



Impacts of Visitor Spending on the Local Economy

Lassen Volcanic National Park, 2012

Natural Resource Report NPS/NRSS/EQD/NRR—2014/847



ON THE COVER

Visitors at Lassen Volcanic National Park
Photo by Park Studies Unit staff

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August 2014

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

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Please cite this publication as:

Cook, P. S. 2014. Impacts of visitor spending on the local economy: Lassen Volcanic National Park, 2012. Natural Resource Report NPS/NRSS/EQD/NRR—2014/847. National Park Service, Fort Collins, Colorado.

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Executive Summary

Lassen Volcanic National Park hosted 407,653 recreation visits in 2012. Adjustments for visitor group size and re-entries resulted in 106,559 visitor group trips to the park in 2012. Based on two Visitor Services Project surveys conducted August 3–9, 2012 and January 17–February 24, 2013, 48% of these visitor group trips were local residents or non-locals on day trips, not including an overnight stay within 75 miles of the park. Twenty-one percent of visitor group trips involved an overnight stay in hotels, motels, cabins, B&Bs, etc. outside the park but in the local area.¹

Visitors reported their group's expenditures in the park and within 75 miles of the park. The average visitor group size was 3.2 people and spent an average of \$169 in the park and within 75 miles of the park. Nineteen percent of the spending took place inside the park.

Total visitor spending in 2012 in the park and within 75 miles of the park was \$17.2 million. The greatest proportions of expenditures were for overnight accommodations (35%). Overnight visitors staying in a lodge, hotel, motel, cabin, B&B, etc. outside the park but within 75 miles of the park accounted for 56% of total spending.

Seventy-four percent of visitor groups indicated the visit to the park was the primary reason for their trip to the area. Counting only a portion of visitor expenses if visiting the park was not the primary reason for the trip yields \$14.2 million in spending attributed directly to the park.

The economic impact of park visitor spending was estimated by applying the spending to an input-output model of the local economy. The local region was defined as Shasta, Lassen, Plumas, Butte, and Tehama counties in California, which roughly coincides with the 75-mile radius from the park for which expenditures were reported.

Including direct and secondary effects, the \$14.2 million in visitor spending attributed to the park generated \$16.6 million in direct sales in the region, which supported 195 jobs. These jobs paid \$5.4 million in labor income, which was part of \$9.1 million in value added to the region.²

A separate study estimated impacts of park employee payroll on the local economy in FY 2010, and the results are reported herein.³ The park itself employed 84 people in FY 2010 with a total payroll including benefits of \$5.5 million. Including secondary effects, the local impacts of park payroll in FY 2010 were \$2.7 million in sales, supporting 109 jobs, \$6.3 million in labor income, and \$7.1 million in value added.

Local Economic Impacts of Lassen Volcanic National Park

	<u>Sales</u>	<u>Jobs</u>	<u>Labor Income</u>	<u>Value Added</u>
Park Visitor Spending	\$16.6M	195	\$5.4M	\$9.1M
<u>Park Payroll</u>	<u>+ \$2.7M</u>	<u>+109</u>	<u>+ \$6.3M</u>	<u>+ \$7.1M</u>
Park Visitor Spending + Payroll	\$19.3M	304	\$11.7M	\$16.2M

¹ Results in this study sometimes differ from those reported in the VSP study reports (Begly et al. 2013, Manni and Le 2013) for two reasons. First, the results in this report adjust for seasonal differences in visitor group trip characteristics and combine data from the two VSP surveys. Second, the current analysis excludes some cases as outliers. See Study Limitations and Errors section and Appendix D.

² Jobs include fulltime and part-time jobs. Labor income consists of wages and salaries, payroll benefits and income of sole proprietors. Value added includes labor income as well as property income (dividend, royalties, interest and rents) to area businesses and indirect business taxes (sales, property, and excise taxes).

³ Stynes (2011).

Introduction

Lassen Volcanic National Park (NP) encompasses Lassen Peak—a large plug dome volcano and the southern-most volcano in the Cascade Range—and protects the hydrothermal features of the area. The 166 square miles of park is located in Shasta, Lassen, Plumas, and Tehama counties, California. Lassen Volcanic NP received 407,653 recreation visits in 2012 including 85,989 overnight stays (Table 1).

Table 1. Recreation visits and overnight stays, Lassen Volcanic NP, 2012

Month	Recreation visits	Overnight stays			Total
		Lodging	Developed camping*	Back country camping	
January	6,702	0	66	77	143
February	5,970	0	117	269	386
March	1,758	0	30	64	94
April	9,867	0	60	44	104
May	28,548	0	1,557	67	1,624
June	56,793	808	12,937	485	14,230
July	98,098	1,340	31,478	1,640	34,458
August	91,293	1,290	14,568	971	16,829
September	59,874	932	13,306	468	14,706
October	35,415	237	2,976	29	3,242
November	6,531	0	75	49	124
<u>December</u>	<u>6,804</u>	<u>0</u>	<u>39</u>	<u>10</u>	<u>49</u>
Total	407,653	4,607	77,209	4,173	85,989

*Includes group campers.

Source: NPS Public Use Statistics 2012.

The purpose of this study is to estimate the annual, local economic impacts of visitors to Lassen Volcanic NP in 2012. Economic impacts were measured as the direct and secondary sales, income, and jobs in the local region resulting from spending by park visitors. (See Appendix A: Glossary for definitions of terms.) In addition, a separate study estimated the impacts of the NPS park payroll on the local region (Stynes 2011), and those results are reported herein. Neither study estimated the economic impacts of park operations or construction spending on the local region.

The local economic region defined for this study included Shasta, Lassen, Plumas, Butte, and Tehama counties in California. This three-county region had a population of 515,548 (USCB 2012), gross regional product of \$15.1 billion (MIG, Inc. 2008), median household income of \$43,830, and family poverty rate of 12.7% (USCB 2012). State and local governments including education were the major employers in the region (MIG, Inc. 2008), and the region experienced a 13.0% unemployment rate in 2012 (BLS 2012).

