largest city	City population
Baker	16,435	Baker City	10,105
Grant	7,580	John Day	1,850
Umatilla	72,245	Pendleton	17,260
Union	25,250	La Grande	12,850
Wallowa	7,130	Enterprise	1,940

Figure 1.1 shows how the study region’s economy compares to Oregon’s statewide economy. The region is relatively dependent on natural resources (NAICS 11) and the “government and other” sector (NAICS 92 plus non-NAICS categories).

Manufacturing plays a roughly equivalent role in the study region as in the state as a whole. The same is true for lodging and restaurants (NAICS 72) and retail (NAICS 44-45), which are of particular interest in the context of recreation and tourism.

² See <http://www.naics.com/naics2-6page.htm> for category descriptions. NAICS is the North American Industry Classification System, a system for classifying economic activity into categories.

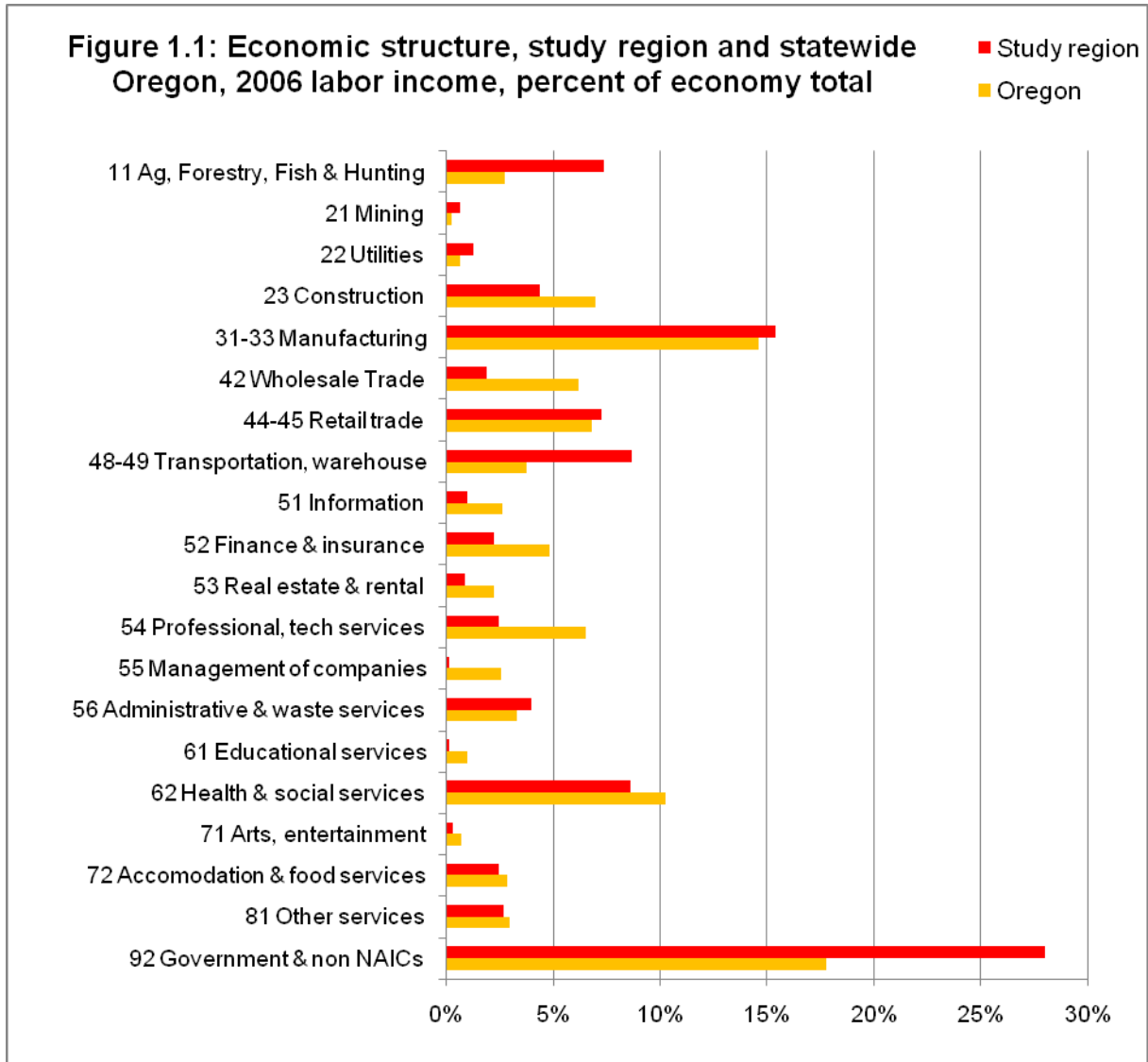
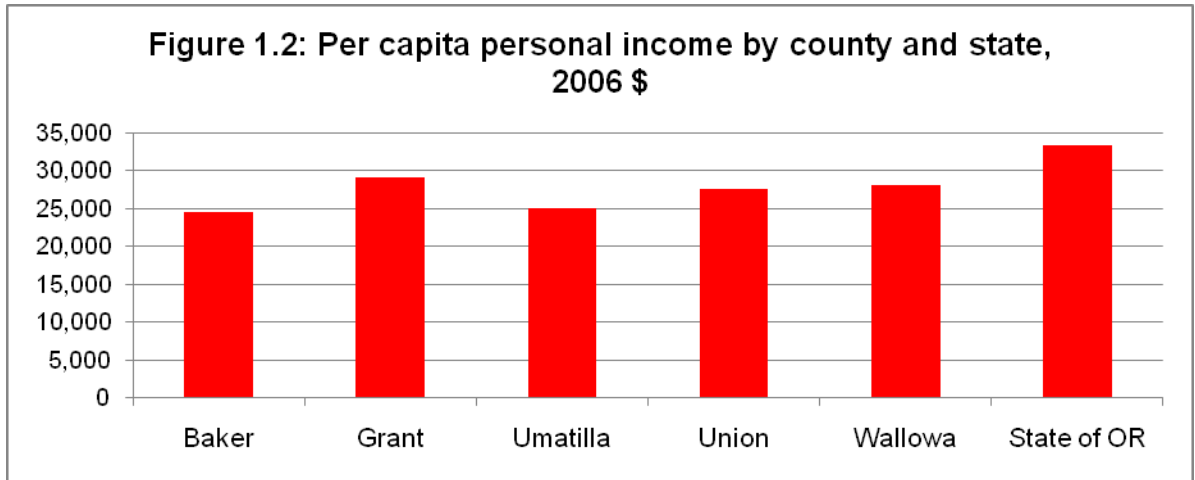
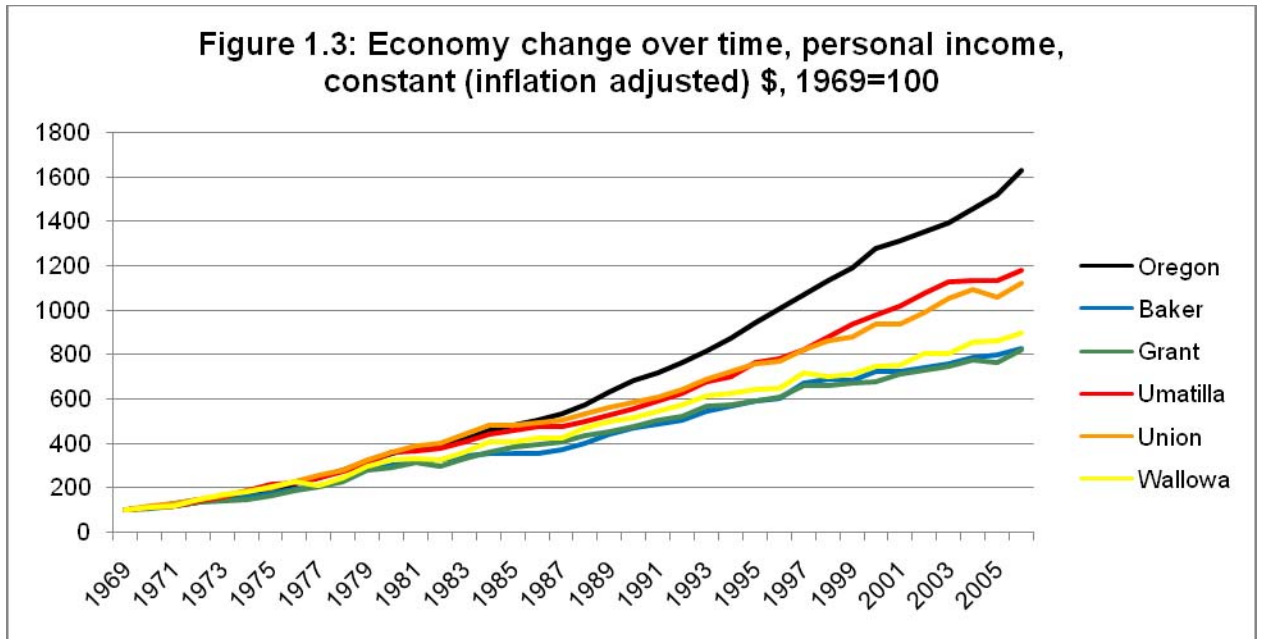


