

# Impacts of Visitor Spending on the Local Economy: Yellowstone National Park, 2006



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## **Executive Summary**

Yellowstone National Park hosted 2.87 million recreation visits in 2006. After adjusting for re-entries to the park, there were 1.15 million person trips to the area in 2006. Based on the 2006 visitor survey, 13% of these trips were day trips not including an overnight stay within 150 miles of the park. Fifty-four percent of the trips involved an overnight stay in motels, lodges and cabins, 30% inside the park and 70% outside. Twenty-four percent of visitors were camping, 8% outside the park and 16% inside.

The average visitor group consisted of 3.3 people and spent \$769 within 150 miles of the park. Visitors reported expenditures of their group inside the park and in the surrounding communities within 150 miles of the park. A third of the spending occurred inside the park. On a party trip basis, average spending in 2006 was \$63 for day trips, \$518 for campers staying inside the park, \$554 for campers staying outside the park, \$1,113 for visitors in motels and lodges outside the park and \$1,248 for visitors staying in park lodges or cabins. On a per night basis, visitors staying in motels, lodges or cabins spent \$360 if staying inside the park and \$339 if staying outside the park. Campers spent \$139 per night if staying outside the park and \$105 if staying inside. The average per night lodging cost reported by the sample of visitors was \$163 for park lodges/cabins, \$137 for lodging outside the park and \$22 for camping in the park.

Total visitor spending in 2006 within 150 miles of the park was \$271 million<sup>1</sup> including \$91 million spent inside the park. Thirty-nine percent of the total spending was for lodging, 19% restaurant meals and bar expenses, 11% gas and oil, 7% groceries and 11% souvenirs. Overnight visitors staying in motels outside the park accounted for 55% of the spending, visitors in park lodges and cabins 26%, and campers 16%

Over 90% of visitors indicated the park visit was the primary reason for the trip to the area. Counting only a portion of visitor expenses if the park visit was not the primary trip purpose yields \$248 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 to cover a six county area across the three states of Wyoming, Montana and Idaho. This region roughly coincides with the 150 mile radius for which spending was reported.

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<sup>1</sup> Revenues received by the park (park admissions and donations) are excluded. Impacts of spending that accrues to the park are covered as part of park operations.

Including direct and secondary effects, the \$271 million spent by park visitors supported 4,952 jobs in the area and generated \$336 million in sales, \$133 million in Labor income and \$201 million in value added<sup>2</sup>.

The park itself employed 596 people in FY 2006 with a total payroll of \$34.5 million. Including secondary effects, the local impact of the park payroll in 2006 was 856 jobs, \$42 million in Labor income and \$48 million total value added<sup>3</sup>. Including both visitor spending and park operations, the total impact of the park on the local economy in 2006 was 5,808 jobs and \$249 million value added. Park operations account for 15% of the overall employment effects and 19% of the value added

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<sup>2</sup> 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.

<sup>3</sup> Impacts of park operations are estimated as the induced effects of the park payroll on the region's economy. Impacts include the wages and salaries of park employees and the economic activity resulting from their household spending in the region. Impacts are estimated using IMPLAN's spending patterns for households with incomes of \$50-\$75,000. Seasonal park jobs are converted to annual equivalents, i.e., four jobs for three months equates to one job on an annual basis. .

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## **Introduction**

The purpose of this study is to estimate the local economic impacts of visitors to Yellowstone National Park in 2006. Economic impacts are measured as the direct and secondary sales, income and jobs in the local area resulting from spending by park visitors. The economic estimates are produced using the Money Generation Model 2 (MGM2) (Stynes and Propst, 2000). Three major 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 Yellowstone NP Visitor Survey, National Park Service Public Use Statistics, and IMPLAN input-output modeling software. 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.

## **Yellowstone National park and the Local Region**

The local region was defined to include Park and Teton counties in Wyoming, Park, Carbon and Gallatin counties in Montana, and Fremont county in Idaho.

Yellowstone National Park received 2,870,295 recreation visits in 2006 and 1.14 million overnight stays (person nights) in the park (Table 1). There were 541,897 overnight stays in park lodges/cabins and 548,756 overnight stays in park campgrounds.

**Table 1. Recreation Visits and Overnight Stays, Yellowstone NP 2006**

Month	Recreation Visits	Overnight stays				Total OVN Stays
		Lodge/Cabin	Camp	Back country	Misc	
January	23,989	6,156	173	99	3	6,431
February	29,011	8,558	144	161	0	8,863
March	18,879	1,310	282	282	0	1,874
April	29,381	0	1,325	71	0	1,396
May	230,762	30,024	26,003	717	81	56,825
June	557,213	105,429	112,224	4,069	2,042	223,764
July	738,807	140,506	176,069	12,074	5,224	333,873
August	635,666	134,762	145,598	12,542	4,256	297,158
September	428,369	94,794	75,096	5,713	1,601	177,204
October	146,790	16,065	11,465	1,059	28	28,617
November	12,382	0	201	460	0	661
<u>December</u>	<u>19,046</u>	<u>4,293</u>	<u>176</u>	<u>29</u>	<u>0</u>	<u>4,498</u>
<b>Total</b>	<b>2,870,295</b>	<b>541,897</b>	<b>548,756</b>	<b>37,276</b>	<b>13,235</b>	<b>1,141,164</b>

