



Impacts of Visitor Spending on the Local Economy

Joshua Tree National Park, 2010

Natural Resource Report NPS/NRSS/EQD/NRR—2012/511



ON THE COVER

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Executive Summary

Joshua Tree National Park hosted 1,434,976 recreation visits in 2010. Adjustments for visitor group size and re-entries resulted in 448,217 visitor group trips to the park in 2010. Based on a 2010 Visitor Services Project survey conducted November 16–22, 61% of these visitor group trips were local residents or non-locals on day trips, not including an overnight stay in the communities of Yucca Valley, Joshua Tree, or Twentynine Palms.¹ Nineteen percent of visitor group trips involved an overnight stay in lodges, hotels, motels, cabins, B&Bs, etc. in the three communities, and 9% were overnight camping stays either inside the park or in the three communities.

Visitors reported their group’s expenditures inside the park and in Yucca Valley, Joshua Tree, and Twentynine Palms. The average visitor group size was 2.6 people and spent an average of \$131 in the park and the three communities.

Total visitor spending in 2010 inside the park and in Yucca Valley, Joshua Tree, and Twentynine Palms was \$58.8 million including \$6.4 million inside the park. The greatest proportions of expenditures were for overnight accommodations (37%) and restaurants and bars (18%).

Seventy-one percent of visitor groups indicated the park visit was the primary reason for their trip to the area. Counting only a portion of visitor expenses if the park visit was not the primary trip purpose yields \$51.4 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 a two-county region including San Bernardino and Riverside counties, California. This region includes the park and the three communities for which spending was reported.

Including direct and secondary effects, the \$51.4 million in visitor spending attributed to the park generates \$60.0 million in direct sales in the region, which support 642 jobs. These jobs pay \$20.6 million in labor income, which is part of \$33.3 million in value added to the region.²

A separate study estimated impacts of the park employee payroll on the local economy.³ The park itself employed 140 people in FY 2010 with a total payroll including benefits of \$8.0 million. Including secondary effects, the local impacts of the park payroll in FY 2010 were \$2.6 million in sales, supporting 162 jobs, \$8.8 million in labor income, and \$9.6 million in value added.

Local Economic Impacts of Joshua Tree National Park

	<u>Sales</u>	<u>Jobs</u>	<u>Labor Income</u>	<u>Value Added</u>
Park Visitor Spending	\$60.0M	642	\$20.6M	\$33.3M
Park Payroll	+ \$2.6M	+ 162	+ \$8.8M	+ \$9.6M
Park Visitor Spending + Payroll	\$62.6M	804	\$29.4M	\$42.9M

¹ Results in this study sometimes differ from those reported in the VSP study report (Jette et al. 2011) because of the omission of cases considered to be outliers in the current analysis. See Study Limitations and Errors section.

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).

Acknowledgments

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Introduction

Joshua Tree National Park (NP) is located in southeastern California and protects parts of two deserts—the Mojave Desert and the Colorado Desert. The park covers 790,636 acres and became a national park in 1994, after being a national monument since 1936. Joshua Tree NP received 1,434,976 recreation visits in 2010, including 287,765 overnight stays (Table 1).

Table 1. Recreation visits and overnight stays, Joshua Tree NP, 2010

Month	Recreation visits	Overnight (OVN) stays			Total OVN stays
		Tent and RV campers	Backcountry campers	Miscellaneous campers	
January	106,932	12,664	471	5,076	18,211
February	123,925	18,685	552	4,294	23,531
March	207,336	32,991	2,022	7,702	42,715
April	190,427	34,577	1,568	10,429	46,574
May	131,035	26,473	771	5,457	32,701
June	76,320	5,185	140	3,858	9,183
July	72,789	3,625	85	1,009	4,719
August	80,053	3,656	75	1,365	5,096
September	81,596	6,135	167	4,878	11,180
October	117,098	24,020	776	13,480	38,276
November	134,653	25,192	908	7,749	33,849
December	112,812	15,653	506	5,571	21,730
Total	1,434,976	208,856	8,041	70,868	287,765

Source: NPS Public Use Statistics 2010.

