

Regional Economic Impacts of Grand Canyon River Runners

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Executive Summary

The purpose of this study is to discover the regional economic impacts of boating in Grand Canyon National Park. White-water rafting of the Grand Canyon is a highly developed form of tourism that sustainably contributes to the local economy. This multi-million dollar industry provides many benefits and diversity to the economy of Coconino county and northern Arizona. Regional expenditure information was obtained by surveying non-commercial boaters and commercial outfitters. The authors used IMPLAN input-output modeling to assess direct, indirect, and induced effects of Grand Canyon river runners. Multipliers were calculated for output, employment, and income. Regional economic impact differences between commercial and non-commercial boaters were analyzed as well. Over 22,000 people rafted on the Colorado River through Grand Canyon National Park in 2001, resulting in an estimated \$21,100,000 of regional expenditures to the greater Grand Canyon economy. Many policy issues such as permit allocations, use of motorized boats, and the maintenance of environmental integrity surround the Grand Canyon river running industry. Being armed with regional economic information will better prepare National Park Service managers for the effects of future policy decisions.

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Introduction

National parks can play a critical role in the social and economic development of rural environments (Papageorgiou and Brotherton, 1999). Communities adjacent to large national parks have economies that are highly dependent on tourism expenditures, with the highest level of economic dependence found in small service-oriented communities in relatively rural areas (Neher and Duffield, 2000). River recreation has also been shown to have positive effects on rural economies and can provide an environmentally friendly impetus to a stagnant economic base (Cordell *et al.*, 1990; Douglas and Harpman, 1995; English and Bowker, 1996; Johnson and Moore, 1993). The integration of a spectacular national park with world-class river recreation would certainly have salient regional economic impacts on surrounding rural communities. Such is the case with Grand Canyon National Park and the Colorado River.

White-water rafting through the Grand Canyon has become a highly developed form of tourism that has generated an immense demand. The stretch of the Colorado River through the Grand Canyon has gained a reputation as *the* premier wilderness river trip in the world, frequently described as the trip of a lifetime and holding international acclaim (Behan, 1999). Commercial rafting of the Grand Canyon alone brings in some \$29 million a year in gross receipts (Grand Canyon National Park, 2002). This multi-million dollar industry provides positive stimuli and great diversity to the regional economy surrounding Grand Canyon National Park, which is typified by high unemployment rates and low per capita income. This study attempts to ascertain the regional economic impacts associated with boating in the Grand Canyon by calculating the direct, indirect,

and induced effects and multipliers for output, income, and employment. Discovering the regional economic impacts of boating in the Grand Canyon will provide park and community leaders insight to the economic effects associated with future policy decisions.

Every year, thousands of people come to northern Arizona to float through the spectacular Grand Canyon. This highly developed form of tourism can be an expensive venture, with commercial rafting trips ranging from \$700 to \$4,000 per person, with commercial boaters paying an average of \$250 per day. If people would rather take a private trip, they are placed on a waiting list that currently may take 19 or more years (Grand Canyon National Park, 2002). The high demand for river trips is controlled by regulations set forth by Grand Canyon National Park. Permitting frameworks stemming from the Colorado River Management Plan of 1989 allocate 68% of user days to commercial concessions and 32% of user days to non-commercial boaters. Regulating the number of boats and visitors is necessary to protect both the ecological sustainability and the recreational experience of Grand Canyon rafting.

The high costs associated with Colorado River trips have positive economic impacts on local economies and multiple effects on all regional industries. Discovering the most affected industries and the portion of expenditures spent locally enables land managers to measure the welfare of surrounding communities dependent on the natural resources of the area. Natural resource economists have measured some of the recreation benefits provided by the Colorado River (Douglas and Harpman, 1996), but have yet to detail the

regional flow of goods and services provided by the boating industry. It is the authors' intention to contribute regional economic information to ameliorate the increasingly problematic issue of protecting delicate natural resources while providing recreational opportunities to society. Economic impact analysis helps assess the welfare of the human populations inhabiting the natural and protected areas that provide their daily income.

