ECONOMIC IMPACT OF THE PICTURED ROCKS NATIONAL LAKESHORE AND THE ESTIMATION ERRORS

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Abstract

This study used an Input-Output model to estimate the economic impacts of visitors spending to the Pictured Rocks National Lakeshore, Michigan, in 2001. Inputs were estimated from the 2001 Picture Rocks National Lakeshore Visitor Study, the National Park Public Use Statistics, and IMPLAN input-output modeling software. Pictured Rocks National Lakeshore hosted 421 thousand recreation visits in 2001, and park visitors spent $14.8 million in the local area (within 60 miles to the park, mainly the Alger County), which generated $4.6 million in direct personal income and supported 426 jobs. Secondary effects generated an additional $979 thousand dollars in personal income and $1.8 million in value added and 44 jobs as visitor spending circulated through the local economy. The sources of estimation errors were discussed. The estimation of segment shares was subject to the largest bias and error among all. Without adjustments, campers who stayed inside the park, calculated from the sample statistics, was 2.5 times of the official park record of campers. Backcountry campers, on the other hand, were underestimated in the survey by 40%. Recommendations for survey implications to improve the accuracy were provided at the end.

1.0 Introduction

Measuring and evaluating economic impacts of the tourism industry has become an important aspect in policy evaluation and decision-making processes. The U. S. federal nature-resource management agencies, such as National Park Service, Forest Service, and Army Corps of Engineers, all began the endeavor to measure the economic impact of uses' spending on the regional economy. Currently, National Park Service (NPS) is using the Money Generation Model version 2 (MGM2) to estimate yearly national-wide and site-specific economic impact (Styneset al. 2000). This paper discusses the economic impacts of visitor spending to the Pictured Rocks National Lakeshore in Michigan using the MGM2 model. Besides providing the quantitative estimates, errors and biases encountered in the estimation process will be discussed and recommendations for further survey implementation are provided at the end.

2.0 Methods

Tourism economic impact is estimated based on the following formula, determining by four factors, average spending, total visitation, visitor segment share and regional multipliers (Equation 1).

$$\text{Total economic impact} = \left(\sum_{i=1}^{n} \text{average spending}_i * \text{total visitation}_i\right) * \text{multipliers} \quad \text{(Equation 1)}$$

Where i = visitor segments

This approach helps to improve estimation accuracy as individual visitor segment may have distinct spending averages. Segmentation was formed based on visitors' lodging types, which included day visitors from the local region (Alger county), day visitors from outside the region, campers staying inside the park, backcountry campers inside the park, visitors staying at hotels outside the park, and campers staying outside the park. Distinct re-entry rates, party sizes, length of stay, and average spending factors were estimated for each segment using the 2001 Picture Rocks National Lakeshore Visitor Study (Visitor Services Project 2001).

The sample statistic was expanded to the total park visitors by using the National Park Public Use Statistics, which provided the annual park visitation figures and overnight use statistics for campers and backcountry users inside the park. Regional multipliers for Alger County were derived from the IMPLAN input-output modeling software.

Table 1.—Visitor spending[a] by lodging segment in local area ($ per party day/night)

Spending Category	Local day visitor	Non-local day visitor	Camper inside the park	Back-country campers[b]	Motel users outside the park	Camper outside the park	Total
Motel, hotel cabin or B&B	0.00	0.00	0.00	0.00	86.58	0.00	31.37
Camping fees	0.00	0.00	10.42	0.00	0.00	15.56	3.65
Restaurants & bars	9.28	12.55	6.76	5.58	30.23	9.04	17.49
Groceries, take-out food/drinks	5.31	2.93	10.50	1.30	10.43	10.39	7.68
Gas & oil	5.16	8.25	8.83	3.67	11.27	9.32	9.20
Local transportation	0.00	0.09	0.24	0.04	1.16	1.28	0.71
Admissions & fees	5.21	4.27	5.06	1.90	12.66	7.11	7.93
Souvenirs and other expenses	1.29	9.41	5.13	4.18	16.64	11.70	11.44
Total	26.25	37.50	46.94	16.67	168.96	64.40	89.50

[a] Spending averages are computed by weighting cases inversely to the number of days the visitor spent inside the park. Off -season spending was assumed to be 5% below the summer values on a per day basis.
[b] Backcountry spending profile is constructed as there were only 4 cases in the backcountry sample.