The purpose of this study is to estimate the annual, local economic impacts of visitors to Joshua Tree NP in 2010. Economic impacts are 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 includes San Bernardino and Riverside counties, California. This two-county region is the smallest region for which data are available that includes the park and the three communities for which visitor spending was reported. This region has a population of 4 million people (USCB 2010), gross regional product of \$118 billion (MIG, Inc. 2008), median household income of \$57,097, and family poverty rate of 10.3% (USCB 2010). State and local governments are the largest employers in the region (MIG, Inc. 2008), which experienced a 15.5% unemployment rate in 2010 (BLS 2010).

Methods

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

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

Inputs are estimated from the Joshua Tree NP Visitor Services Project (VSP) survey data (Jette et al. 2011), National Park Service Public Use Statistics (2010), and 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 survey was conducted at Joshua Tree NP from November 16–22, 2010.⁴ The VSP survey measured visitor demographics, activities, and travel expenditures. Questionnaires were distributed to a systematic, random sample of 767 visitor groups. Visitors returned 502 questionnaires resulting in a response rate of 65.5%.

Spending and economic impact estimates for Joshua Tree NP are based on the 2010 VSP survey data. Visitors were asked to report expenditures inside the park and in the nearby communities of Yucca Valley, Joshua Tree, and Twentynine Palms. The region for determining economic impact was defined as a two-county area—San Bernardino and Riverside counties, California. Economic impact data are not readily available at the community level, and this two-county region is the smallest region for which data are available that includes the park and the three communities for which visitor spending was reported.

The MGM2 model divides visitors into segments to help explain differences in spending across distinct user groups. Five segments were established for Joshua Tree NP visitors based on reported trip characteristics and overnight accommodation expenditures:

Local: Visitors reporting being residents of the communities of Yucca Valley, Joshua Tree, or Twentynine Palms.

Day trip: Visitors that are not residents of Yucca Valley, Joshua Tree, or Twentynine Palms, and who did not stay overnight in any of the three communities.

Motel: Visitors reporting motel expenditures in the communities of Yucca Valley, Joshua Tree, or Twentynine Palms.⁵

Camping: Visitors reporting camping fee expenditures either inside the park or in the communities of Yucca Valley, Joshua Tree, or Twentynine Palms.⁶

⁴ Results in this study sometimes differ from those reported in the VSP study report (Jette et al. 2011) because of the omission of cases considered to be outliers in the current analysis. See Study Limitations and Errors section.

⁵ The questionnaire asked about expenditures for “Lodges, hotels, motels, cabins, B&B, etc.” For convenience, these expenditures are referred to as “motel” in this report.

⁶ Only seven respondents reported camping expenditures in the communities of Yucca Valley, Joshua Tree, or Twentynine Palms, not enough for a statistically significant segment. They were combined with respondents who reported camping expenditures inside the park.

Other overnight (Other OVN): Visitors staying overnight in Yucca Valley, Joshua Tree, or Twentynine Palms, but not reporting any overnight accommodation expenditures. This segment includes visitors staying in private homes, with friends or relatives, or in other unpaid overnight accommodations.⁷

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 Public Use Statistics (2010) overnight stay figures.

⁷ 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 the VSP survey data, 50% of park entries were classified as day visits by either residents of Yucca Valley, Joshua Tree, or Twentynine Palms, or visitors not staying overnight in the park or those communities (Table 2). The average visitor group size ranged from 2.3 to 2.9 people across the five segments with an average visitor group of 2.6 people.⁸ The average length of stay in the three local communities on overnight trips was 2.3 nights.