The same way forest economists utilize growth and yield models in the timber industry, resource economists must also analyze the regional impacts of the current use of our natural resources. In the northern Arizona region, the use of natural resources revolves around tourism and recreation. Grand Canyon National Park and the surrounding regional economy have a symbiotic relationship. Visitation and support of the national park would be seriously reduced if the services and amenities surrounding it were nonexistent and likewise, the regional economy would certainly suffer without the stimulus provided by Grand Canyon National Park. The estimation of regional economic impacts details the structure of this symbiotic relationship.

Literature Review

Past research on the regional economic impacts of river rafting is limited to only a few specific studies. The literature on recreation economics is much more broad, as many studies have been conducted on economic impacts of recreation in rural and/or economically depressed areas (Bergstrom *et al.*, 1990; Cordell *et al.* 1992; Hohl and Tisdell, 1995; Schelhas *et al.*, 2002). Only one study focused on the Colorado River. Douglas and Harpman (1995) examined regional employment effects of recreation expenditures at Lee's Ferry on the Colorado River. While angling was included, the

majority of recreation expenditures were the result of white-water rafting. The study showed that total recreation expenditures for trips to Lee’s Ferry were \$14,167,847 in 1990 dollars. The economic modeling software IMPLAN (Impact Analysis for Planning) was used to estimate regional employment impacts from these expenditures at 586 jobs, which reinforced their conclusion that the recreation industry is labor intensive. Table 1 displays multipliers calculated for previous river recreation studies. English and Bowker (1996) assessed the statewide economic impacts of guided rafting on five different rivers.

Table 1. Type III Regional Economic Multipliers for Recreational Spending on River Recreation

| River/(Type of Use) | Total Gross Output | Total Income | Employment |
|---|--------------------|--------------|------------|
| Delaware Water Gap River, PA (All uses) ¹ | 2.00 | 2.25 | 1.58 |
| Upper Delaware River, PA & NY (All uses) ¹ | 2.03 | 2.16 | 1.57 |
| New River Gorge River, WV (All uses) ¹ | 2.10 | 2.36 | 1.84 |
| Chattooga River, GA & SC (Rafting only) ² | 2.18 | 2.08 | 1.70 |
| Gauley River, WV (Rafting only) ² | 2.42 | 2.38 | 1.90 |
| Kennebec River, ME (Rafting only) ² | 2.49 | 2.43 | 1.82 |
| Middlefork River, ID (Rafting only) ² | 2.28 | 2.34 | 1.90 |
| Nantahala River, NC (Rafting only) ² | 2.39 | 2.25 | 1.73 |
| Colorado River, AZ (Rafting and angling) ³ | -- | -- | 1.31 |

Sources: ¹Cordell *et al.*, 1990; ²English and Bowker, 1996; ³Douglas and Harpman, 1995

The characteristics of the five rivers varied in length, remoteness, difficulty, protected area designation, and use levels. Output, income, and employment multipliers were estimated for each river. Cordell *et al.* (1990) analyzed the regional economic impacts of three National Park Service river recreation sites. Their methods included on-site surveys of tourists and mail-in questionnaires asking recreationists to detail trip expenditures. Cordell *et al.* also used IMPLAN software to calculate regional economic multipliers for output, employment, and income. All the authors agreed that recreational rivers have positive effects on regional economies.

There have been several studies documenting preferences of Colorado River boaters (Bishop *et al.*, 1987; Hall and Shelby, 2000; Stewart *et al.*, 2000), but they offer minimal economic characteristics of rafters. However, in 1976, Parent and Robeson compiled an economic analysis of river running in the Grand Canyon. This technical report for the Grand Canyon National Park offers a comprehensive look at the commercial boating sector in the 1970s. Their report focused on the efficiency of the concessionaires and the national park, and offered only a couple-page analysis of the regional impacts. The report also lacked any economic analysis of the non-commercial boating sector. Parent and Robeson (1976) reported numerous data problems stemming from inconsistent and incomplete reporting of financial information by the float trip concessionaires. While the economics of the river running industry have changed considerably since 1976, the Parent and Robeson report remains useful as a measuring stick of how the industry has changed.