Source: NPS Public Use Statistics

A park visitor study was conducted at Yellowstone NP from July 23-29, 2006 (Manni, Littlejohn, et. al., 2007). The study measured visitor demographics, activities, and travel expenditures. Questionnaires were distributed to a sample of 1,302 visitors at park entrances. Visitors returned 903 questionnaires for a 69% response rate. Data generated in the visitor survey were used as the basis to develop spending profiles, segment shares and trip characteristics for Yellowstone NP visitors.

### MGM2 Visitor Segments

The MGM2 model divides visitors into segments to help explain differences in spending across distinct user groups. Seven segments were established for Yellowstone National Park visitors based on reported trip characteristics and lodging expenditures<sup>4</sup>:

**Day trips<sup>5</sup>:** Visitors not staying overnight away from home within 150 miles of the park. This segment includes day trips as well as pass-through travelers, who may be staying overnight on their trip outside the local region.

**Motel-in:** Visitors reporting lodging expenses (lodges or cabins) inside the park

<sup>4</sup> Visitors reporting multiple lodging types and expenditures were classified based on the highest lodging expense.

<sup>5</sup> Only a small number of day trips by visitors living within 150 miles of the park were sampled, so local visitors are included in the day trip segment.

**Camp-in:** Visitors reporting camping expenses inside the park (developed campgrounds).

**Motel-out:** Visitors reporting motel expenses outside the park within 150 miles of the park

**Camp-out:** Visitors reporting camping expenses outside the park within 150 miles of the park.

**Other OVN:** Visitors staying overnight in the area but not reporting any lodging expenses. This segment includes visitors staying in private homes, with friends or relatives or other unpaid lodging.

The 2006 visitor survey was used to estimate the percentage of visitors from each segment as well as spending averages, lengths of stay and party sizes for each segment. Segment shares from the survey were adjusted to be consistent with park overnight stay figures. As the sample size for backcountry visitors was very small, this segment was grouped with the “other overnight” segment when estimating spending.

Based on the visitor survey and park overnight stay figures, 8% of park visits (entries) were classified as day trips, and 91% were classified as overnight trips that included an overnight stay in the local area. (Table 3). The average spending party ranged from 2.97 to 3.44 across the six segments with the average visitor party consisting of 3.26 people. The average length of stay in the area on overnight trips was 3.82<sup>6</sup>.

Ninety percent of visitors indicated that visiting the park was the primary reason for the trip to the area<sup>7</sup>. Other stated reasons were visiting friends and relatives in the area, business or visiting other area attractions.

**Table 2. Selected Visit/Trip Characteristics by Segment, 2006**

Characteristic	Day Trips	Motel-in	Camp-in	Motel-out	Camp-out	Other ovn	All Visitors
Segment share	8%	13%	12%	46%	11%	10%	100%
Average Party size	2.97	3.30	3.35	3.27	3.44	3.34	3.26
Length of stay (days/nights)	1.00	4.76	4.91	3.86	3.99	4.65	3.82
Re-entry rate (park entries/trip)	1.45	2.00	2.00	3.05	3.20	2.84	2.48
Percent primary purpose trips	91%	95%	94%	85%	92%	87%	90%
Nights inside park	1	2.90	2.93	0.53	0.08	0.81	1.33
Nights outside park	1	1.86	1.86	3.32	3.83	3.84	2.61

The 2,870,295 recreation visits in 2006 were allocated to the six segments using the visit segment shares in Table 2. Since spending is reported for the stay in the area, park visits

<sup>6</sup> These figures vary slightly from the VSP report (Littlejohn, Meldrum and Hollenhorst. 2005) due to omission of outliers. Some visitors listing motels or campgrounds as lodging types did not report any lodging expenses and are classified here in the other OVN category.

<sup>7</sup> Visitors identifying a recreation activity were treated as making the trip primarily to visit the park.

(entries) were converted to trips to the area by dividing by the average number of times each visitor entered the park during their stay.

Recreation visits were converted to 352,016 party trips by dividing recreation visits by the average party size and park entry rate for each segment (Table 3). Total person trips in 2006 were 1.148 million. Total visitor spending is estimated by multiplying the number of party trips from each segment by the average spending estimated in the survey.