Table 2. Selected visit/trip characteristics by segment, 2010

Characteristic	Segment					All visitors
	Local	Day trip	Motel	Camping	Other OVN	
Visitor segment share (park entries)*	8%	43%	24%	15%	10%	100%
Average visitor group size	2.2	2.5	2.7	2.9	2.4	2.6
Length of stay (days or nights)	1.0	1.0	1.9	2.7	2.5	2.3
Re-entry rate (park entries per trip)	1.1	1.1	1.5	1.7	1.3	1.3
Percent primary purpose trips	100%	62%	77%	88%	57%	71%

Seventy-one percent of visitor groups indicated that visiting the park was the primary reason for their trip to the area. Other stated reasons included: business, traveling through, visiting other area attractions, and visiting friends or relatives in the area, including those at the Twentynine Palms U.S. Marine Corps base.

The 1,434,976 recreation visits in 2010 were allocated to the five segments using the visit segment shares in Table 2. Because spending is 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 1,434,976 recreation visits represented 448,217 visitor group trips (Table 3).

Table 3. Recreation visits and visitor group trips by segment, 2010

Measure	Segment					All visitors
	Local	Day trip	Motel	Camping	Other OVN	
Recreation visits	114,798	617,040	344,394	215,246	143,408	1,434,976
Visitor group trips	49,360	225,792	83,788	42,426	46,850	448,217
Percent of visitor group trips*	11%	50%	19%	9%	10%	100%

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

⁸ 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 group in the communities of Yucca Valley, Joshua Tree, and Twentynine Palms.⁹ Spending averages were computed on a visitor group trip basis for each segment. The average visitor group spent \$131 on the trip inside the park and in the three communities (Table 4). On a visitor group trip basis, average spending was \$11 for day trips by local residents and \$54 for day trips by non-local visitors. Visitor groups staying in motels spent an average of \$465 on their trips, and those camping spent an average of \$131 on their trips. Visitor groups spent about 11% of their total spending inside the park and 89% outside the park.

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

Expenditures	Segment					All visitors*
	Local	Day trip	Motel	Camping	Other OVN	
<u>Inside Park</u>						
Camping fees	0.00	0.00	0.49	29.35	0.00	2.87
Local transportation	0.00	1.19	0.00	0.00	0.00	0.60
Admissions & fees	0.00	6.04	7.26	8.83	3.61	5.61
<u>Souvenirs & other expenses</u>	<u>0.00</u>	<u>5.89</u>	<u>6.55</u>	<u>8.57</u>	<u>2.80</u>	<u>5.29</u>
Total Inside Park	0.00	13.12	14.30	46.75	6.41	14.38
<u>Outside Park</u>						
Motels	0.00	0.00	246.08	0.00	0.00	46.00
Camping fees	0.00	0.00	0.00	1.95	0.00	0.18
Restaurants & bars	1.76	8.86	90.95	11.33	6.22	23.38
Groceries & takeout food	0.00	4.34	27.83	26.88	3.42	10.29
Gas & oil	9.17	14.45	37.00	39.56	16.34	20.66
Local transportation	0.00	8.21	27.22	0.00	0.83	9.31
Admission & fees	0.00	2.66	9.16	0.00	0.00	3.05
<u>Souvenirs & other expenses</u>	<u>0.00</u>	<u>2.05</u>	<u>12.83</u>	<u>4.95</u>	<u>0.28</u>	<u>3.93</u>
Total Outside Park	10.93	40.56	451.07	84.67	27.09	116.81
Total Inside & Outside Park	10.93	53.68	465.37	131.42	33.50	131.18

*Weighted by percent visitor group trips.

The relative standard error at a 95% confidence level for the overall spending average is 16%. A 95% confidence interval for the overall visitor group spending average is therefore \$131 plus or minus \$35 or between \$96 and \$166.

⁹ Some expenditure categories in the VSP questionnaire were combined for reporting herein and MGM2 analysis. See Appendix B.

On a per night basis, visitor groups staying in motels spent \$246 in the park and three communities, and campers spent \$48 (Table 5). The average reported per-night lodging expense was \$130 for motels and \$11 for camping fees.