Socioeconomic Background of Study Area

The greater Grand Canyon region has a diverse demographic makeup consisting of five sovereign Native American nations and a strong Hispanic contingent interspersed with a majority of Caucasians. Property rights in the greater Grand Canyon region are just as diverse, with the Navajo, Hopi, Paiute, Havasupai, and Hualapai reservations comprising almost 40% of the land in Coconino County (Arizona Department of Commerce, 2002). Grand Canyon National Park actually shares boundaries with the Navajo, Havasupai, and the Hualapai, along with Lake Mead National Recreation Area, Glen Canyon National Recreation Area, and the newly designated Parashant National Monument. Federal and state ownership accounts for another 47% of the land in Coconino County, leaving the remaining 13% of the land in private hands (Arizona Department of Commerce, 2002). The greater Grand Canyon region has a poverty level nearly twice that of the rest of the nation. High unemployment rates are also persistent in the region, as the region's average annual unemployment rate in 1996 was 8.6%, compared with 5.5% for the state of Arizona and 5.4% for the United States (Grand Canyon Trust, 1997). Jurisdiction issues, poverty, and unemployment contribute to a turbulent social and economic atmosphere in the greater Grand Canyon region and justify economic development research and planning.

Description of Study Area

Almost all rafting trips through the Grand Canyon begin at Lee's Ferry. Lee's Ferry is a historic river crossing located some 16-river miles below Glen Canyon Dam in northern Arizona. Often, visitors will hike down to the river, or hike out early and only raft certain

sections of the canyon. River mile 226 of the Colorado River is Diamond Creek, a typical ending point for Grand Canyon rafters. Boaters who do not end their trip at Diamond Creek can continue on to the beginning of Lake Mead. Figure 1 displays the study area.

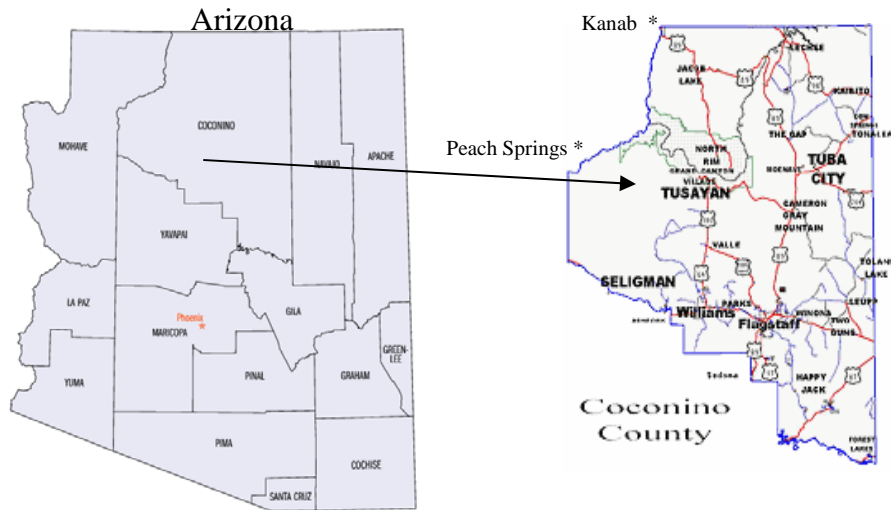


Figure 1. Grand Canyon Regional Economic Zone (Source: U.S. Census Bureau; <http://quickfacts.census.gov>)

Because this is a regional impact study, we focused strictly on expenditures within the economic communities surrounding the Grand Canyon. This “Grand Canyon” economic region has been defined to include all the towns within Coconino County, Arizona and the two bordering towns of Peach Springs, AZ (Mohave County) and Kanab, UT (Kane County). Limiting our study to this area is justified because:

- 1) The study site of the Colorado River and the Grand Canyon lies almost entirely within Coconino County.
- 2) 14 of the 16 rafting concessionaires have warehouses or bases within Coconino County and Kanab.