3.0 Results

3.1 Visits and Average Spending

Pictured Rocks National Lakeshore hosted 421 thousand recreation visits (person entry to the park) in 2001. Recreation visits were first converted to night basis as the unit for the average spending was based on expenditure per party per night. By using average length of stay, re-entry rate to the park, and party size, 421 thousand recreation visits were converted to 153,000 vehicle entries and 155,000 party-nights to the local area. Local residents accounted for 7% of the 421,000 recreation visits; day trips from outside the region (including stays with friends and relatives or seasonal homes in the area, 8%) accounted for 28%. Area motels accounted for 39% of total party nights, campgrounds 33% (5% inside the park) and backcountry stays represented 4% of party nights. We estimated that park visitors accounted for about 60,200 room nights in area motels and about 43,800 campsite nights outside the park in 2001.

On average, local day visitors spent $26 per party per day, while day visitors from outside the local area spent $38 per day. Campers staying outside the park spent $64 dollars per day, about $17 dollars more than those camping inside the park. Visitors staying at hotel, cabin and B&B spent around $169 per day and a corresponding nightly room rate of $87. Backcountry campers spent around $17 dollars per party day, or about $38 for a 2.3- night stay. Spending averages per party per night by segment are shown in Table 1.

3.2 Total Spending and Total Economic Impacts

Visitors to Pictured Rocks NL in 2001 spent $14.8 million in the local area. Visitors spent $5.2 million on motel/hotel rooms, $2.7 million on restaurant meals, and $1.9 million on souvenirs. Groups staying in area motels contributed about 69 percent ($10 million) of the total spending in the region followed by groups staying outside the park at campgrounds (19%), and non-local day visitors (7%).

Multiplied with Alger County multipliers, the $14.8 million spent by Pictured Rocks NL visitors had a direct economic impact on the region of $12.0 million in direct sales, $4.6 million in personal income (wages and salaries), $7.4 million in value added, and supported 426 jobs in the region (Table 2). The lodging sector received the largest amount of direct sales ($5.2 million), followed by restaurants ($2.7 million) and the retail trade sector ($1.9 million). Secondary effects generated an additional $979 thousand dollars in personal income and $1.8 million in value added 44 jobs. In total, visitors to the Pictured Rocks National Lakeshore supported $15 million of direct sales, $5.6 million of personal income, $9.3 million of value added, and 470 jobs in Alger County, MI, in 2001.

Table 2.—Economic Impacts of Pictured Rocks NL visitor spending, 2001

Sector/Spending category	Direct Sales (thousand $)	Jobs	Personal Income (thousand $)	Value Added (thousand $)
Direct Effects				
Motel, hotel cabin or B&B	5,213	203	1,954	3,209
Camping fees	763	30	286	470
Restaurants & bars	2,738	92	911	1,320
Admissions & fees	1,291	39	552	904
Local transportation	131	4	55	67
Retail Trade	1,583	55	776	1,308
Wholesale Trade	233	4	96	165
Local Production of goods	91	0	0	0
Total Direct Effects	12,042	426	4,631	7,442
Secondary Effects	2,927	44	979	1,825
Total Effects	14,968	470	5,611	9,268
Multiplier	1.24	1.10	1.21	1.25

Table 3.—Total Visitor Spending by Different Analytical Procedures

Analytical Procedures	Total visitor spending (million $)	Ratio to the final estimates
Includes all cases	14.86	1.01
Excludes cases with spending outliers and missing values	15.48	1.05
No adjustments to the segment shares	16.04	1.09
Excludes outliers and adjust for segment shares (final estimates)	14.75	1.00

The sales multiplier for the region was 1.24, and the local region surrounding Pictured Rocks NL captures 81% of visitor spending. Nineteen percent of visitor spending leaks out of the local economy to cover the costs of imported goods bought by visitors.

4.0 Estimation Bias and Errors

It is more challenging to estimate the economic impact of a year-round recreation service site than for a short-term festival or event. In general, park visitors are composed of diverse groups in terms of their activity types and lodging categories. Further, the volume and use of park resources are subject to strong seasonal variation, especially in Michigan (Warzecha et al. 2000; Stynes and Sun 2003). These two factors lead to variation in park visitation, user travel patterns, and average spending. Subsequently, they create complexity in parameter estimation and possible errors in the overall economic impacts.