**Table 3. Recreation Visits and Party Trips by Segment**

Measure	Recreation visits	Person trips	Party visits/trips	Percent of party trips
Day Trips	225,682	153,404	51,602	15%
Motel-in	370,842	185,421	56,266	16%
Camp-in	356,006	178,003	53,150	15%
Motel-out	1,328,664	435,415	133,261	38%
Camp-out	301,969	94,223	27,428	8%
<u>Other ovn</u>	<u>287,030</u>	<u>101,243</u>	<u>30,308</u>	<u>9%</u>
Total	2,870,295	1,147,709	352,016	100%

The segment mix based on party trips is somewhat different than based on park visits (entries) as visitors staying outside the park enter the park more times than those staying inside the park and most visitors on day trips only enter once. Fifteen percent of visitor parties are classified as day trips and 38% are staying in motels and other commercial lodging outside the park. Thirty-one percent of visitor parties are staying overnight inside the park compared to 46% staying outside. Park lodges and cabins account for 16% of visitor parties, while 15% of visitor parties are staying in park campgrounds.

## Visitor spending

The visitor survey covered expenditures of the travel party inside the park or within 150 miles of the park. Spending averages were computed on a party trip basis for each segment. The average visitor group in 2006 spent \$769 within 150 miles of the park, excluding park admission fees<sup>8</sup>. On a party trip basis, average spending was \$63 for day trips, \$1,248 for visitors in park lodges or cabins, and \$518 for park campers (Table 4). Visitors staying in motels, cabins, lodges or B&B's outside the park spent \$1,113 on their trip and those camping outside the park spent \$554 (Table 4).

<sup>8</sup> The average of \$769 is significantly lower than the \$1,255 spending average in the VSP report (Manni, Littlejohn, et. al. 2006) due to the omission of some outliers and treatment of missing spending data. The median spending in the VSP report was \$700. See Appendix B for further explanation of these differences.

**Table 4. Average Visitor Spending by Segment, 2006 (\$ per party per trip)**

	Day Trips	Motel- in	Camp- in	Motel- out	Camp- out	Other ovn	All Visitors
<b>Spending Inside Park</b>							
Motel, hotel cabin or B&B	0.00	472.51	0.00	19.45	0.00	0.00	82.89
Camping fees	0.00	3.01	78.06	4.33	0.00	0.00	13.91
Restaurants & bars	14.47	204.94	54.48	46.61	25.12	13.72	63.89
Groceries, take-out food/drinks	3.97	37.42	27.99	11.14	2.45	4.57	15.59
Gas & oil	5.09	49.16	53.63	13.33	12.20	4.20	23.06
Local transportation	0.00	25.00	5.70	5.39	0.00	0.00	6.89
Amusements	2.76	15.00	5.00	3.00	3.00	3.00	5.19
Souvenirs	11.98	90.27	54.22	49.87	31.64	24.60	47.83
<b>Spending Outside Park within 150 miles</b>							
Motel, hotel cabin or B&B	0.00	104.08	0.00	455.94	0.00	0.00	189.24
Camping fees	0.00	2.27	29.56	3.26	160.16	0.00	18.54
Restaurants & bars	3.32	59.63	25.65	158.03	69.46	27.47	81.49
Groceries, take-out food/drinks	5.42	18.92	44.26	48.69	55.22	27.56	35.61
Gas & oil	11.36	39.13	61.51	84.82	99.88	46.53	61.10
Local transportation	3.74	73.07	17.64	92.01	5.85	17.60	51.69
Admissions & fees	0.00	29.35	27.31	57.04	21.31	12.49	33.15
Souvenirs and other expenses	0.87	24.42	32.84	60.21	68.21	21.80	38.97
<b>Grand Total</b>	<b>62.98</b>	<b>1,248.18</b>	<b>517.84</b>	<b>1,113.10</b>	<b>554.49</b>	<b>203.55</b>	<b>769.04</b>
Total in park	38.27	897.31	279.07	153.11	74.40	50.10	259.25
Total Outside park	24.70	350.88	238.78	959.99	480.09	153.45	509.80

About a third of the spending was inside the park, two thirds outside. As one would expect, visitors staying overnight inside the park spent the majority of their money inside the park, while visitors staying outside the park spent most of their money in surrounding communities.

The sampling error at a 95% confidence level for the overall spending average is 8%. A 95% confidence interval for the overall visitor spending average is therefore \$769 plus or minus \$61 or between \$708 and \$830.

On a per party night basis, visitors in park lodges or cabins spent \$360 in the local region compared to \$339 per night for visitors staying in motels or lodges outside the park. Campers spent slightly more per night if staying outside the park (\$139 per night ) than inside the park (\$105). The average reported per night lodging expense was \$163 for park lodges or cabins, \$137 for motels outside the park, \$22 for camping fees inside the park and \$40 outside the park (Table 5).