Methods

The economic impact estimates were produced using the Money Generation Model 2 (MGM2) (Stynes et al. 2007). The three main inputs to the model were:

1. number of visits broken down by lodging-based segment;
2. spending averages for each segment; and
3. economic multipliers for the local region.

Inputs were estimated from Lassen Volcanic NP Visitor Services Project (VSP) survey data (Begly et al. 2013, Manni and Le 2013), National Park Service Visitor Use Statistics (2012), and Impact Analysis for Planning (IMPLAN) input-output modeling software (MIG, Inc. 2008). The MGM2 model provides a spreadsheet template for combining park use, spending, and regional multipliers to compute changes in sales, labor income, jobs, and value added in the region.

The VSP visitor surveys were conducted at Lassen Volcanic NP from August 3–9, 2012 and January 17–February 24, 2013.⁴ The VSP survey measured visitor demographics, activities, and travel expenditures. Questionnaires were distributed to a systematic, random sample of 645 visitor groups in summer 2012 and 399 visitor groups in winter 2013. Response rates were 68.4% and 73.2%, respectively.

Spending and economic impact estimates for Lassen Volcanic NP are based on the summer 2012 and winter 2013 VSP survey data. Spending averages for summer visitor groups were estimated using the summer 2012 VSP survey data and applied to visitor groups between May and October. Winter visitor group spending averages were estimated using the winter 2013 VSP survey data and assumed to represent visitor groups from November through April. Although winter visitor spending data were collected in January and February 2013, spending averages and patterns are assumed to apply to winter visitors in 2012.

Visitors were asked to report expenditures in the park and within 75 miles of the park. The local region for determining economic impact was defined as a five-county area around the park including Shasta, Lassen, Plumas, Butte, and Tehama counties in California, which roughly coincides with the 75-mile radius for which visitor spending was reported.

The MGM2 model divides visitors into segments to help explain differences in spending across distinct user groups. Seven segments were established for Lassen Volcanic NP visitors based on reported trip characteristics and lodging expenditures:

Local: Visitors who were residents of the local region, i.e., lived within 75 miles of the park.

Day trip: Visitors from outside the local region who did not stay overnight in the local region.

⁴ Results in this study sometimes differ from those reported in the VSP study reports (Begly et al. 2013, Manni and Le 2013) for two reasons. First, the results in this report adjust for seasonal differences in visitor group trip characteristics and combine data from the two VSP surveys. Second, the current analysis excludes some cases as outliers. See Study Limitations and Errors section and Appendix D.

Motel-in: Visitors who reported motel expenses within the park.⁵

Camp-in: Visitors who reported camping expenses within the park.

Motel-out: Visitors who reported motel expenses outside the park, but within the local region.

Camp-out: Visitors who reported camping expenses outside the park, but within the local region.

Other overnight (Other OVN): Non-local visitors who stayed overnight in the local region, but did not report any lodging expenses. This segment included visitors who stayed in private homes, with friends or relatives, or in other unpaid lodging.⁶

The VSP survey data were used to estimate the percentage of visitors from each segment as well as spending averages, lengths of stay, and visitor group sizes for each segment. Segment shares from the VSP survey were adjusted to be consistent with the park's NPS Visitor Use Statistics (2012) overnight stay figures.

⁵ The questionnaire asked about expenditures for "Lodge, hotel, motel, cabins B&B, etc." For convenience, these expenditures are referred to as "motel" in this report.

⁶ Visitors reporting multiple lodging types and expenditures were classified based on the greatest reported lodging expense. Some visitors listing motels or campgrounds as lodging types did not report any lodging expenses and were classified in the other overnight (Other OVN) category.

Results

Visits

Based on VSP survey data, 37% of park entries were classified as day visits either by residents or by visitors from outside the local region (Table 2). The remaining 63% were classified as overnight visits including an overnight stay in the local region. The average visitor group size ranged from 2.7 to 3.7 people across the seven segments with an average visitor group of 3.2 people.⁷ The average length of stay in the local region on overnight trips was 2.8 nights. Seventy-four percent of visitor groups indicated that visiting the park was the primary reason for their trip to the area.

Table 2. Selected visit/trip characteristics by segment, 2012

Characteristic	Segment							All visitors
	Local	Day trip	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN	
Visitor segment share (park entries)	13%	24%	1%	12%	24%	8%	17%	100%
Average visitor group size	2.7	3.1	3.7	3.5	3.1	3.2	3.3	3.2
Length of stay (days or nights)	1.0	1.0	2.6	2.8	2.1	3.6	3.2	2.8
Re-entry rate (park entries per trip)	1.0	1.1	1.4	1.4	1.4	1.4	1.4	1.3
Percent primary purpose trips	100%	61%	88%	84%	72%	69%	64%	74%

The 407,653 recreation visits in 2012 were allocated to the seven segments using the visit segment shares in Table 2. Because spending was reported for the stay in the area, recreation visits were converted to visitor group trips to the area by dividing recreation visits by the average number of times each visitor entered the park during their stay and the average visitor group size. The 407,653 recreation visits represented 106,559 visitor group trips (Table 3).

Table 3. Recreation visits and visitor group trips by segment, 2012

Measure	Segment							All visitors
	Local	Day trip	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN	
Recreation visits	54,751	98,904	3,700	48,479	98,150	33,490	70,179	407,653
Visitor group trips	19,714	30,515	734	9,925	22,574	7,449	15,648	106,559
Percent of visitor group trips*	19%	29%	1%	9%	21%	7%	15%	100%

*Segment percentages do not sum to 100% due to rounding.

⁷ Visitor group size reported herein is based on the number of people covered by expenditures reported in the VSP survey.