Figure 1.2 shows variation in per capita personal income across counties in the region (data for Figure 1.2 and 1.3 are from the U.S. Bureau of Economic Analysis and show personal income, which is a broader measure than labor income). Grant County has the highest level of personal income, but all counties lag behind the state average.



As shown in Figure 1.3, the economies of the region have grown over time, but at a slower rate than for Oregon as a whole. Umatilla and Union counties have experienced the greatest relative growth.



In summary, the study region is a largely rural area that is relatively dependent on natural resource sectors. Income growth has lagged behind the state as a whole.

2. Expenditure Calculation

Expenditure totals are affected, sometimes greatly, by assumptions and data treatment. The results presented here include two “sensitivity analyses.” Specifically, separate models are estimated based on assumptions regarding 1) which activities should be considered “quiet” and 2) whether expenditure by local resident visitors is included. This is shown in Table 2.1.

Table 2.1: Four models estimated in analysis			
		Include expenditure by local resident recreationists?	
		Yes	No
Set of included activities	Inclusive	Inclusive, All Visitors	Inclusive, No Locals
	Restrictive	Restrictive, All Visitors	Restrictive, No Locals

The All Visitors models include expenditure by local residents. This type of analysis is sometimes referred to as “economic significance” rather than economic impact. The No Locals models exclude expenditure by local residents. Local visitors are defined as living within 50 miles of the recreation site.

Following the TMECA approach, “non primary” visitors are included using expenditure profiles for local day visitors.³ These visitors do not report the WWNF as their primary destination, but it is assumed that they made additional expenditure as a result of their visit to the forest.

The Inclusive models include the ten “definite” quiet activities plus the four “possible” quiet activities listed in Appendix A. The Restrictive models include only the ten “definite” activities.

Expenditures for each of these groups, by expenditure item, are shown in Table 2.2.

Table 2.2: Total annual expenditures by item, thousands of 2003 dollars				
Item	Inclusive, All Visitors	Inclusive, No Locals	Restrictive, All Visitors	Restrictive, No Locals
Lodging	2,141	1,724	1,798	1,450
Restaurant/Bar	2,771	1,934	2,351	1,628
Groceries	2,809	1,501	2,506	1,302
Gas/Oil	3,405	1,777	3,079	1,570
Other Transport	290	259	237	209
Activities	842	621	657	465
Admissions/Fees	564	312	486	264
Souvenirs/Other	2,171	1,069	1,955	905
Total	14,992	9,197	13,067	7,792

Appendix A describes the process by which visitation and associated expenditure were estimated. Visitation is based on the U.S. Forest Service 2003 National Visitor Use Monitoring (NVUM) application on the WWNF. Expenditure is based on national NVUM profiles created by the Forest Service, as the sample size for NVUM applications on individual forests is not sufficient to confidently estimate expenditure by activity and trip segment. Expenditure covers spending made within 50 miles of the site at which the visitor was surveyed.

Many factors, including diverse activities and multiple access points, create the potential for error in estimates of national forest visitation and expenditure levels. NVUM data are the best available in

³ For backpacking, the expenditure profile for local overnight visitors is used because there are no backpacking day visitors.

this context, and they were compared to other recreation data in a “ground truthing” process. Other sources included:

- Oregon State Comprehensive Outdoor Recreation Plan (SCORP) surveys from 2002 and 2006.
- Oregon results from the U.S. Fish and Wildlife Service National Survey of Fishing, Hunting and Wildlife Associated Recreation from 2006.
- Oregon Department of Fish and Wildlife hunter harvest surveys from 2003 and 2007.
- National Survey on Recreation and the Environment from 1999 to 2005.
- U.S. National Park Service expenditure profiles.
- Outdoor Industry Foundation surveys from 2005.
- Oregon State Parks visitor data from 2002 to 2007.