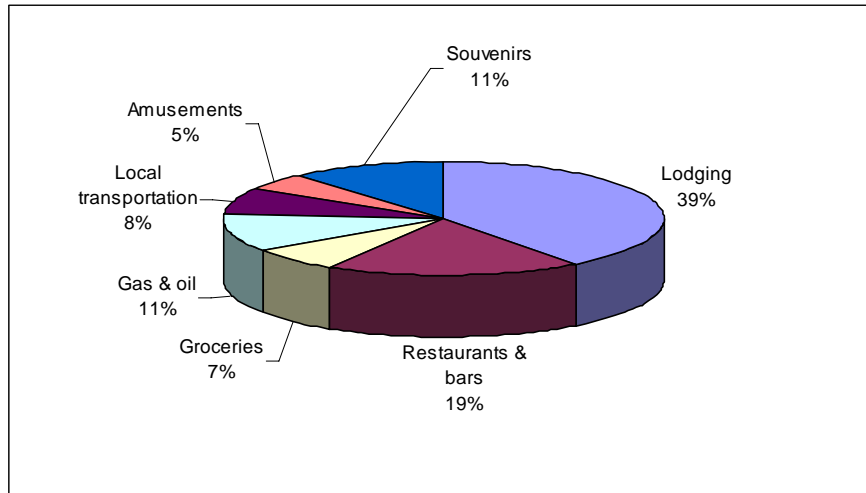
**Table 5. Average Spending per Night for Visitors on Overnight Trips (\$ per party per night)**

Spending Category	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN
Motel (nights in park)	163.13	0.00	36.87	0.00	0.00
Motel (nights outside park)	55.90		137.50		
Camping fees	1.11	21.91	1.97	40.16	0.00
Restaurants & bars	55.57	16.31	52.97	23.72	8.86
Groceries, take-out food/drinks	11.83	14.71	15.49	14.46	6.91
Gas & oil	18.54	23.44	25.41	28.11	10.91
Local transportation	20.60	4.75	25.21	1.47	3.79
Admissions & fees	9.32	6.58	15.54	6.09	3.33
<u>Souvenirs and other expenses</u>	<u>24.09</u>	<u>17.72</u>	<u>28.49</u>	<u>25.04</u>	<u>9.98</u>
<b>Total per party per night</b>	<b>360.08</b>	<b>105.41</b>	<b>339.43</b>	<b>139.04</b>	<b>43.79</b>

Total spending was estimated by multiplying the number of party trips for each segment by the average spending per trip and summing across segments. Yellowstone National Park visitors spent a total of \$271 million in the local area in 2006 (Table 6). Overnight visitors staying in motels outside the park account for 55% of the total spending, visitors in park lodges and cabins 26% and campers 16%. Lodging expenses represent 39% of the total spending and restaurants and bars 19%. Gas and oil and souvenirs each account for 11% of the total (Figure 1).

**Table 6. Total Visitor Spending by Segment, 2006 (\$000s)**

	Day Trips	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN	All Visitors
<b>In Park</b>							
Motel, hotel cabin or B&B	0	26,586	0	2,591	0	0	29,178
Camping fees	0	169	4,149	577	0	0	4,895
Restaurants & bars	747	11,531	2,896	6,211	689	416	22,490
Groceries, take-out	205	2,105	1,488	1,485	67	139	5,488
Gas & oil	263	2,766	2,850	1,777	335	127	8,117
Local transportation	0	1,407	303	718	0	0	2,427
Amusements	143	844	266	400	82	91	1,825
Souvenirs	618	5,079	2,882	6,646	868	746	16,838
<b>In Community</b>							
Motel, hotel cabin or B&B	0	5,856	0	60,759	0	0	66,615
Camping fees	0	128	1,571	435	4,393	0	6,527
Restaurants & bars	171	3,355	1,363	21,059	1,905	833	28,686
Groceries, take-out	279	1,065	2,353	6,488	1,515	835	12,535
Gas & oil	586	2,202	3,269	11,303	2,740	1,410	21,510
Local transportation	193	4,111	938	12,261	160	533	18,197
Admissions & fees	0	1,652	1,452	7,602	584	379	11,668
<u>Other purchases</u>	<u>45</u>	<u>1,374</u>	<u>1,745</u>	<u>8,023</u>	<u>1,871</u>	<u>661</u>	<u>13,719</u>
<b>Grand Total</b>	<b>3,250</b>	<b>70,230</b>	<b>27,523</b>	<b>148,333</b>	<b>15,208</b>	<b>6,169</b>	<b>270,714</b>
Total in park	1,975	50,488	14,833	20,404	2,041	1,518	91,258
Total outside park	1,275	19,742	12,691	127,929	13,168	4,651	179,456
Segment Percent of Total	1%	26%	10%	55%	6%	2%	100%



**Figure 1. Yellowstone National Park Visitor Spending by Spending Category**

Park concession receipts provide a check on the validity of the spending estimates. The total spending inside the park estimated from the visitor survey data and park visit statistics is within five percent of reported park concession receipts for 2006.

Not all visitor spending would be lost to the region in the absence of the park, as some visitors did not make the trip primarily to visit the park. Spending directly attributed to park visits was estimated by counting all spending for trips where 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 outside the park was counted for day trips. All spending inside the park was treated as park-related spending. With these assumptions, a total of \$248 million in visitor spending is attributed to the park visit. This represents 92% of the overall visitor spending total (Table 7) .