Visitor Spending

The VSP survey collected data about expenditures of visitor groups inside the park and within 75 miles of the park.⁸ Spending averages were computed on a visitor group trip basis for each segment. The average visitor group spent \$169 on the trip, including expenditures inside the park and within 75 miles of the park (Table 4). On a visitor group trip basis, average spending was \$39 for day trips by local residents and \$46 for day trips by non-local visitors. Visitor groups staying in motels in the park spent an average of \$325 on their trips, while those staying in motels outside the park spent \$430. Those camping inside the park spent an average of \$232 on their trips, while those camping outside the park spent \$269. Visitor groups spent about 19% of their total spending inside the park and 81% of their total spending outside the park.

Table 4. Average spending by segment (dollars per visitor group per trip)

Expenditures	Segment							All visitors*
	Local	Day trip	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN	
<u>Inside Park</u>								
Motel	0.00	0.00	218.42	0.00	2.02	0.00	0.00	2.15
Camping fees	0.00	0.00	2.25	47.20	2.09	7.02	0.00	5.87
Restaurants & bars	4.85	5.27	5.83	6.33	5.62	5.15	2.71	4.99
Groceries & takeout food	2.00	2.04	11.25	14.38	3.38	3.94	0.88	3.64
Gas & oil	1.18	2.78	7.08	13.04	2.03	2.54	1.38	3.19
Local transportation	0.00	0.00	0.00	2.55	0.00	0.00	0.00	0.26
Admission & fees	3.50	4.11	7.29	10.00	4.53	6.96	2.43	4.70
<u>Souvenirs & other expenses</u>	<u>3.08</u>	<u>5.30</u>	<u>12.08</u>	<u>11.76</u>	<u>12.73</u>	<u>14.16</u>	<u>3.69</u>	<u>7.74</u>
Total Inside Park	14.62	19.50	264.21	105.26	32.40	39.76	11.09	32.53
<u>Outside Park</u>								
Motel	0.00	0.00	22.08	0.00	206.97	0.00	0.00	45.52
Camping fees	0.00	0.00	0.00	0.52	0.16	84.40	0.00	7.02
Restaurants & bars	4.83	5.05	11.88	11.43	68.48	10.45	7.71	20.46
Groceries & takeout food	1.98	3.55	6.88	41.01	28.83	44.63	9.90	17.01
Gas & oil	8.70	17.15	13.33	46.94	61.48	60.47	16.77	31.92
Local transportation	0.81	0.08	0.00	16.27	12.01	0.59	0.57	4.59
Admission & fees	0.44	0.33	3.33	4.05	12.82	13.46	1.33	4.72
<u>Souvenirs & other expenses</u>	<u>7.93</u>	<u>0.81</u>	<u>3.67</u>	<u>6.74</u>	<u>6.49</u>	<u>15.50</u>	<u>0.33</u>	<u>5.03</u>
Total Outside Park	24.69	26.97	61.17	126.95	397.26	229.50	36.61	136.28
Total Inside & Outside Park	39.31	46.46	325.37	232.21	429.65	269.26	47.70	168.81

*Weighted by percent visitor group trips.

⁸ Some expenditure categories in the VSP questionnaire were combined for reporting herein and MGM2 analysis. See Appendix B.

The relative standard error at a 95% confidence level for the overall spending average was 11%. A 95% confidence interval for the overall visitor group spending average was therefore \$169 plus or minus \$18 or between \$151 and \$187.

On a per night basis, visitor groups staying in motels in the park spent \$127 in the local region, while visitor groups staying in motels outside the park spent \$204 per night (Table 5). The average reported per-night lodging expense was \$94 for motels inside the park and \$100 for motels outside the park.

Table 5. Average spending per night for visitor groups on overnight trips (dollars per visitor group per night)

Expenditures	Segment				
	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN
Motel	93.53	0.00	99.55	0.00	0.00
Camping fees	0.88	16.82	1.07	25.41	0.00
Restaurants & bars	6.89	6.26	35.30	4.34	3.25
Groceries & takeout food	7.05	19.52	15.34	13.50	3.36
Gas & oil	7.94	21.14	30.25	17.51	5.66
Local transportation	0.00	6.63	5.72	0.16	0.18
Admission & fees	4.13	4.95	8.26	5.67	1.17
<u>Souvenirs & other expenses</u>	<u>6.13</u>	<u>6.52</u>	<u>9.15</u>	<u>8.25</u>	<u>1.25</u>
Total per visitor group per night	126.53	81.85	204.65	74.85	14.88

Total spending was estimated by multiplying the number of visitor group trips for each segment by the average spending per trip and summing across segments. Lassen Volcanic NP visitors spent a total of \$17.2 million in the local region in 2012 (Table 6). Visitors who stayed in motels outside the park accounted for 56% of the total spending. Motel expenses represented 28% of total spending (Figure 1).

Table 6. Total visitor spending by segment, 2012 (thousands of dollars)

Expenditures	Segment							All visitors
	Local	Day trip	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN	
Inside Park								
Motel	0	0	160	0	46	0	0	206
Camping fees	0	0	2	468	47	52	0	570
Restaurants & bars	96	161	4	63	127	38	42	531
Groceries & takeout food	39	62	8	143	76	29	14	372
Gas & oil	23	85	5	129	46	19	22	329
Local transportation	0	0	0	25	0	0	0	25
Admission & fees	69	125	5	99	102	52	38	491
<u>Souvenirs & other expenses</u>	<u>61</u>	<u>162</u>	<u>9</u>	<u>117</u>	<u>287</u>	<u>105</u>	<u>58</u>	<u>799</u>
Total Inside Park	288	595	194	1,045	731	296	174	3,323
Outside Park								
Motel	0	0	16	0	4,672	0	0	4,688
Camping fees	0	0	0	5	4	629	0	637
Restaurants & bars	95	154	9	113	1,546	78	121	2,116
Groceries & takeout food	39	108	5	407	651	332	155	1,698
Gas & oil	171	523	10	466	1,388	450	262	3,271
Local transportation	16	2	0	162	271	4	9	464
Admission & fees	9	10	2	40	290	100	21	472
<u>Souvenirs & other expenses</u>	<u>156</u>	<u>25</u>	<u>3</u>	<u>67</u>	<u>146</u>	<u>115</u>	<u>5</u>	<u>518</u>
Total Outside Park	487	823	45	1,260	8,968	1,709	573	13,864
Total Inside & Outside Park	775	1,418	239	2,305	9,699	2,006	746	17,187
Segment Percent of Total	5%	8%	1%	13%	56%	12%	4%	100%