- 3) The majority of non-commercial trips, and many of the commercial trips, use Flagstaff as their meeting hub, and all start at Lee's Ferry (both in Coconino County)
- 4) A functional economic area to be used for regional analysis has been defined by Walsh (1986) as having a centrally located city of at least 10,000 inhabitants (Flagstaff) and having a close proximity to the natural resource.
- 5) The majority of boat trips end at Diamond Creek where boaters exit through the town of Peach Springs and the Hualapai reservation.
- 6) The majority of negative social impacts associated with Grand Canyon tourism are absorbed by the immediate surrounding areas of the defined impact zone.

Similar regional economic impact studies of recreation have used study areas comprised of one-county regions on up to entire states (Loomis and Walsh, 1997, one county; Douglas and Harpman, 1996, two counties; Cordell *et al.*, 1990, multiple counties; Cordell *et al.*, 1992, multiple counties and the state level). Discussing the size of the impact region, Loomis and Walsh (1997) suggest that the minimum size area is the county or group of counties surrounding the site that contain the major cities providing lodging, food services, equipment rentals, and transportation. The larger the defined impact area is, the larger the multiplier effects will be, as a greater proportion of the economic transactions occur within a larger impact zone. However, previous research has lacked discussions of correlating the defined economic impact zone of tourist activities with the area that absorbs the majority of negative externalities (increased cost

of living, traffic congestion, pollution, infrastructure deterioration, etc.) associated with visitation to the resource in question.

Regional impact studies commonly incorporate all counties adjacent to the main county housing the recreation site. While these adjacent counties do receive a small portion of the economic impacts, it is probable that these economic impacts are linearly related to the undesirable social impacts resulting from increased visitation. Theoretically, increasing the impact zone would dilute the regional economic impacts of a single tourist activity. Empirically, it is also true, provided economic impact of the activity is measured strictly as a percentage of overall regional output. But this measurement is rarely used because a single tourist activity comprises a small amount of total regional economic activity. However, increasing the size of the impact region actually increases multiplier effects and reduces the overall amounts of leakage, two measurements of economic impact that are focused upon. Extending the regional economic zone beyond just the most affected area will overestimate multiplier effects and expenditure retention for the region that is most affected economically and socially. Future research on regional economic impacts of recreation and tourism should focus on frameworks for quantitatively measuring the area containing the majority of negative social impacts resulting from the specific tourist activity. It is *this* area that should be correlated to the effects of economic impacts.

Data Collection

Estimates of the economic impacts of recreation and tourism resources typically rely on reported trip expenditures to calculate changes in final demand (Johnson and Moore, 1993). Provided there is a paucity of quantitative expenditure data for a particular resource, user surveys afford the most reliable estimates of related expenditures. High costs and lengthy processing times associated with user surveys have led some researchers to incorporate pre-existing expenditure data from similar resources to calculate changes in final demand (Seidl and Weiler, 2001). However, due to sources of measurement error such as memory lapse and rounding of expenditures by respondents, it is essential to not bring other sources of variation into the study. Site-specific user surveys eliminate this possible variation source associated with transposing data gathered from a different resource. In the case Grand Canyon river rafting, regional expenditure information did not exist. Thus, the authors developed an expenditure survey designed to capture all regional expenditures by Grand Canyon boaters.

Grand Canyon boaters were broken into two segments—commercial participants and non-commercial participants. Commercially guided trips are allotted 115,500 user days per year, while self-guided (private) trips are allotted 54,450 user days per year (Grand Canyon National Park, 2002). In order to properly assess economic impacts, different surveys were designed for the commercial and non-commercial sectors.