**Table 7. Total Spending Attributed to Park Visits, 2006 (\$000s)**

	Day Trip	Motel-in	Camp-in	Motel-out	Camp-out	Other OVN	All Visitors
Motel, hotel cabin or B&B	0	32,179	0	54,273	0	0	86,452
Camping fees	0	292	5,632	947	4,034	0	10,905
Restaurants & bars	910	14,736	4,183	24,125	2,439	1,139	47,533
Groceries, take-out food/drinks	472	3,122	3,708	7,004	1,458	864	16,628
Gas & oil	823	4,868	5,936	11,391	2,851	1,352	27,221
Local transportation	185	5,332	1,188	11,147	147	463	18,461
Admissions & fees	143	2,421	1,636	6,866	619	420	12,103
<u>Souvenirs and other expenses</u>	661	6,392	4,529	13,472	2,587	1,320	28,960
<b>Total Attributed to Park</b>	<b>3,194</b>	<b>69,342</b>	<b>26,811</b>	<b>129,224</b>	<b>14,136</b>	<b>5,558</b>	<b>248,264</b>
Percent of spending attributed to the park	98%	99%	97%	87%	93%	90%	92%

## Economic Impacts of Visitor Spending

The economic impacts of Yellowstone National Park visitor spending on the local economy are estimated by applying the spending to a set of economic ratios and multipliers representing the economy of the local region. Economic ratios convert spending to the associated jobs, income and value added in each sector. Multipliers for the region were estimated with the IMPLAN system using 2001 data<sup>9</sup>. The tourism sales multiplier for the region is 1.49. Every dollar of direct sales to visitors generates another \$ .49 in secondary sales through indirect and induced effects<sup>10</sup>.

Impacts are estimated based first on all visitor spending (Table 8) and then based on the visitor spending attributed to the park (Table 9). Including direct and secondary effects, the \$271 million spent by park visitors<sup>11</sup> supports 4,952 jobs in the area and generates \$336 million in sales, \$133 million in labor income and \$201 million in value added (Table 8).

**Table 8. Economic Significance of Yellowstone NP Visitor Spending to the Local Economy, 2006.**

Sector/Spending category	Sales \$000's	Jobs	Labor Income \$000's	Value Added \$000's
<b>Direct Effects</b>				
Motel, hotel cabin or B&B	95,793	1,553	41,672	67,839
Camping fees	11,422	122	1,491	3,563
Restaurants & bars	51,176	991	22,416	25,320
Admissions & fees	13,493	199	5,010	8,423
Local transportation	20,624	332	11,496	12,672
Grocery stores	4,560	78	1,982	2,653
Gas stations	6,607	75	2,783	3,624
Other retail	15,278	257	7,436	10,425
Wholesale Trade	4,014	98	2,238	2,466
<u>Local Production of goods</u>	<u>2,506</u>	<u>4</u>	<u>103</u>	<u>156</u>
<b>Total Direct Effects</b>	<b>225,473<sup>a</sup></b>	<b>3,709</b>	<b>96,626</b>	<b>137,142</b>
<u>Secondary Effects</u>	<u>110,759</u>	<u>1,242</u>	<u>36,769</u>	<u>63,724</u>
<b>Total Effects</b>	<b>\$ 336,232</b>	<b>4,952</b>	<b>\$ 133,395</b>	<b>\$ 200,866</b>
Multiplier	1.49	1.33	1.38	1.46

a. Total direct sales are less than visitor spending as direct sales excludes the cost of goods sold at retail unless the good is locally made.

Labor income covers wages and salaries, including payroll benefits and incomes of sole proprietors. Value added is the preferred measure of the contribution to the local economy as it includes all sources of income to the area -- payroll benefits to workers, profits

<sup>9</sup> Economic ratios and multipliers for the region are reported in Appendix C.

<sup>10</sup> 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.

<sup>11</sup> Revenues received by the park (park admissions and donations) are excluded in estimating visitor spending impacts as the impacts resulting from park revenues are covered as part of park operations.

and rents to businesses, and sales and other indirect business taxes that accrue to government units. The largest direct effects are in lodging establishments and restaurants.

Excluding some spending on trips where the primary trip purpose was not to visit Yellowstone NP reduces the overall impacts by about 10% (Table 9).

**Table 9. Local Economic Impacts of Visitor Spending Attributed to the Park Visit, 2006.**

<u>Sector/Spending category</u>	<u>Sales \$000's</u>	<u>Jobs</u>	<u>Labor Income \$000's</u>	<u>Value Added \$000's</u>
<b>Direct Effects</b>				
Motel, hotel cabin or B&B	86,452	1,402	37,608	61,224
Camping fees	10,905	116	1,424	3,402
Restaurants & bars	47,533	921	20,821	23,518
Admissions & fees	12,103	179	4,494	7,556
Local transportation	18,461	297	10,290	11,343
Grocery stores	4,207	72	1,829	2,448
Gas stations	6,070	69	2,557	3,329
Other retail	14,480	243	7,047	9,880
Wholesale Trade	3,742	91	2,086	2,299
<u>Local Production of goods</u>	<u>2,308</u>	<u>4</u>	<u>96</u>	<u>145</u>
<b>Total Direct Effects</b>	<b>206,262<sup>a</sup></b>	<b>3,394</b>	<b>88,251</b>	<b>125,144</b>
<u>Secondary Effects</u>	101,418	1,136	33,633	58,346
<b>Total Effects</b>	<b>307,680</b>	<b>4,530</b>	<b>121,884</b>	<b>183,490</b>
Multiplier	1.49	1.33	1.38	1.47

a. Total direct sales are less than visitor spending as direct sales excludes the cost of goods sold at retail unless the good is locally made.