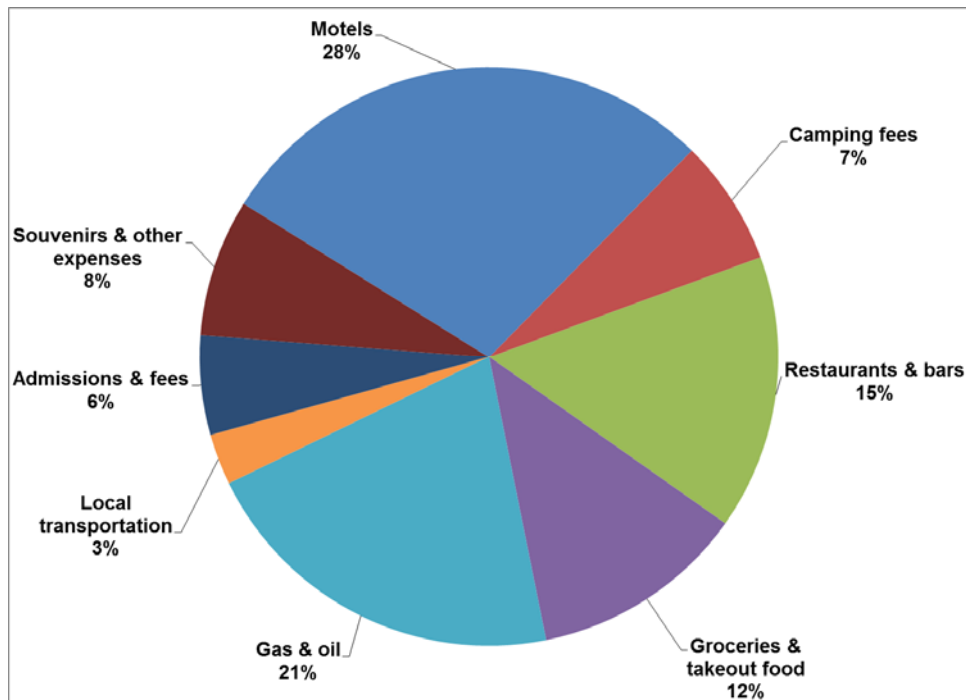


Figure 1. Lassen Volcanic NP visitor spending by category

Because visitors would come to the region whether or not the park existed, not all visitor spending can be attributed to the park. Twenty-six percent of visitor groups did not make the trip primarily to visit Lassen Volcanic NP. Spending directly attributed to park visits was estimated by counting all spending on trips for which the park was the primary reason for the trip. If the park was not the primary trip purpose, one night of spending was counted for overnight trips and half of the spending in the region was counted for day trips. With these assumptions, a total of \$14.2 million in visitor spending was attributed to the park visit (Table 7). This represented 83% of the overall visitor spending total.

Table 7. Total spending attributed to park visits, 2012 (thousands of dollars)

Expenditures	Segment							All visitors
	Local	Day trip	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN	
Motel	0	0	175	0	4,027	0	0	4,202
Camping fees	0	0	2	473	50	538	0	1,063
Restaurants & bars	96	285	12	165	1,444	99	133	2,233
Groceries & takeout food	39	149	13	508	631	286	130	1,758
Gas & oil	0	421	9	419	1,183	348	197	2,577
Local transportation	0	2	0	170	231	3	7	414
Admission & fees	69	133	8	135	349	129	54	877
<u>Souvenirs & other expenses</u>	<u>61</u>	<u>182</u>	<u>11</u>	<u>177</u>	<u>412</u>	<u>195</u>	<u>62</u>	<u>1,099</u>
Total Attributed to Park	265	1,172	230	2,048	8,327	1,599	582	14,223
Percent of Spending Attributed to the Park	34%	83%	96%	89%	86%	80%	78%	83%
Percent of Attributed Spending	2%	8%	2%	14%	59%	11%	4%	100%

Economic Impacts of Visitor Spending

The economic impacts of Lassen Volcanic NP visitor spending on the local economy were estimated by applying visitor spending to a set of economic ratios and multipliers in MGM2 representing the economy of the five-county region—Shasta, Lassen, Plumas, Butte, and Tehama counties, California.⁹ Economic ratios and multipliers for the region were estimated using IMPLAN (version 3, MIG, Inc. 2008) with 2008 data.¹⁰ Multipliers were adjusted to 2012 based on price changes between 2010 and 2012 (see Study Limitations and Errors section below).

Not all visitor spending was counted as direct sales to the region. The amount a visitor spends for a retail good is made up of the cost of the good from the producer, a markup by a wholesaler, and a markup by a retailer. In MGM2, retail and wholesale margins for grocery & takeout food, gas & oil, and souvenirs & other expenses were applied to visitor spending to account for mark-ups by retailers and wholesalers. The retail margins for the three sectors were 25.3%, 22.3%, and 50.0%, respectively, and the wholesale margins were 12.3%, 8.3%, and 11.4%. In addition, regional purchase coefficients from IMPLAN for all sectors were used to account for the proportion of demand within the region satisfied by imports into the region.

⁹ Economic ratios convert between various economic measures, e.g., direct spending to the directly associated jobs, labor income, and value added in each sector. Economic multipliers capture the secondary effects of economic measures.

¹⁰ See Appendix C: Economic Ratios and Multipliers for the region.