Survey Procedures

Non-commercial, or private, boaters are allocated approximately one-third of the available rafting user days. To identify their regional economic impacts, the authors conducted a literature review and identified expenditure categories related to river rafting. River guides and private boaters familiar with the Grand Canyon were interviewed to further supplement information on categorical expenditures. Once a survey format was developed, past Grand Canyon boaters were administered a pre-test to identify any omissions in expenditure categories. Names and addresses of all private trip leaders in 2001 were obtained from Grand Canyon National Park. Following the format suggested by Dillman and Salant (1994), all 254 trip leaders were mailed 1) an initial contact postcard, 2) followed one week later by a cover letter containing the expenditure survey, and 3) finally a reminder postcard following the survey instrument by ten days. Trip leaders that did not respond after the reminder postcard were then sent another copy of the survey seeking their participation.

Estimates of the regional economic impacts of commercial boaters could not be obtained by communicating with the commercial boaters themselves. All commercial rafters pay a lump sum of money for a catered package from one of sixteen licensed outfitters. Thus, the majority of regional impacts must be traced by following the expenditures of the outfitter. Further complicating the regional issue, is the fact that only eight of the sixteen outfitters have operational river bases (not just a warehouse) within the defined Grand Canyon regional economic zone (Grand Canyon River Outfitters Association,

2002). The authors designed an expenditure survey oriented specifically for the outfitters. Regional expenditures were aggregated by industrial category for all 16 outfitters by the Grand Canyon Outfitters Association (GCROA, 2002). The authors were prohibited from accessing individual economic information from the concessionaires, as GCROA cited proprietary rights to deny access. Investigators had planned on using a logistic regression to compare each concessionaire's regional economic impact to the distance of their operational base from Grand Canyon National Park. However, all data received from GCROA was in aggregate form.

Regional Economic Impact Assessment Methods

Input-Output Analysis

Input-Output (I-O) modeling was the main economic tool used to assess the regional economic impacts of boating in the Grand Canyon. The regional I-O model provides a detailed “snapshot” of a local economy and is the best approach for revealing the interactions of various sectors of a regional economy and linking these sectors to their sources of economic stimuli (Davis, 1990). In the case of Grand Canyon boating, the economic stimuli are represented by the initial purchases of regional commodities and services by the rafters. When industries experience an increase in sales, they must purchase more inputs from other industries. The I-O model utilizes transaction tables to keep track of inter-industry sales and purchases, with each industrial sector in the model represented as both a buyer and a seller. Within any economy, the various sectors purchase inputs and sell outputs with the other sectors. The name “input-output” originates from this form of double entry accounting. The modern-day framework of

input-output models was established by Harvard economist Wassily Leontief in 1936 (Isard et al., 1998). In the mid-1980s, the U.S. Forest Service created the Impact Analysis for Planning (IMPLAN) computer software, which modernized input-output methods, to estimate the direct, indirect, and induced economic impacts of resource management plans. Since then, IMPLAN has been used for numerous regional economic impact analyses. IMPLAN identifies multiplier effects, which represent the backward linkages of a final transaction. Backward linkages are the goods and services purchased by an industry in order to produce a final product. With the Grand Canyon boating industry, backward linkages are represented by inter-industry transactions needed to produce food, lodging, equipment rentals, and other trip necessities required by Grand Canyon boaters. Figure 2 illustrates the backward and forward linkages of Grand Canyon river running.