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

Expenditures	Segment		
	Motel	Camping	Other OVN
Motels	130.28	0.00	0.00
Camping fees	0.26	11.40	0.00
Restaurants & bars	48.15	4.13	2.49
Groceries & takeout food	14.74	9.79	1.37
Gas & oil	19.59	14.41	6.54
Local transportation	14.41	0.00	0.33
Admission & fees	8.69	3.22	1.44
<u>Souvenirs & other expenses</u>	<u>10.26</u>	<u>4.92</u>	<u>1.23</u>
Total per visitor group per night	246.37	47.87	13.40

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. Joshua Tree NP visitors spent a total of \$58.8 million in the park and three nearby communities in 2010 (Table 6). Overnight visitors staying in motels account for 66% of the total spending, while non-local visitors on day trips account for 21%. Motel expenses represent 35% of total spending, and restaurant and bar expenses represent 18% (Figure 1).

Table 6. Total visitor spending by segment, 2010 (thousands of dollars)

Expenditures	Segment					All visitors
	Local	Day trip	Motel	Camping	Other OVN	
Inside Park						
Camping fees	0	0	41	1,245	0	1,286
Local transportation	0	269	0	0	0	269
Admissions & fees	0	1,364	608	375	169	2,516
<u>Souvenirs & other expenses</u>	<u>0</u>	<u>1,329</u>	<u>549</u>	<u>363</u>	<u>131</u>	<u>2,373</u>
Total Inside Park	0	2,962	1,198	1,983	300	6,443
Outside Park						
Motels	0	0	3,472	0	0	3,472
Camping fees	0	0	0	155	0	155
Restaurants & bars	259	1,429	1,430	71	460	3,648
Groceries & takeout food	52	88	174	16	162	492
Gas & oil	25	299	328	106	146	903
Local transportation	18	92	76	10	72	268
Admission & fees	93	911	615	41	198	1,858
<u>Souvenirs & other expenses</u>	<u>113</u>	<u>1,053</u>	<u>472</u>	<u>27</u>	<u>313</u>	<u>1,979</u>
Total Outside Park	540	9,159	37,795	3,592	1,269	52,355
Total Inside & Outside Park	540	12,121	38,993	5,576	1,569	58,798
Segment Percent of Total	1%	21%	66%	9%	3%	100%