## Impacts of Park Operations

The park itself employed 596 people in FY 2006 with a total payroll of \$34.5 million. Including secondary effects, the local impact of the park payroll in 2006 was 856 jobs, \$42 million in personal income and \$48 million total value added<sup>12</sup>. Including both visitor spending and park operations, the total impact of the park on the local economy in 2006 was 5,808 jobs and \$249 million value added. Park operations account for 15% of the employment effects and 19% of the value added

<sup>12</sup> Impacts of park operations are estimated as the induced effects of the park payroll on the region's economy. Impacts include the wages and salaries of park employees and the economic activity resulting from their household spending in the region. Impacts are estimated using IMPLAN's spending patterns for households with incomes of \$50-\$75,000. Seasonal park jobs are converted to annual equivalents, i.e., four jobs for three months equates to one job on an annual basis. .

## Study Limitations and Error

The accuracy of the MGM2 estimates rests on the accuracy of the three inputs: visits, spending averages, and multipliers. 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 trips to the region rather than park entries. Re-entry rates were estimated based on the number of times visitors reported entering the park during their trip to the area.

Spending averages are derived from the 2006 Yellowstone NP Visitor Survey. Estimates from the survey are subject to sampling errors, measurement errors and potential seasonal/sampling biases. The overall spending average is subject to sampling errors of 8%. Spending averages are also sensitive to decisions about outliers and treatment of missing data. In order to estimate spending averages, incomplete spending data was filled with zeros. Cases reporting large party sizes (> 8 people), long stays (>14 nights) or spending greater than \$5,000 were omitted from the analysis (see Appendix B for details).

The sample only covers visitors during a single week in July. To extrapolate to annual totals, it was assumed that these visitors were representative of visitors during the rest of the year.

Multipliers are derived from an input-output model of the local economy using IMPLAN (MIG., Inc. 1999) . Input-output models rest on a number of assumptions<sup>13</sup>. Visits are taken from NPS public use statistics.

Sorting out how much of the spending to attribute to the park when the park is not the primary motivation for the trip is somewhat subjective. However, since most visitors to Yellowstone NP made the trip primarily to visit the park and quite a bit of spending occurs inside the park, adjustments for non-primary purpose trips only has a small effect on the overall spending and impact estimates.

The Yellowstone NP visitor spending and impact estimates may be partially validated by comparisons with other data. As noted earlier, the estimates of visitor spending inside the park are consistent with concession receipts for 2006, which suggests that the spending averages and visitor expansion factors are reasonably accurate.

## REFERENCES

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<sup>13</sup>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 509 sectors based on the NAICS system.

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## Appendix A: Definitions of Economic Terms

Term	Definition
Sales	Sales of firms within the region to park visitors.
Jobs	The number of jobs in the region supported by the visitor spending. Job estimates are not full time equivalents, but include part time positions.
Labor income	Wage and salary income, sole proprietor's income and employee payroll benefits.
Value added	Labor income plus rents and profits 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 hotel includes wages and salaries paid to employees, their payroll benefits, profits of the hotel, and sales and other indirect business taxes. The hotel's non-labor operating costs such as purchases of supplies and services from other firms are not included as value added by the hotel.
Direct effects	Direct effects are the changes in sales, income and jobs in those business or agencies that directly receive the visitor spending.
Secondary effects	These are the changes in the economic activity in the region that result from the re-circulation of the money spent by visitors. Secondary effects include indirect and induced effects.
Indirect effects	Changes in sales, income and jobs in industries that supply goods and services to the businesses that sell directly to the visitors. For example, linen suppliers benefit from visitor spending at lodging establishments.
Induced effects	Changes in economic activity in the region resulting from household spending of income earned through a direct or indirect effect of the 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.
Total effects	Sum of direct, indirect and induced effects. <ul style="list-style-type: none"> <li>▪ Direct effects accrue largely to tourism-related businesses in the area</li> <li>▪ Indirect effects accrue to a broader set of businesses that serve these tourism firms.</li> <li>▪ Induced effects are distributed widely across a variety of local businesses.</li> </ul>

## Appendix B: Handling of Missing Spending Data and Outliers

### Missing Spending Data

To compute spending averages and to sum spending across categories, spending categories with missing spending data had to be filled. The spending question included two columns, one for spending inside the park and one for spending outside the park. If spending was reported in any category within each column, the remaining categories in that column were assumed to be zero.

Seventy percent of the sample reported some spending both inside and outside the park. Eighty-one cases reported expenses outside the park, but left the section for expenses inside the park blank. Conversely, 121 cases reported expenses inside the park, but left the section for spending outside the park blank. An additional 11 cases entered zeros in all spending categories and 62 cases (7% of the sample) left the entire spending question blank (Table B-1).