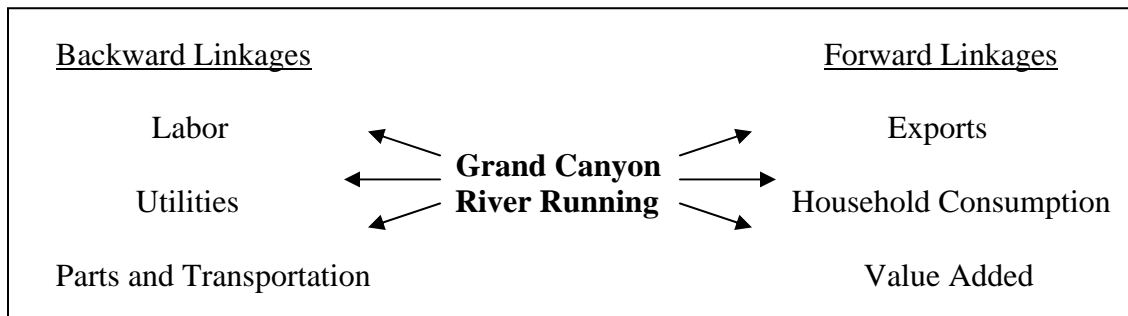


Figure 2. Industrial Linkages of the Grand Canyon River Running Industry (Source: Adapted from IMPLAN Pro Analysis Guide, 1999)

The purchases of goods and services by rafting tourists are the initial data contributing to the overall economic impacts. Trip expenditures by both private boaters and concessionaires were broken down into the following industrial categories: rafting fees,

gas and oil, transportation, grocery, restaurant, personal gear, lodging, boat gear, equipment rentals, miscellaneous retail, and other. Survey expenditure items were designed specifically to correlate with IMPLAN industrial sectors.

Regional economic impact assessments rely on detecting a change in final demand associated with a particular natural resource, new business, or evolving management policies. The change in final demand is related to the importation of “new” income into the area. These “new” income injections are similar to income received from exporting goods to other regions, except that the transportation cost is now openly transferred to the consumer. By treating recreation and tourism as an export industry, the issue then arises concerning the inclusion of local users of the resource. Typically, local user expenditures are considered a re-circulation of pre-existing income in the region, and are not viewed as new income supporting an exported good. However, Johnson and Moore (1993) suggest that local expenditures should be included in the impact analysis if the locals would boat another river outside of the region provided they were unable to float the Colorado River. Figure 3 presents the flow chart designed by Johnson and Moore (1993) to determine whether or not to include the expenditures of local users. The elusiveness of the Grand Canyon river permit drives many local boaters out of the region to raft rivers like the San Juan and the Animas, compelling the investigators to include local user expenditures in the analysis. The issue however, is not quite as significant for rafting through the Grand Canyon, due to the vast amount of non-local boaters.

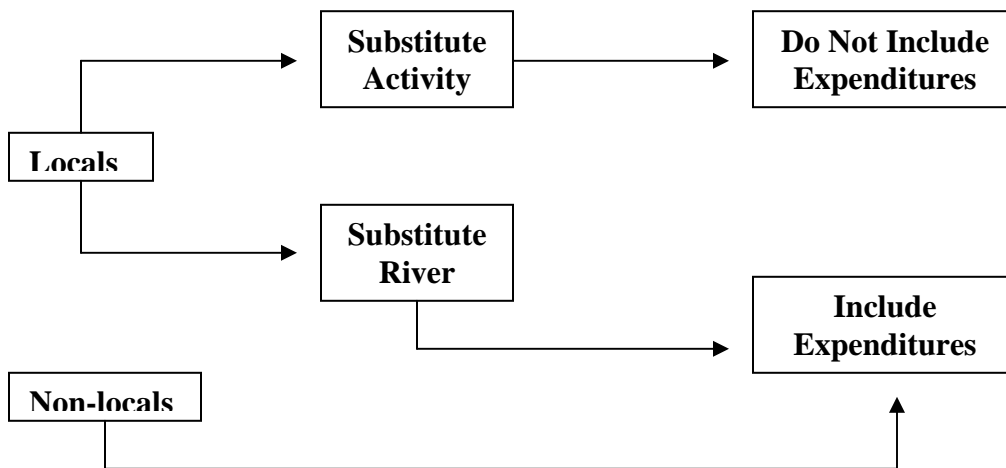


Figure 3. Adjustment for Single Destination Visitors (Source: Johnson and Moore, 1993)