The tourism output sales multiplier for the region is 1.55. Every dollar of direct sales to visitors generated another \$0.55 in secondary sales through indirect and induced effects.¹¹ (See Appendix A: Glossary for further explanation of terms.)

The economic impacts to the local region are presented in two ways: (1) based on all visitor spending and (2) based only on visitor spending attributable to the park. The first estimate—including all visitor spending—shows the overall contribution park visitors make to the local region. The second estimate—including only visitor spending attributable to the park—shows the impact or contribution the park makes to the economy of the local region.

Impacts of All Visitor Spending

Using all visitor spending and including direct and secondary effects, the \$17.2 million spent by park visitors generated \$19.6 million in sales, which supported 228 jobs in the local region (Table 8). These jobs paid \$6.3 million in labor income, which was part of \$10.7 million in value added to the region.¹²

Table 8. Impacts of all visitor spending on the local economy, 2012

Sector/Expenditure category	Sales (thousands of dollars)	Jobs	Labor Income (thousands of dollars)	Value Added (thousands of dollars)
Direct Effects				
Motels	4,894	64	1,648	2,983
Camping fees	1,207	15	370	604
Restaurants & bars	2,647	51	862	1,280
Groceries & takeout food	963	8	203	358
Gas & oil	490	8	223	317
Local transportation	524	7	226	347
Admission & fees	803	4	252	554
Souvenirs & other expenses	658	12	287	427
Wholesale trade	364	2	136	233
<u>Local production of goods</u>	<u>98</u>	<u>0</u>	<u>14</u>	<u>19</u>
Total Direct Effects	12,647	171	4,222	7,120
<u>Secondary Effects</u>	<u>6,917</u>	<u>57</u>	<u>2,113</u>	<u>3,614</u>
Total Effects	19,564	228	6,336	10,734

Note: Impacts of \$17.2 million in visitor spending reported in Table 6. Totals may not equal sum of individual categories due to rounding.

Value added is the preferred measure of the contribution of visitors to the local economy as it includes all sources of income to the area—payroll benefits to workers, profits and rents to businesses, and sales and other indirect business taxes that accrue to government units. Value

¹¹ Indirect effects result from tourism businesses buying goods and services from local firms, while induced effects stem from household spending of income earned from visitor spending.

¹² Jobs include full and part time jobs. Labor income consists of wages and salaries, payroll benefits and income of sole proprietors. Value added includes labor income as well as profits and rents to area businesses and sales and excise taxes.

added impacts are also comparable to Gross Regional Product, the broadest measure of total economic activity in a region. The largest direct effects are in motels and restaurants & bars.

Impacts of Visitor Spending Attributed to the Park

Using only visitor spending attributable to the park by including only some spending on trips where the primary trip purpose was not to visit Lassen Volcanic NP reduced the overall impacts by about 7% (Table 9; see spending inclusion assumptions in previous section). Including direct and secondary effects, the \$33.7 million spent by park visitors and attributable to the park generated \$43.7 million in sales, which supported 526 jobs in the local region. These jobs paid \$13.9 million in labor income, which was part of \$25.1 million in value added to the region.

Table 9. Economic impacts of visitor spending attributed to the park, 2012

Sector/Expenditure category	Sales (thousands of dollars)	Jobs	Labor Income (thousands of dollars)	Value Added (thousands of dollars)
Direct Effects				
Motels	4,202	55	1,415	2,561
Camping fees	1,063	13	326	532
Restaurants & bars	2,233	43	727	1,080
Groceries & takeout food	877	7	185	326
Gas & oil	414	7	188	268
Local transportation	445	6	192	294
Admission & fees	575	3	180	397
Souvenirs & other expenses	550	10	240	356
Wholesale trade	287	2	107	184
<u>Local production of goods</u>	<u>80</u>	<u>0</u>	<u>12</u>	<u>16</u>
Total Direct Effects	10,725	146	3,574	6,013
<u>Secondary Effects</u>	<u>5,886</u>	<u>49</u>	<u>1,798</u>	<u>3,073</u>
Total Effects	16,612	195	5,372	9,085

Note: Impacts of \$14.2 million in visitor spending attributed to park reported in Table 7. Totals may not equal sum of individual categories due to rounding.

Economic Impacts of the NPS Park Payroll

In addition to visitor spending, spending by park employees also impacts the local region. A separate study (Stynes 2011) estimated the impacts of park payroll in FY 2010 by applying economic multipliers to wage and salary data to capture the induced effects of NPS employee spending on local economies. Lassen Volcanic NP itself employed 84 people in FY 2010 with a total payroll including benefits of \$5.5 million. Including secondary effects, the local impacts of the park payroll in FY 2010 were \$2.7 million in sales, 109 jobs, \$6.3 million in labor income, and \$7.1 million value added (Stynes 2011).

Combined Economic Impacts

The combined impacts to the region of visitor spending attributable to the park and NPS payroll were \$19.3 million in sales, which supported 304 jobs with labor income of \$11.7 million, which was part of a total value added of \$16.2 million.

Study Limitations and Errors

The accuracy of the MGM2 estimates rests on the accuracy of three inputs: visits, spending averages, and multipliers. Visits were taken from NPS Visitor Use Statistics (2012). Recreation visit estimates rely on counting procedures at the park, which may miss some visitors and count others more than once during their visit. Re-entry rates are important to adjust the park visit counts to reflect the number of visitor group trips to the region rather than park entries. Re-entry rates were estimated based on visitor responses to a VSP survey question about the number of times the visitor entered the park.

Spending averages are derived from the summer 2012 and winter 2013 Lassen Volcanic NP VSP visitor surveys (Begly et al. 2013, Manni and Le 2013). Estimates from the surveys are subject to sampling errors, measurement errors, and potential seasonal biases. The overall spending averages are subject to a sampling error of 11%.