With written mailback questionnaires, it is difficult to sort out whether blanks in spending questions represent refusals or a lack of spending. We adopted a conservative approach and treated omitted spending data as representing zeros. This decreases the overall spending averages by about 7% compared to treating blanks as missing observations. Since the camping and motel segments are defined based on their expenditures, only the day trip and other overnight segments include cases that did not report spending. About a third of the cases classified as day trips or other overnight visitors had missing spending data.

**Table B-1. Sample cases by reporting of spending inside and outside the park**

Segment	In and out	Neither	Out only	In only	Zero spending	Total
Day Trip	26	21	17	4	3	71
Motel-in	74	0	22	0	0	96
Camp-in	86	0	26	0	0	112
Motel-out	338	0	0	80	0	418
Camp-out	67	0	0	28	0	95
<u>Other ovrn</u>	<u>37</u>	<u>41</u>	<u>16</u>	<u>9</u>	<u>8</u>	<u>111</u>
Total	628	62	81	121	11	903
Pct	70%	7%	9%	13%	1%	100%



## Outliers

The treatment of outliers can also influence the spending estimates. Our general procedures are to omit cases involving large parties, long stays or very high spending. These omissions typically do not significantly alter estimates of total spending for a given park, as reductions in per trip spending averages are generally offset by corresponding reductions in average party sizes. With lower party sizes, the spending averages per party are applied to a larger number of parties (estimated by dividing person visits by party size). Similarly, the omission of longer stay trips reduces trip spending averages, but it usually increases per night spending averages as longer trips typically entail lower rates of spending per day.

Omitting outliers reduces the variances in the estimates and especially the sensitivity of estimates for individual segments to the inclusion or exclusion of a handful of atypical cases. Treating large parties arriving in multiple vehicles as representing multiple spending units is more consistent with how they are handled in the park visit statistics. For example, one case at Yellowstone reported paying for 36 people for a six night stay and spending over \$20,000. Treating this as eighteen couples spending \$1,000 each is more consistent with the average spending of \$769 per party for visitors in general or just over \$1,000 per trip for visitors staying in motels or cabins.

For the Yellowstone visitor sample, cases were considered to be outliers if :

- Nights in the area > 7
- Party size (People paid for) >14
- Total spending > \$5,000.

The sample of visitors at Yellowstone NP included 40 cases reporting expenses for more than eight people, 14 cases with stays of more than 14 nights, and 30 cases spending more than \$5,000 in total on the trip (Table B-2)..

**Table B-2. Outliers by segment for Yellowstone NP sample**

Segment	Valid case	People paid >8	Nights >7	Total spending >\$5,000	Total Cases
Day Trip	68	3	0	0	71
Motel-in	88	5	1	2	96
Camp-in	106	4	2	0	112
Motel-out	374	12	6	26	418
Camp-out	85	7	2	1	95
<u>Other ovrn</u>	<u>98</u>	<u>9</u>	<u>3</u>	<u>1</u>	<u>111</u>
Total	819	40	14	30	903
Pct	91%	4%	2%	3%	100%

Tables B-3 shows the estimates of spending averages with and without outliers. Drops in the spending averages when outliers are omitted are generally explained by a couple of bad cases. For example, one case classified as a day trip reported \$3,780 in spending for four people including \$1,000 for souvenirs and \$1,300 for admissions/recreation. The case

may have omitted a decimal point and meant to report \$10 and \$13, respectively. The large drop in spending for the “Camp-out” segment is explained by one case reporting \$9,600 in camping fees for a two night stay. These outliers appear to be reporting or coding errors.

**Table B-3. Spending Averages with and without outliers**

Segment	Including Outliers			Excluding Outliers			
	N	Mean Spending	Std. Dev.	N	Mean Spending	Std. Dev.	Pct Error <sup>a</sup>
Day Trip	71	\$126	\$472	68	\$63	\$146	55%
Motel-in	96	1,529	1,436	88	1,356	978	15%
Camp-in	112	582	610	106	562	559	19%
Motel-out	418	1,695	2,509	374	1,222	952	8%
Camp-out	95	718	1,130	85	545	468	18%
<u>Other ovrn</u>	<u>111</u>	<u>272</u>	<u>663</u>	<u>98</u>	<u>231</u>	<u>429</u>	<u>37%</u>
Total	903	1,138	1,941	819	769	759	7%

a. Pct errors computed at a 95% confidence level

The trip spending average of \$769 per party is substantially lower than the average of \$1,255 reported in the VSP report (Manni, Littlejohn, et. al. 2006). The estimate in Table B-3 including outliers of \$1,138 excludes park admission fees and a few large transportation expenses that appear to be airfares. Dropping questionable cases like those mentioned above and other outliers reduces the estimated spending average to \$769 per party per trip. As it is difficult to judge a spending average across such diverse visitor segments as day trips, campers and visitors staying in cabins, motels or the park lodge, the validity of the spending averages are better assessed by examining the spending patterns of individual segments in Table 4. The fact that per night room and campsite spending averages are consistent with local room and campsite rates helps to validate these figures.