No two data sources provide exactly the same measures, so there is the inevitable issue of comparing “apples and oranges.” Nonetheless, the ground truthing results corroborate NVUM data as being reasonably accurate measures of visitation and expenditure.

3. Impact Calculation

Visitor expenditure was “run” through the IMPLAN input-output model to estimate “multiplier effects.” The initial expenditure represents the “direct effect” on output. In order to provide the goods and services purchased by visitors, local businesses buy inputs from other businesses, and they pay wages and profits to individuals/households. Input purchases generate “indirect effects,” while spending of wages and profits generates “induced effects.” Input purchases and individual spending that occur outside the study region represent “leakages” that limit multiplier effects.

Tables 3.1 and 3.2 show the economic impacts of WWNF quiet recreation in the study area. The IMPLAN model was estimated in disaggregated form with all 509 IMPLAN sectors, but results are grouped into broad categories based on the 2-digit NAICS classification.

As indicated in Table 2.2 above, visitors in the Inclusive, All Visitor grouping spend \$15 million per year (2003 dollars). However, most of the spending in retail sectors is immediately “lost” to the local economy, as it is used to purchase products typically made elsewhere. On the other hand, the spending has a multiplier effect, and the figures in Tables 3.1 and 3.2 are for total impacts (direct, indirect, and induced). It is through this multiplier process that initial spending in a narrow range of sectors (hotel, restaurants, retail, etc.) generates impacts throughout the economy. For example, expenditure in the Inclusive, All Visitor grouping generates 101 jobs in the accommodation and food services sector, but it also generates 7 jobs in the manufacturing sector.

In total, visitor spending in the Inclusive, All Visitor model generate \$18.8 million in output and \$5.4 million in labor income. This income is associated with 252 jobs. The impact on income always will be lower than the impact on sales, but it is income and jobs that are most important. The figures for output and income should not be added together. The change in output due to visitor spending creates the income, but they are distinct impacts.

Equivalent results for the Inclusive, No Locals model are shown in the three columns on the right of Table 3.1, while equivalent results for the Restrictive, All Visitors and Restrictive, No Locals models are shown in Table 3.2. Summary results are shown in Table 3.3 and Figures 3.1 and 3.2