Spending averages are also sensitive to decisions about outliers and treatment of missing data. In order to estimate spending averages, incomplete spending data were filled with zeros. Visitor groups of more than 12 people (5 cases in summer sample, 2 cases in winter sample), visiting the local region for more than 14 nights (3 cases in summer sample, 0 cases in winter sample), or spending greater than \$1,146 in the summer sample (16 cases) and \$1,033 in the winter sample (8 cases; the mean for each sample plus two times the standard deviation of the mean for spending) were omitted from the analysis. These are conservative assumptions about outliers and likely result in conservative estimates of economic impacts.

The sample only covers visitors during a single week in August for summer visitors and five weeks in January and February for winter visitors. To extrapolate to annual totals, it was assumed that the summer sample represented visitors from May thru October, and the winter sample represented visitors from November thru April. Visitors in January and February 2013 were assumed to be similar to winter visitors throughout 2012.

Multipliers are derived from an input-output model of the local economy using IMPLAN (MIG, Inc. 2008). The basic assumptions of input-output models are that sectors have homogeneous, fixed and linear production functions, that prices are constant, and that there are no supply constraints. The IMPLAN system uses national average production functions for each of 440 sectors based on the NAICS system (see Appendix B, Table B3). The most recent local IMPLAN datasets available for this analysis were 2008. National IMPLAN multiplier data were available for 2009, so local employment, labor income, and value added multipliers were updated to 2009 using 2008/2009 national ratios. In addition, local employment multipliers were updated to 2010 based on changes in consumer price indices.

Sorting out how much spending to attribute to the park when the park is not the primary reason for the trip is somewhat subjective. Because 26% of visitor groups to Lassen Volcanic NP did not make the trip primarily to visit the park and most spending occurred outside the park, adjustments for non-primary purpose trips have a significant effect on the overall spending and impact estimates.

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Appendix A: Glossary

Term	Definition
Direct effects	Changes in sales, income and jobs in those business or agencies that directly receive visitor spending.
Economic multiplier	Captures the size of secondary effects and are usually expressed as a ratio of total effects to direct effects.
Economic ratio	Converts various economic measures from one to another. For example, direct sales can be used to estimate direct effects on jobs, personal income, and value added by applying economic ratios. That is: • Direct jobs = direct sales * jobs to sales ratio • Direct personal income = direct sales * personal income to sales ratio • Direct value added = direct sales * value added to sales ratio.
Indirect effects	Changes in sales, income and jobs in industries that supply goods and services to the businesses that sell directly to visitors, i.e., businesses in the supply chain. For example, linen suppliers benefit from visitor spending at motels.
Induced effects	Changes in economic activity in the region resulting from household spending of income earned through a direct or indirect effect of visitor spending. For example, motel and linen supply employees live in the region and spend their incomes on housing, groceries, education, clothing and other goods and services. IMPLAN's Social Accounting Matrix (SAM) multipliers also include induced effects resulting from local/state/federal government spending.
Jobs	The number of jobs in the region supported by visitor spending. Job estimates are not full time equivalents, but include both fulltime and part-time positions.
Labor income	Wage and salary income, sole proprietor (business owner) income and employee payroll benefits.
Regional purchase coefficient (RPC)	The proportion of demand within a region supplied by producers within that region.
Retail margin	The markup to the price of a product when a product is sold through a retail trade activity. Retail margin is calculated as sales receipts minus the cost of goods sold.

Term	Definition
Sales	Direct sales (retail goods and services) of firms within the region to park visitors.
Secondary effects	Changes in the economic activity in the region that result from the re-circulation of money spent by visitors. Secondary effects include indirect and induced effects.
Total effects	Sum of direct, indirect and induced effects. • Direct effects accrue largely to tourism-related businesses in the area. • Indirect effects accrue to a broader set of businesses that serve these tourism firms. • Induced effects are distributed widely across a variety of local businesses.
Value added	Labor income plus property income (rents, dividends, royalties, interest) and indirect business taxes. As the name implies, it is the net value added to the region's economy. For example, the value added by a motel includes wages and salaries paid to employees, their payroll benefits, profits of the motel, and sales, property, and other indirect business taxes. The motel's non-labor operating costs such as purchases of supplies and services from other firms are not included as value added by the motel.
Visitor group	A group of people traveling together to visit the park. Visitor group is the basic sampling unit for VSP surveys; each visitor group receives only one questionnaire.
Wholesale margin	The markup to the price of a product when a product is sold through wholesale trade. Wholesale margin is calculated as wholesale sales minus the cost of the goods sold.

Appendix B: Expenditure Sector Assignments

Tables B1 and B2 show expenditure categories visitors were asked to estimate in the Lassen Volcanic NP VSP questionnaires for summer and winter, respectively. Some expenditure categories were combined and renamed for MGM2 analysis.

Table B1. Expenditure categories in Lassen Volcanic NP questionnaire and MGM2 sector assignment, summer

Questionnaire expenditure categories	Inside park	Outside park	MGM2 sector
Lodge, hotel, motel, cabin, B&B, etc.	X	X	Motels
Camping fees and charges	X	X	Camping fees
Guide fees and charges	X	X	Admissions & fees
Restaurants and bars	X	X	Restaurants & bars
Groceries and takeout food	X	X	Groceries & takeout food
Gas and oil (auto, RV, boat, etc.)	X	X	Gas & oil
Other transportation expenses (rental cars, taxis, auto repairs, but NOT airfare)	X	X	Local transportation
Admission, recreation, entertainment fees	X	X	Admissions & fees
All other purchases (souvenirs, books, postcards, sporting goods, clothing, donations, etc.)	X	X	Souvenirs & other expenses

X = category included in questionnaire.