## Appendix C: Multipliers

**Table M2. Yellowstone Region Multipliers for selected tourism-related sectors, 2006**

Sector	Direct effects			Sales Multipliers	
	Jobs/ MM sales	Labor inc/sales	Value Added /sales	Type I	Type II
Hotels and motels	16.22	0.44	0.71	1.17	1.45
Other accommodations	10.68	0.13	0.31	1.47	1.63
Food services and drinking places	19.37	0.44	0.49	1.25	1.54
Amusements and recreation	14.78	0.37	0.62	1.24	1.50
Automotive repair and maintenance	11.75	0.21	0.48	1.24	1.40
Transit and ground passenger transp.	24.30	0.56	0.61	1.21	1.58
Sporting goods stores	26.23	0.34	0.46	1.32	1.56
Gasoline stations	11.40	0.42	0.55	1.27	1.55
Food and beverage stores	17.00	0.43	0.58	1.25	1.53
General merchandise stores	16.81	0.49	0.68	1.19	1.49
Wholesale trade	8.28	0.38	0.66	1.19	1.43
Misc manufacturing	5.11	0.34	0.51	1.18	1.40

SOURCE: Input-output model of six county region economy estimated with the IMPLAN system using 2001 data. Job to sales ratios are adjusted to 2006 based on changes in national job to sales ratios between 2001 and 2006. Other ratios and multipliers are assumed unchanged from 2001.

### Brief 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 and salaries

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 II is the usual Type II sales multiplier = (direct + indirect + induced sales)/ direct sales

Sales I captures only direct and indirect sales

### Using the Hotel sector row to illustrate.

**Direct Effects:** Every million dollars in hotel sales creates 16 jobs in hotels. Forty-four percent of hotel sales goes to wages and salaries of hotel employees and 71% of hotel sales is value added. That means 29% of hotel sales goes to purchase inputs by hotels. The wage and salary income creates the induced effects and the 29% spent on purchases by the hotel starts the rounds of indirect effects.

**Multiplier effects:** There is an additional 17 cents of indirect sales in the region for every dollar of direct hotel sales (type I sales multiplier = 1.17). Total secondary sales is 45 cents per dollar of direct sales, which means 17 cents in indirect effects and 28 cents in induced effects. Including secondary effects, every million dollar of hotel sales in the region yields \$1.45 million in sales.

## Appendix D. Yellowstone Concession Receipts

Yellowstone concession receipts provide a rough check on the spending estimates. Gross receipts for 2006 were obtained for the three concession operations at Yellowstone NP: DNC Parks & Resorts at Yellowstone LLC, Xanterra Parks & Resorts Inc, and Yellowstone Park Service Stations, Inc. – Gardiner Division. Gross concession receipts in Table D1 are the sum of receipts for the three concession operators.

The comparison of visitor spending reports with concession receipts does not provide a precise test of validity as visitor spending categories and the categories in which concession receipts are reported do not exactly match up. Also, some visitors may mistakenly report expenses in the wrong category or confuse spending inside versus outside the park. There will also be errors in visitor estimates of their expenses and possibly some errors in concession receipts.

Keeping these cautions in mind, the survey-based estimate of in-park spending is about 5% less than the reported concession receipts and 10% less when in-park camping fees are excluded. Concessionaires reported \$96.4 million in receipts in 2006 compared to the MGM2 estimate of \$91.3 million including camping fees and \$86.4 million excluding camping. The sampling error on the survey estimate of average in-park spending is 11%, so the reported concession receipts are within the 95% confidence interval of the visitor spending estimate.

With the exception of souvenirs/other merchandise, most individual categories are quite close. It appears that visitors may have underestimated expenses in the souvenirs/other category if this matches up with the gifts, handicrafts and other merchandise concession category, as this category explains most of the difference between the two figures. Seasonal differences in spending patterns could also account for the differences since the visitor spending totals are extrapolated from the summer survey.

**Table D1. Comparison of in-park spending with concession receipts, 2006**

<b>Spending Category</b>	Survey Estimate (\$000's)	Concession Receipts (\$000's)	Concession Category
Motel, hotel cabin or B&B	29,178	30,424	Hotel
Camping fees	4,895	0	Campground
Restaurants & bars	22,490	23,221	Restaurant., Café, Bar, Snack Bar
Groceries, take-out food/drinks	5,488	5,112	Groceries, vending
Gas & oil	8,117	7,371	Auto fuel, Service, Marine fuel
Local transportation	2,427	1,429	Vehicle transportation.
Amusements	1,825	1,746	Boat rental, slips, Horse, Rentals
<u>Souvenirs and other purchases</u>	<u>16,838</u>	<u>13,047</u>	Gifts, handicrafts, other
		<u>14,057</u>	<u>Other merchandise</u>
<b>Total</b>	<b>91,258</b>	<b>96,408</b>	<b>Total</b>