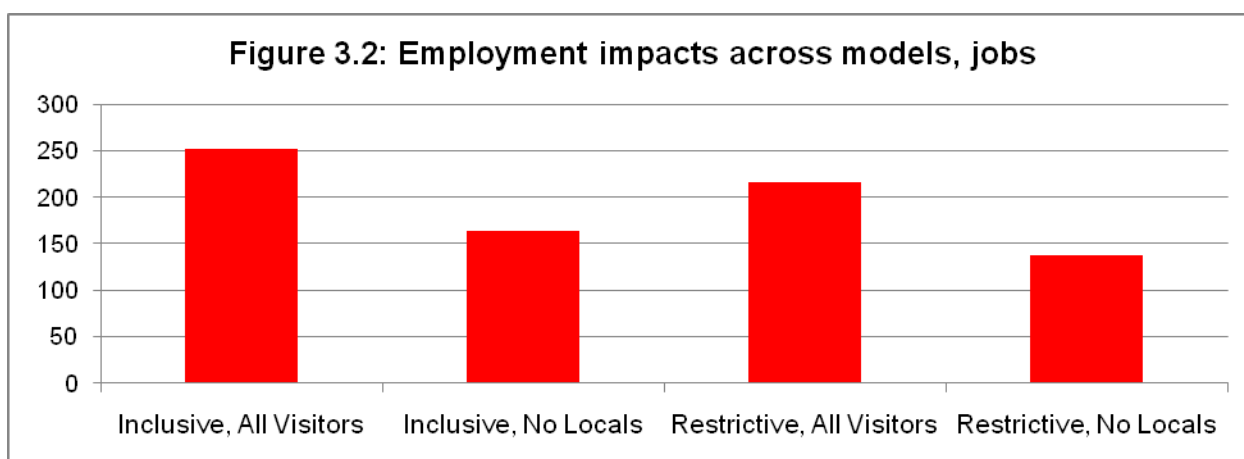
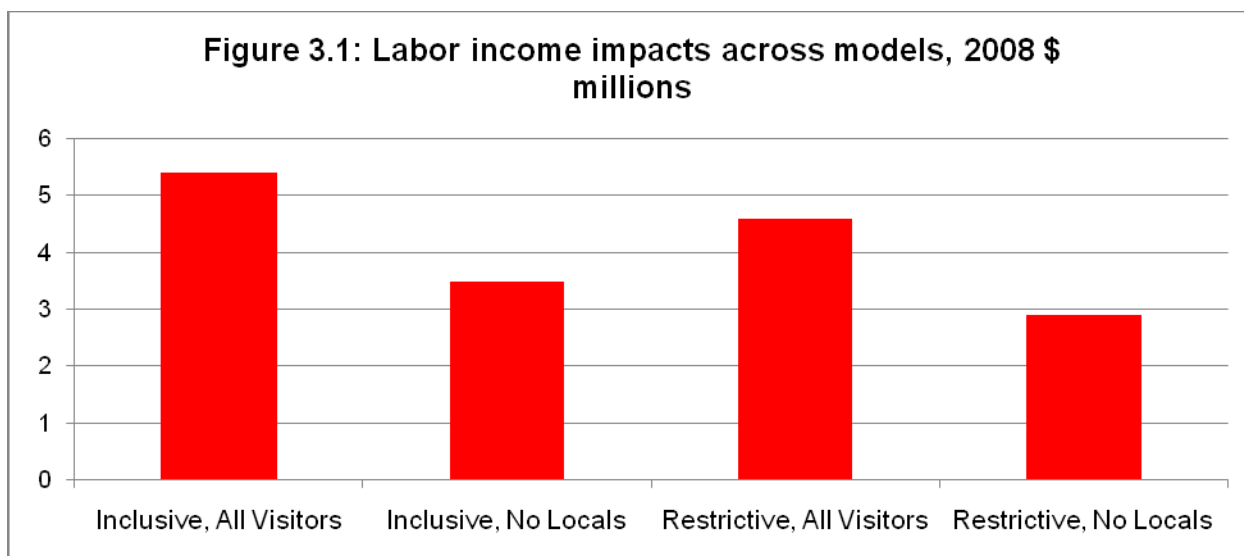
Figures in the Inclusive, All Visitors model inevitably will be the highest, as they reflect the widest range of activities and inclusion of both local and non-local visitors.

Table 3.1: Total annual impacts, Inclusive models in thousands of 2008 dollars (employment in jobs)							
	Inclusive, All Visitors				Inclusive, No Locals		
	Output	Labor income	Employ- ment		Output	Labor income	Employ- ment
11 Ag, Forestry, Fish & Hunting	360	76	6		221	46	3.8
21 Mining	1,217	93	3.3		630	48	1.7
22 Utilities	194	40	0.4		129	27	0.2
23 Construction	103	36	0.9		72	25	0.7
31-33 Manufacturing	1,585	227	7.1		866	123	3.8
42 Wholesale Trade	1,521	572	13.2		804	302	7
44-45 Retail trade	829	385	6.3		548	266	4.3
48-49 Transportation, warehouse	2,287	838	43.7		1,220	450	22.9
51 Information	365	78	2.3		235	50	1.5
52 Finance & insurance	291	75	2.1		187	48	1.4
53 Real estate & rental	375	74	3.9		248	50	2.6
54 Professional, tech services	309	124	3.6		197	79	2.3
55 Management of companies	43	13	0.3		25	8	0.2
56 Administrative & waste services	235	108	5.2		150	69	3.3
61 Educational services	21	7	0.7		13	4	0.4
62 Health & social services	433	220	6.1		280	142	3.9
71 Arts, entertainment	1,233	320	31.7		827	215	21.2
72 Accommodation & food services	5,196	1,548	101		3,817	1,134	73.6
81 Other services	181	67	3.4		120	45	2.3
92 Government & non NAICs Institutions	1,102	479	10.6		758	346	7.3
	886	0	0		635	0	0
Total	18,767	5,380	252		11,983	3,477	164