Table B2. Expenditure categories in Lassen Volcanic NP questionnaire and MGM2 sector assignment, winter

Questionnaire expenditure categories	Inside park	Outside park	MGM2 sector
Lodge, hotel, motel, cabin, B&B, etc.		X	Motels
Camping fees and charges	X	X	Camping fees
Guide fees and charges		X	Admissions & fees
Restaurants and bars	X	X	Restaurants & bars
Groceries and takeout food	X	X	Groceries & takeout food
Gas and oil (auto, RV, boat, etc.)		X	Gas & oil
Other transportation expenses (rental cars, taxis, auto repairs, but NOT airfare)		X	Local transportation
Admission, recreation, entertainment fees	X	X	Admissions & fees
All other purchases (souvenirs, books, postcards, sporting goods, clothing, donations, etc.)	X	X	Souvenirs & other expenses

X = category included in questionnaire.

MGM2 sectors names correspond to similar sector names and numbers in IMPLAN (Table B3). IMPLAN sectors also correspond to 2007 North American Industry Classification System (NAICS) sectors.

Table B3. MGM2 sector correspondence to IMPLAN and 2007 NAICS sectors

MGM2 sector	IMPLAN		2007 NAICS
	No.	Name	
Motels	411	Hotels and motels, including casino hotels	72111-2
Camping fees	412	Other accommodations	72119, 7212-3
Restaurants & bars	413	Food services and drinking places	722
Groceries & takeout food	324	Retail - Food and beverage	445
Gas & oil	326	Retail - Gasoline stations	447
Local transportation	336	Transit and ground passenger transportation	485
Admissions & fees	410	Other amusement and recreation industries	71391-3, 71399
Souvenirs & other expenses	329	Retail - General merchandise	452
Local production of goods	69	All other food manufacturing	31199
	88	Men's and boys' cut and sew apparel manufacturing	31522
	115	Petroleum refineries	32411
	311	Sporting and athletic goods manufacturing	33992
	317	All other miscellaneous manufacturing	339993,
			339995, 339999
Wholesale trade	319	Wholesale trade	42

Source: IMPLAN (MIG, Inc. 2008).

Appendix C: Economic Ratios and Multipliers

Table C1. Economic ratios and multipliers for selected tourism-related sectors, Lassen Volcanic NP region, 2012

Sector	Direct effects				Total effects multipliers			
	Jobs/ \$MM sales	Income/ sales	Value added/ sales	Sales I	Sales SAM	Job II/ \$MM sales	Income II/ sales	Value added II/ sales
Motels	13.07	0.34	0.61	1.28	1.56	17.72	0.51	0.89
Camping fees	12.06	0.31	0.50	1.34	1.62	17.52	0.51	0.83
Restaurants & bars	19.37	0.33	0.48	1.27	1.52	23.47	0.48	0.76
Groceries & takeout food	12.82	0.43	0.66	1.24	1.55	17.40	0.60	0.96
Gas & oil	4.36	0.31	0.69	1.22	1.47	8.24	0.46	0.95
Local transportation	17.01	0.45	0.65	1.14	1.45	20.95	0.60	0.90
Admission & fees	8.21	0.21	0.37	1.41	1.63	13.27	0.40	0.70
Souvenirs & other expenses	18.00	0.44	0.65	1.24	1.57	22.70	0.61	0.96
Local production of goods	3.97	0.15	0.19	1.06	1.21	6.77	0.25	0.38
Wholesale trade	6.84	0.37	0.64	1.23	1.52	11.21	0.54	0.92

Source: IMPLAN (MIG, Inc. 2008), updated to 2012.

Explanation of table

Direct effects are economic ratios to convert sales in each sector to jobs, income and value added.

Jobs/\$MM sales is jobs per million dollars in sales.

Income/sales is the percentage of sales going to wages, salaries, and employee benefits.

Value added/sales is the percentage of sales that is value added (Value added covers all income, rents and profits and indirect business taxes).

Total effects are multipliers that capture the total effect relative to direct sales.

Sales I captures only direct and indirect sales.

Sales SAM is the SAM sales multiplier = (direct + indirect + induced sales) / direct sales.

Job II/\$MM sales = total jobs (direct + indirect + induced) per \$ million in direct sales.

Income II /sales = total income (direct + indirect + induced) per \$ of direct sales.

Value added II/sales = total value added (direct + indirect + induced) per \$ of direct sales.

Using the Motels sector row to illustrate

Direct Effects: Every million dollars in Motels sector sales (i.e., short-term lodging room rentals) creates 13.1 jobs in the Motels sector. Sixty-one percent of Motels sector sales are value added, including 34% that goes to wages and salaries of motel employees. That means 39% of Motels sector sales goes to purchase inputs by motels (e.g., linens, cleaning supplies). The wage and salary income creates the induced effects, and the 39% of sales spent on purchases by motels starts the rounds of indirect effects.

Multiplier effects: There is an additional 28 cents of indirect sales in the region for every dollar of direct Motels sector sales (type I sales multiplier = 1.28). Total secondary sales are 56 cents per dollar of direct sales, which means 28 cents in indirect effects and 28 cents in induced

effects. An additional 4.6 jobs are created from secondary effects of each million dollars in Motels sector sales (17.7 total jobs – 13.1 direct jobs per \$million). These jobs are distributed across other sectors of the local economy. Similarly, the secondary effects on income for each dollar of Motels sector sales are 17% (51%-34%), and the secondary effects on value added for each dollar of Motels sector sales are 28% (89%-61%). Including secondary effects, every million dollars of Motels sector sales in the region yields \$1.56 million in sales, \$510,000 in income, and \$890,000 in value added.

Appendix D: Comparison of Summer and Winter Visitors

There were differences in spending and trip characteristics between the summer and winter samples (Table D1, Table D2 and Table D3). Winter visitor groups are less likely to camp and include higher percentages of day trips by local residents and non-locals. Overall, winter visitors have smaller visitor group sizes, shorter lengths of stay in the area, and fewer park re-entries. Differences in spending patterns between summer and winter visitor groups reflect these differences in trip characteristics. Spending averages for visitor groups throughout the year were computed by weighting seasonal spending averages by the percentage of visits occurring during each season (summer or winter).