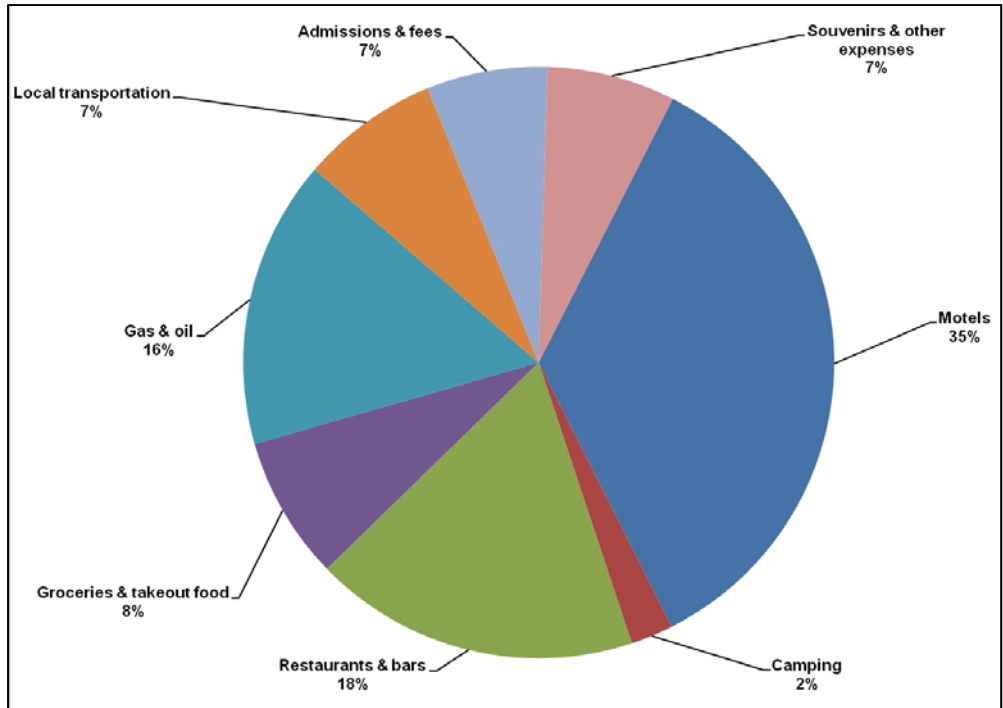


Figure 1. Joshua Tree NP visitor spending by category

Because visitors would come to the region whether or not the park existed, not all visitor spending can be attributed to the park. Twenty-nine percent of visitor groups did not make the trip primarily to visit Joshua Tree 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. All spending inside the park was treated as park-related spending. With these assumptions, a total of \$51.4 million in visitor spending is attributed to the park visit (Table 7). This represents 87% of the overall visitor spending total.

Table 7. Total spending attributed to park visits, 2010 (thousands of dollars)

Expenditures	Segment					All visitors
	Local	Day trip	Motel	Camping	Other OVN	
Motels	0	0	18,408	0	0	18,408
Camping fees	0	0	41	1,322	0	1,363
Restaurants & bars	0	1,619	6,804	445	216	9,083
Groceries & takeout food	0	794	2,082	1,056	118	4,050
Gas & oil	0	2,640	2,768	1,554	567	7,529
Local transportation	0	1,501	2,036	0	29	3,567
Admission & fees	0	1,849	1,202	375	169	3,595
<u>Souvenirs & other expenses</u>	<u>0</u>	<u>1,703</u>	<u>1,380</u>	<u>549</u>	<u>139</u>	<u>3,772</u>
Total Attributed to Park	0	10,107	34,721	5,301	1,238	51,366
Percent of Spending Attributed to the Park	0%	83%	89%	95%	79%	87%
Percent of Attributed Spending	0%	20%	68%	10%	2%	100%

Economic Impacts of Visitor Spending

The economic impacts of Joshua Tree NP visitor spending on the local economy are estimated by applying visitor spending to a set of economic ratios and multipliers in MGM2 representing the economy of the two-county region— San Bernardino and Riverside counties, California.¹⁰ This two-county region is the smallest region for which data are available that includes the park and the three communities for which visitor spending was reported. Economic ratios and multipliers for the region were estimated using the *Impact Analysis for Planning (IMPLAN) Professional software* (version 3, MIG, Inc. 2008) with 2008 data.¹¹ Multipliers were adjusted to take into account price changes from 2008 to 2010 (see Study Limitations and Errors section below).

Not all visitor spending is 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 are applied to visitor spending to account for mark-ups by retailers and wholesalers. The retail margins for the three sectors are 25.3%, 22.3%, and 50.0%, respectively, and the wholesale margins are 12.3%, 8.3%, and 11.4%. In addition, regional purchase coefficients from IMPLAN for all sectors are used to account for the proportion of demand within the region satisfied by imports into the region.

The tourism output sales multiplier for the region is 1.33. Every dollar of direct sales to visitors generates another \$0.33 in secondary sales through indirect and induced effects.¹² (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 \$58.8 million spent by park visitors generates \$64.8 million in sales, which support 732 jobs in the local region (Table 8). These jobs pay \$23.4 million in labor income, which is part of \$37.9 million in value added to the region.¹³

¹⁰ 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.

¹¹ See Appendix C: Economic Ratios and Multipliers for the region.

¹² 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.

¹³ 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.

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 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.