Table 3.2: Total annual impacts, Restrictive models in thousands of 2008 dollars (employment in jobs)							
	Restrictive, All Visitors			Restrictive, No Locals			
	Output	Labor income	Employ- ment	Output	Labor income	Employ- ment	
11 Ag, Forestry, Fish & Hunting	306	65	5.1	181	38	3.1	
21 Mining	1,098	84	2.9	558	43	1.5	
22 Utilities	166	34	0.3	108	22	0.2	
23 Construction	88	30	0.8	60	21	0.5	
31-33 Manufacturing	1,415	203	6.4	748	107	3.3	
42 Wholesale Trade	1,369	515	11.9	705	266	6.1	
44-45 Retail trade	720	332	5.5	462	223	3.6	
48-49 Transportation, warehouse	2,054	751	39.4	1,058	390	19.9	
51 Information	309	66	2	195	41	1.2	
52 Finance & insurance	248	63	1.8	155	40	1.1	
53 Real estate & rental	300	56	2.8	192	36	1.8	
54 Professional, tech services	257	104	3	160	65	1.8	
55 Management of companies	38	12	0.3	22	7	0.2	
56 Administrative & waste services	202	93	4.5	127	58	2.8	
61 Educational services	16	5	0.5	9	3	0.3	
62 Health & social services	369	187	5.2	233	118	3.3	
71 Arts, entertainment	1,026	266	26.4	658	171	16.9	
72 Accommodation & food services	4,393	1,309	85.4	3,217	956	62	
81 Other services	143	54	2.8	91	35	1.8	
92 Government & non NAICs Institutions	876	355	8.5	590	253	5.8	
	759	0	0	534	0	0	
Total	16,151	4,586	216	10,064	2,891	137	

Table 3.3 summarizes the results in table format, while Figures 3.1 and 3.2 present results visually. Which results should be used? Four models were estimated in this report to help readers “compare apples and apples.” If the comparison is with other analyses that include expenditure by local residents, then the figures from the All Visitors models should be used. Likewise, if one takes a conservative view of which activities should be considered “quiet,” figures from the Restrictive models should be used.

Table 3.3: Impact summary by model		
	Labor Income (\$ thousands)	Employment (jobs)
Inclusive, All Visitors	5,380	252
Inclusive, No Locals	3,477	164
Restrictive, All Visitors	4,586	216
Restrictive, No Locals	2,891	137



Total labor income for the study region was approximately \$2.5 billion in 2006. In that respect, recreation on the WWNF, and WWNF policy affecting recreation access, has relatively little impact on the overall regional economy. Nonetheless, quiet recreation does generate substantial income and employment, and these impacts can be especially important for “gateway communities” such as Enterprise and Joseph.

4. Summary

In the context of the overall regional economy, the economic impact of quiet recreation – and recreation generally – on the WWNF is modest. However, quiet recreation in particular represents the majority of recreation visits on the WWNF (see Appendix A). Despite variation in expenditure across activities, quiet recreation also represents the majority of recreation’s economic impact on the WWNF.

Depending on the activities and visitors included, notably whether local visitors are included, quiet recreation on the WWNF contributes between \$2.9 and \$5.4 million in labor income. This represents between 137 and 252 jobs. Decisions in the Travel Management process are affected by considerations beyond simply economic impacts, but these figures are reminders that quiet

recreation makes a significant contribution to the region surrounding the Wallowa-Whitman National Forest.

Appendix A: Details on Expenditure Calculation

This appendix describes the data foundation for visitor numbers and expenditure. Visitor numbers are based on NVUM data for the WWNF in particular. These data have been updated by the Forest Service, and they differ from that presented in the original 2004 NVUM report for the WWNF.

Based on the update, the forest has 484,258 visits per year. Each respondent in the NVUM survey reported the activities they participated in as well as the “main activity” of their visit. Responses to the main activity were used to estimate the proportion of overall forest visits (484,258) allocated to each of the 26 activities listed in the NVUM survey. The list included “catch all” activities, such as “Other Non-motorized” and “Other Motorized.”