Table D1. Visitor segment mix and conversion factors, summer versus winter

Characteristic	Segment							All visitors
	Local	Day trip	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN	
<u>Summer</u>								
Visitor segment share (park entries)	12%	22%	1%	13%	25%	9%	18%	100%
Average visitor group size	2.7	3.1	3.7	3.6	3.1	3.3	3.3	3.2
Length of stay (days or nights)	1.0	1.0	2.6	3.0	2.1	3.8	3.3	2.9
Re-entry rate (park entries per trip)	1.0	1.1	1.4	1.4	1.4	1.3	1.4	1.3
Percent primary purpose trips	100%	58%	88%	84%	72%	65%	64%	73%
<u>Winter</u>								
Visitor segment share (park entries)	28%	46%	0%*	<1%*	15%	<1%*	10%	100%
Average visitor group size	2.9	2.9	-*	-*	2.5	-*	2.6	2.8
Length of stay (days or nights)	1.0	1.0	-*	-*	1.8	-*	2.2	1.9
Re-entry rate (park entries per trip)	1.0	1.0	-*	-*	1.2	-*	1.1	1.0
Percent primary purpose trips	100%	86%	-*	-*	71%	-*	60%	85%

*No lodging is available inside the park during the winter season; therefore, no Motel-in segment is included for winter. Also in the winter sample, only 9 visitor groups reported camping in the park and 1 visitor group reported camping outside the park. Trip characteristics were not estimated due to the small sample sizes and missing data.

Table D2. Average visitor spending by segment, dollars per visitor group per trip, summer 2012

Expenditures	Segment							All visitors*
	Local	Day trip	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN	
<u>Inside Park</u>								
Motel	0.00	0.00	218.42	0.00	2.21	0.00	0.00	2.19
Camping fees	0.00	0.00	2.25	47.45	2.27	7.05	0.00	5.93
Restaurants & bars	5.35	5.84	5.83	6.39	5.88	5.09	2.77	5.29
Groceries & takeout food	2.17	2.19	11.25	14.45	3.69	3.95	0.90	3.79
Gas & oil	1.45	3.45	7.08	13.18	2.22	2.55	1.50	3.49
Local Transportation	0.00	0.00	0.00	2.57	0.00	0.00	0.00	0.26
Admission & fees	4.06	4.65	7.29	10.09	4.69	6.98	2.60	5.01
<u>Souvenirs & other expenses</u>	<u>3.01</u>	<u>5.90</u>	<u>12.08</u>	<u>11.87</u>	<u>13.54</u>	<u>14.14</u>	<u>3.43</u>	<u>8.04</u>
Total Inside Park	16.04	22.03	264.21	106.01	34.50	39.76	11.20	34.00
<u>Outside Park</u>								
Motels	0.00	0.00	22.08	0.00	209.78	0.00	0.00	46.14
Camping fees	0.00	0.00	0.00	0.53	0.18	83.72	0.00	6.97
Restaurants & bars	5.22	5.52	11.88	11.52	68.56	10.29	7.90	20.70
Groceries & takeout food	1.59	3.35	6.88	41.17	28.94	44.61	9.76	16.91
Gas & oil	6.35	16.13	13.33	46.86	60.94	60.56	16.30	31.06
Local Transportation	0.00	0.00	0.00	16.45	11.37	0.59	0.45	4.29
Admission & fees	0.43	0.15	3.33	4.09	13.66	13.51	1.44	4.88
<u>Souvenirs & other expenses</u>	<u>8.84</u>	<u>0.83</u>	<u>3.67</u>	<u>6.69</u>	<u>6.17</u>	<u>15.57</u>	<u>0.36</u>	<u>5.13</u>
Total Outside Park	22.43	25.97	61.17	127.31	399.60	228.84	36.21	136.06
Total Inside & Outside Park	38.48	48.00	325.37	233.32	434.10	268.60	47.41	170.07

*Weighted by percent visitor group trips.

Table D3. Average visitor spending by segment, dollars per visitor group per trip, winter 2012

Expenditures	Segment						All visitors*
	Local	Day trip	Camp-in	Motel-out	Camp-out	Other OVN	
<u>Inside Park</u>							
Camping fees	0.00	0.00	-**	0.13	-**	0.00	0.23
Restaurants & bars	2.62	2.94	-**	2.79	-**	2.04	2.77
Groceries & takeout food	1.24	1.41	-**	0.10	-**	0.60	1.15
Admission & fees	0.99	1.88	-**	2.75	-**	0.40	1.62
<u>Souvenirs & other expenses</u>	<u>3.39</u>	<u>2.85</u>	-**	<u>4.05</u>	-**	<u>6.72</u>	<u>3.58</u>
Total Inside Park	8.25	9.07	-**	9.82	-**	9.76	9.34
<u>Outside Park</u>							
Motels	0.00	0.00	-**	176.87	-**	0.00	26.28
Camping fees	0.00	0.00	-**	0.00	-**	0.00	0.61
Restaurants & bars	3.09	3.12	-**	67.61	-**	5.40	13.02
Groceries & takeout food	3.72	4.39	-**	27.66	-**	11.53	8.62
Gas & oil	19.19	21.35	-**	67.34	-**	22.40	27.99
Local Transportation	4.41	0.41	-**	18.90	-**	2.00	4.42
Admission & fees	0.48	1.07	-**	3.92	-**	0.00	1.22
<u>Souvenirs & other expenses</u>	<u>3.86</u>	<u>0.73</u>	-**	<u>9.87</u>	-**	<u>0.00</u>	<u>2.98</u>
Total Outside Park	34.76	31.07	-**	372.17	-**	41.33	85.13
Total Inside & Outside Park	43.01	40.15	-**	381.99	-**	51.09	94.47

*Weighted by percent visitor group trips.

**In the winter sample, only 9 visitor groups reported camping in the park and 1 visitor group reported camping outside the park. Spending averages were not estimated due to the small sample sizes and missing data.

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NPS 111/126168, August 2014

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