Table 8. Impacts of all visitor spending on the local economy, 2010*

Sector/Expenditure category	Sales (thousands of dollars)	Jobs	Labor Income (thousands of dollars)	Value Added (thousands of dollars)
Direct Effects				
Motels	20,619	187	6,496	11,602
Camping fees	1,369	16	548	709
Restaurants & bars	10,480	176	3,930	5,591
Groceries & takeout food	1,167	18	618	1,003
Gas & oil	2,065	22	1,060	1,719
Local transportation	4,443	79	2,364	2,943
Admission & fees	3,883	61	1,838	2,811
Souvenirs & other expenses	2,067	39	1,083	1,761
Wholesale trade	1,011	6	383	657
<u>Local production of goods</u>	<u>1,676</u>	<u>2</u>	<u>103</u>	<u>190</u>
Total Direct Effects	48,779	606	18,421	28,987
<u>Secondary Effects</u>	<u>15,987</u>	<u>125</u>	<u>4,976</u>	<u>8,894</u>
Total Effects	64,767	732	23,397	37,881

*Note: Impacts of \$58.8 million in visitor spending reported in Table 6. Totals may not equal sum of individual categories due to rounding.

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 Joshua Tree NP reduces the overall impacts by about 12% (Table 9; see spending inclusion assumptions in previous section). Including direct and secondary effects, the \$51.4 million spent by park visitors and attributable to the park generates \$60.0 million in sales, which support 642 jobs in the local region. These jobs pay \$20.6 million in labor income, which is part of \$33.3 million in value added to the region.

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 by applying economic multipliers to wage and salary data to capture the induced effects of NPS employee spending on local economies. Joshua Tree NP itself employed 140 people in FY 2010 with a total payroll including benefits of \$8.0 million. Including secondary effects, the local impacts of the park payroll in FY 2010 were \$2.6 million in sales, 162 jobs, \$8.8 million in labor income, and \$9.6 million value added (Stynes 2011).

Table 9. Economic impacts of visitor spending attributed to the park, 2010*

Sector/Expenditure category	Sales (thousands of dollars)	Jobs	Labor Income (thousands of dollars)	Value Added (thousands of dollars)
Direct Effects				
Motels	18,408	167	5,800	10,358
Camping fees	1,363	16	545	706
Restaurants & bars	9,083	153	3,406	4,846
Groceries & takeout food	1,025	16	542	881
Gas & oil	1,679	18	862	1,398
Local transportation	3,567	64	1,897	2,362
Admission & fees	3,595	56	1,701	2,603
Souvenirs & other expenses	1,886	35	988	1,607
Wholesale trade	869	5	329	565
<u>Local production of goods</u>	<u>1,399</u>	<u>2</u>	<u>91</u>	<u>167</u>
Total Direct Effects	42,873	532	16,163	25,492
<u>Secondary Effects</u>	<u>14,102</u>	<u>111</u>	<u>4,393</u>	<u>7,848</u>
Total Effects	56,976	642	20,556	33,340

*Note: Impacts of \$51.4 million in visitor spending attributed to park reported in Table 7. Totals may not equal sum of individual categories due to rounding.

Combined Economic Impacts

The combined impacts to the region of visitor spending attributable to the park and NPS payroll are \$62.6 million in sales, which support 804 jobs with labor income of \$29.4 million which is part of a total value added of \$42.9 million.

Study Limitations and Errors

The accuracy of the MGM2 estimates rests on the accuracy of three inputs: visits, spending averages, and multipliers. Visits are taken from NPS Public Use Statistics (2010). 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 asking the number of entries into the park during the trip.

The VSP survey contacted visitors at several locations, including park visitor centers, that are not park entry counting locations in the park's visitor counting procedures. Experience has shown that contacting visitors at visitor centers tends to under-represent local and day trip visitors in the VSP sample. To compensate, percentages of local and day trip visitor segment shares were adjusted upward from 5.4% to 8.0% and 38.7% to 43.0%, respectively.

Spending averages are derived from the 2010 Joshua Tree NP VSP survey data (Jette et al. 2011). Estimates from the survey are subject to sampling errors, measurement errors, and potential seasonal/sampling biases. The overall spending average is subject to sampling error of 16%.

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. Over the entire dataset, visitor groups larger than 8 people (26 cases), visiting the local region for more than 7 nights (15 cases), or spending more than \$5,330 (the mean plus three times the standard deviation of the mean for spending, 3 cases) were omitted from the analysis. In addition, for each visitor spending category by visitor segment, cases with values greater than the mean plus three times the standard deviation of the mean were eliminated from the average expenditure presented herein. These are conservative assumptions about outliers and likely result in conservative estimates of economic impacts.