Just over 20% of respondents did not report a main activity. The Forest Service TMECA application for the WWNF treated these respondents as “Other activity.” The present analysis allocates these respondents to each of the 26 activities, proportional to participation by other respondents. In essence, participation in all other activities was “scaled up” to total 100%. Simultaneously, it was “scaled down” to account for respondents who selected more than one main activity. These scaling processes do not affect relative proportions of motorized and non-motorized activity participation.

Participation across activities is shown in Table A1.

Table A1: Participation across activities, NVUM survey results			
Activity	% Participating	% as main activity	
		Original	After scaling
Developed Camping	8.18	2.66	3.07
Primitive Camping	11.1	0.56	0.65
Backpacking	8.81	3.48	4.01
Resort Use	5.39	1.03	1.19
Picnicking	15.14	3.05	3.52
Viewing Natural Features	51.3	10.37	11.95
Visiting Historic Sites	10.37	2.04	2.35
Nature Center Activities	9.94	0.66	0.76
Nature Study	6.6	1.74	2.01
Relaxing	35.57	6.04	6.96
Fishing	12.43	5.93	6.83
Hunting	22.28	17.89	20.62
OHV Use	7.71	0.64	0.74
Driving for Pleasure	29.39	3.05	3.52
Snowmobiling	3.63	3.2	3.69
Motorized Water Activities	3.53	0.42	0.48
Other Motorized Activity	0.9	0.8	0.92
Hiking / Walking	36.71	10.74	12.38
Horseback Riding	1.73	0.36	0.41
Bicycling	1.41	0.24	0.28

Non-motorized Water	1.74	0.47	0.54
Downhill Skiing	2.14	1.84	2.12
Cross-country Skiing	2.74	2.12	2.44
Other Non-motorized	4.04	0.67	0.77
Gathering Forest Products	9.4	2.67	3.08
Viewing Wildlife	50.45	4.09	4.71
No Activity Reported	20.39	20.76	
Total	373.02	107.52	100.00

Of these activities, some clearly were “quiet” (e.g., hiking/walking) and some clearly were not (e.g., OHV use). Other activities less clearly fit into one category or the other. This uncertainty was addressed in two ways.

First, three activities accounted for 10% or more of all visitors, by main activity:

- Hunting
- Hiking / Walking
- Viewing Natural Features

All (100%) hiking/walking visits were allocated to the quiet category. Some hunters use ATVs for game removal and other purposes. Of the WWNF NVUM respondents reporting hunting as their main activity, 17% reported they also engaged in OHV use. In the 2002 statewide SCORP survey, hunters were asked if they used an ATV while hunting. Table A2 presents the percentage of respondents, by type of hunting, who used an ATV during at least one hunting occasion. These are for respondents reporting that most of the hunting trips occurred in Region 10 (Baker, Grant, Union, or Wallowa counties).

Type of hunting	Percent who used an ATV
Big game, rifle	30%
Big game, bow	20%
Waterfowl	0%
Upland bird or small game	14%

Based on these WWNF NVUM and SCORP results, 25% of hunting on the WWNF was treated as motorized and 75% was allocated to quiet recreation.

WWNF NVUM data indicate that 8% of the visitors whose main activity is “viewing natural features” also engage in one or more of the following during their visit: OHV use, snowmobiling, motorized water activities, other motorized activities, or primitive camping. Therefore, 8% of the viewing natural features visits were treated as motorized and 92% allocated to quiet recreation.

The remaining activities were treated as “definitely quiet recreation,” “possibly quiet recreation,” or “other recreation.” The “definite” activities were:

- Hunting (75%)
- Hiking / Walking
- Viewing Natural Features (92%)
- Fishing
- Backpacking

- Picnicking
- Other Non-motorized
- Non-motorized Water
- Horseback Riding
- Bicycling

The “possible” activities were:

- Viewing Wildlife
- Developed Camping
- Nature Study
- Resort Use

The Restrictive models only include participants from the “definite” list. The Inclusive models include participants from both the “definite” and the “possible” lists.

Note that the focus was on summer recreation. Therefore, cross-country skiing was not included, even though it is a form of quiet recreation.

The above participation percentages were applied to the NVUM estimate of annual visits in order to estimate visits per activity. Visits for each activity were separated into trip type segment shares based on national distributions reported in Stynes and White,⁴ Table A-1. For example, of the 33,099 fishing visits, 11% were allocated to non-local day visits, 24% to non-local overnight, 50% to local day, 11% to local overnight, and 4% to non-primary. These visits were then converted to “party trips” by dividing visits by average party size for the given activity and trip type (Table A-2 in Stynes and White).