Two major sources of errors in estimation are demonstrated here. First, procedures to analyze inconsistent responses from the visitor survey, such as the treatment for outliers, missing values and contradictory responses on key parameters, influence the final output estimates. Key parameters included party size, length of stay, and re-entry rate to the park, which are subject to the biases of seasonality, sampling and responses errors. These factors influence the estimation of overall visitation by individual segment as well as the total visitor spending. In general, the decision to analyze these parameters may lead to a 5% variation in overall spending. For example, total visitor spending would be $14.86 million if all cases were included versus total spending as $15.48 million if cases that skipped the spending questions were excluded.

Second, the Pictured Rocks Visitor Survey was conducted from July 24 to August 4, 2001. The sample data was assumed to reflect the high season use patterns and spending only. The representation of snowmobiles or cross-country skies was not accounted for, who may have distinct use patterns and spending profiles. One indication of possible survey bias due to short-term summer visitor survey can be made by comparing the visits estimation from the survey to the official park overnight statistics. Without adjustments, campers who stayed inside the park, calculated from the sample statistics, was 2.5 times of the official park record of campers. Backcountry campers, on the other hand, were underestimated in the survey by 40%. Without adjustments, total visitor spending for Pictured Rocks NL was $16.04 million, a 10% over-estimation when compared with the adjusted figure, $14.75 million.

The accuracy of the MGM2 estimates rests on the three inputs: visits, spending averages, and multipliers. Multipliers and economic ratios are based on an IMPLAN model for Alger County and should be reasonably reliable for this application (Stynes and Sun, 2003). The sampling errors on the spending averages were 5% overall and ranged from 6- 28% for individual segments. Spending averages also vary by about 5% depending on how missing spending data and outliers are treated. The treatment of segment shares, however, has introduced approximate 10% or higher variation on the total visitor spending, the largest source of error. This is in part can be explained by the data collection scheme as 1) the visitor survey was conducted during a 10 period in the summer and 2) visitors were interviewed inside the park. The first factor induced biases by ignoring the visitor characteristics of off-season users, who tend to have shorter stays, spend less and may have more local day trips to the park. The second factor over sampled visitors with longer stays than day users as the probability to be sampled is in direct proportional to their length of stay inside the park. Subsequently, the sample statistics indicated an over-representation of visitors who stayed overnight inside the park.

Recommendation for future economic impact studies are, first, visitor survey would be conducted throughout the year to better profile both high and low season user patterns. Second, visitors should be interviewed at the park entries as sampling visitors inside the park may bias certain user groups. For example, campers and hotel users may be over represented if sampling was conducted near campgrounds or park lodging facilities. Third, determining the relative visitor composition by lodging types has been the most challenging and critical step in the estimation process. A separate visitors survey is suggested collect just this information. Additional postcard surveys, for example, at the park entry to inquire visitors' lodging choices inside the park or the local communities would help to address the accuracy of visitor segment shares.

5.0 Conclusion

The economic contribution of the Pictured Rocks National Lakeshore to the regional community is documented through an economic impact analysis. However, the accuracy in estimation is subject to errors and biases, mainly from the treatment of segment shares and seasonality. Therefore, to aid to the accuracy in impact estimation, we recommend 1) a long-term monitoring system to understand visitor spending and travel patterns under different seasons, and 2) additional short survey (such as using postcards) at park entries to understand the relative composition of park visitors by lodging segments.

6.0 Citations

Stynes, D.J., Propst, D.B., Chang, W. and Sun, Y. (2000). Estimating national park visitor spending and economic impacts: The MGM2 model. May, 2000. Final report to National Park Service. East Lansing, MI: Dept. Park, Recreation and Tourism Resources, Michigan State University.

Stynes, D.J., and Sun, Y. (2003). Impacts of visitor spending on local economy: Pictured Rocks National Lakeshore, 2001. May, 2003. Final report to National Park Service. East Lansing, MI: Dept. Park, Recreation and Tourism Resources, Michigan State University.

Visitor Services Project. (2001). Pictured Rocks National Lakeshore Visitor Study. Summer, 2001. Visitor Services Project Report #128. Moscow, ID: National Park Service and University of Idaho, Cooperative Park Studies Unit.

Warzecha, C.A., James, E.B., Anderson, D.H., and Thompson, J.L. (2000). Pictured Rocks National Lakeshore: Visitor Use Study, Winter 1999/2000. University of Minnesota, St. Paul, MN.