The sample only covers visitors during a week in mid-November. To extrapolate to annual totals, it was assumed that this sample represented visitors throughout the year.

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 B2). 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 29% of visitors to Joshua Tree NP did not make the

trip primarily to visit the park and all spending occurs 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: <ul style="list-style-type: none"> • 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.
Sales	Direct sales (retail goods and services) of firms within the region to park visitors.

Term	Definition
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. <ul style="list-style-type: none"> • 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

Table B1 shows expenditure categories visitors were asked to estimate in the Joshua Tree NP VSP questionnaire. Some expenditure categories were combined and renamed for MGM2 analysis.

Table B1. Expenditure categories in Joshua Tree NP questionnaire and MGM2 sector assignment

Questionnaire expenditure categories	Inside park	Outside park	MGM2 sector
Lodges, hotels, motels, cabins, B&B, etc.		X	Motels
Camping fees and charges	X	X	Camping fees
Guide fees and charges	X	X	Admissions & fees
Restaurants and bars		X	Restaurants & bars
Groceries and takeout food		X	Groceries & takeout food
Gas and oil (auto, RV, boat, etc.)		X	Gas & oil
Other transportation expenses (rental cars, auto repairs, taxis, but not including airfare)	X	X	Local transportation
Admission, recreation, entertainment fees	X	X	Admissions & fees
All other purchases (souvenirs, film, books, sporting goods, clothing, etc.)	X	X	Souvenirs & other expenses
Donations	X	X	Souvenirs & other expenses

X = category included in questionnaire.

MGM2 sectors names correspond to similar sector names and numbers in IMPLAN (Table B2). IMPLAN sectors also correspond to 2007 NAICS sectors.

Table B2. 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	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, Joshua Tree NP region, 2010

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	9.02	0.32	0.56	1.16	1.33	11.64	0.42	0.74
Camping fees	11.98	0.40	0.52	1.21	1.37	15.13	0.52	0.73
Restaurants & bars	16.61	0.37	0.53	1.18	1.34	19.07	0.48	0.72
Groceries & takeout food	15.09	0.53	0.86	1.15	1.35	17.83	0.64	1.07
Gas & oil	9.19	0.51	0.83	1.14	1.29	11.41	0.60	1.00
Local transportation	16.54	0.53	0.66	1.11	1.30	18.90	0.63	0.83
Admission & fees	15.38	0.47	0.72	1.25	1.37	18.36	0.59	0.94
Souvenirs & other expenses	18.33	0.52	0.85	1.16	1.36	21.13	0.64	1.06
Local production of goods	5.15	0.29	0.46	1.14	1.29	7.15	0.38	0.62
Wholesale trade	6.13	0.38	0.65	1.15	1.33	8.71	0.49	0.84

Source: IMPLAN (MIG, Inc. 2008), updated to 2010.

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 motel sales creates 9.0 jobs in motels. Fifty-six percent of motel sales are value added, including 32% that goes to wages and salaries of motel employees. That means 44% of motel sales also go to purchase inputs by motels (e.g., linens, cleaning supplies). The 32% spent on wages and salaries creates the induced effects, and the 44% spent on purchases by motels starts the rounds of indirect effects.

Multiplier effects: There is an additional 16 cents of indirect sales in the region for every dollar of direct motel sales (type I sales multiplier = 1.16). Total secondary sales are 33 cents per dollar of direct sales, which means 16 cents in indirect effects and 17 cents in induced effects. An additional 2.6 jobs are created from secondary effects of each million dollars in motel sales (11.6

total jobs – 9.0 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 motel sales are 10% (42%-32%), and the secondary effects on value added for each dollar of motel sales are 18% (74%-56%). Including secondary effects, every million dollar of motel sales in the region yields \$1.33 million in sales, which support 11.6 jobs. Those jobs pay \$420,000 in labor income, which is part of the overall value added of \$740,000.

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