Party trips by activity and trip type segment were then entered into IMPLAN using the appropriate expenditure bridge (see Appendix B). Expenditure by activity and trip type segment is based on the expenditure tables in Stynes and White. The Wallowa-Whitman National Forest is classified as a high spending forest.

⁴ Daniel J. Stynes and Eric M. White, 2006, “Spending Profiles for National Forest Recreation Visitors by Activity.”

Appendix B: Impact Model Steps and Assumptions

The following steps were followed in creating the IMPLAN models and estimating impacts.

1. A study region was created with the following Oregon counties: Baker, Grant, Umatilla, Union, and Wallowa. Study area data are from 2006.
2. IMPLAN default values were used, except in the case of the regional purchase coefficient (RPC) for Sector 479 Hotels and Motels. This was changed from .79 to .20 to follow the TMECA approach. In practice, the change has very little effect on impact estimates.
3. Type SAM multipliers were created. These multipliers treat households as endogenous and thus include induced effects.
4. An impact scenario was created for each model (e.g., Inclusive, All Visitors). TMECA bridges were used to allocate expenditure from NVUM profiles (eight expenditure categories) across the relevant sectors within the 509-sector IMPLAN structure. These bridges varied across activity grouping and trip type segment.

The TMECA bridges allocate 100% of spending, including all margins, to the local area. In the case of margined (retail) sectors, this assumes that all transport and wholesale trade is locally provided. This assumption will lead to some over-estimation of impacts, especially in rural areas.

5. Impact estimates were generated and reported. NVUM expenditure data are in 2003 dollars, which were adjusted in IMPLAN to 2006 dollars to match the model data file. Impact results are shown in 2008 dollars using the IMPLAN deflators to further convert from 2006 to 2008.

Input-output analysis assumptions

IMPLAN is based on input-output (IO) analysis and is widely used to estimate the economic impacts of recreation, tourism, and other activities. The IO approach involves several assumptions. These assumptions generally are not met in their entirety, but IO (and IMPLAN in particular) provides a good balance between practicality and accuracy. That is particularly true in cases, such as the present, in which the impact being evaluated is a small proportion of the overall study area economy. In such cases, non-linearities can be reasonably approximated with the linear relationships inherent in IO.

IO assumptions include the following.

1. All businesses within each sector produce a single, homogeneous product or service; the input procedures used in the production process are identical. That is, the economy should be disaggregated so that each sector is producing the same good.
2. An increase of production will lead to purchase of inputs in the proportions shown in the technical coefficients matrix. In technical terms, the production function is linear and homogeneous. This assumption restricts economies of scale; IO analysis assumes a business always will use the same proportion of inputs regardless of how much it grows.
3. When households are included in the analysis (as is done for this analysis), their spending patterns (consumption functions) also are assumed to be linear and homogeneous.

4. The structure of the economy will not change. Many input-output models, including the one used here, are static in nature. They are based on data from a single year (in this case 2006) and yet are used to estimate impacts in other years. Dramatic structural changes in the economy (in this case between 2006 and 2008) would invalidate this assumption.
5. When IO is used to estimate the effect of changes in final demand (as in the present case), there must be unemployed resources available to be brought into the sector as inputs.

About the Authors

Kreg Lindberg is the principal author of this report. John Loomis is the contributing author. Lindberg and Loomis have 50 years experience in the field of outdoor recreation and tourism, including extensive work in economic valuation and impact.

Lindberg and Loomis have published multiple articles in leading academic/research journals, including *Journal of Leisure Research*, *Leisure Sciences*, *Forest Science*, and *Tourism Economics*. Loomis has published three texts in this field, including *Recreation Economic Decisions*, *Integrated Public Lands Management*, and *Environmental Policy Analysis for Decision Making*.

Lindberg has a Ph.D. in forestry from Oregon State University, with a minor in economics. Loomis has a Ph.D. in economics from Colorado State University, with a field specialization in natural resource economics. Both are university professors teaching in the fields of recreation, economics, and research methods – Lindberg in the Department of Forest Ecosystems and Society at Oregon State University, Loomis in the Department of Agricultural and Resource Economics at Colorado State University.