IMPLAN Analysis

IMPLAN breaks national, state, county, and zip code data into a 528 industrial sector matrix. IMPLAN uses various secondary sources such as the Bureau of Economic Analysis (BEA) and their Regional Economic Information Systems (REIS), the U.S. Census Bureau and their County Business Patterns (CBP), and the Bureau of Labor Statistics (BLS) to compile specific regional economic data. A regional model was constructed by IMPLAN Inc. that included the defined study area of Coconino County and the towns of Peach Springs, AZ and Kanab, UT. To calculate regional multipliers for output, income, and employment, regional expenditures by both boating concessionaires and non-commercial boaters were entered into IMPLAN's impact analysis. Industries respond to inter-industry demands by supplying goods and services to each other. The demand generated for necessary inputs creates a round by round cycle of transactions. Multipliers are the sum of these iterations divided by the original direct effect. Once all

categorical expenditures were entered into the I-O model, the IMPLAN software was able to detail the chain reaction of industrial supply and demand. Because the social accounting matrix is based on producer prices, many recreation expenditures have to be margined to change purchaser prices into producer prices. Also, many goods and services have to be imported to a particular region, especially when dealing with remote areas. IMPLAN allows users to specify margins and regional purchase coefficients (RPC) to account for these economic leakages. The authors used the RPCs calculated by IMPLAN for the Grand Canyon regional economy. The most up to date information for the region is from 1999. IMPLAN has a deflator option for each expenditure item allowing 2001 expenditures to be deflated to 1999 dollars.

IMPLAN's derivation of multipliers involves sophisticated matrix algebra (for a detailed explanation of the matrix algebra see Isard *et al*, 1998). The resulting multipliers delineate three separate components of regional economic activity. These components are direct effects, indirect effects, and induced effects.

- 1.) Direct effects are the changes in the industries to which a final demand change was made.
- 2.) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly affected industries.
- 3.) Induced effects typically reflect changes in spending from households as income increases or decreases due to the changes in production. (IMPLAN Pro Analysis Guide, 1999).

Multipliers describe the extended circulation of a initial \$1's worth of tourist

expenditures. For example, if the output multiplier is 1.5, the initial dollar creates 50 cents of further economic activity due to inter-industry demand. Typically, tourism and recreation multipliers are significantly lower than extractive-based industry multipliers (agriculture, forestry, mining, etc.) but out-compete these industries with higher volumes of initial output (Walsh, 1986).

IMPLAN and its use of the input-output model have received a share of criticisms, with most being concerned with the accuracy of the description of the regional economy (Bergstrom *et al.*, 1990). The picture of the regional economy is often several years old and researchers must be aware of major changes that have recently occurred in the industrial makeup of the regional economy. The most crucial assumption related to input-output analysis is that of fixed direct purchase coefficients, which infer that the input recipes for each industry do not change during the period of analysis (Davis, 1990). This assumption implies 1) unchanged technology, 2) unchanged relative prices of inputs, 3) unchanged Standard Industrial Classification (SIC) codes, 4) no new firms have entered the region, and 5) no firms have left the region. While the idea of an absolutely fixed structure for a regional economy seems somewhat preposterous, the assumption is necessary to isolate the recreational spending in question and can be easily updated with local knowledge. Comparing IMPLAN's picture of the regional economy with other sources such as the Bureau of Economic Analysis (BEA) and the U.S. Census Bureau can help researchers update the regional economic picture. Another often cited criticism of IMPLAN involves using national technical coefficients for disaggregated regions. However, IMPLAN addressed this critique by allowing users to adjust regional technical

coefficients to more aptly mimic the local economy.

Despite its limitations, IMPLAN is widely applied and professionally accepted both within and outside the U.S. Forest Service, and is especially amenable to assessing the economic impacts of outdoor recreation (Bergstrom *et al.*, 1990). IMPLAN and REMI (Regional Economic Models, Inc.) are the two most widely used input-output models, with the BEA's RIMS II model receiving moderate use (Rickman and Schwer, 1995). In an evaluation of relative performance, IMPLAN's outcomes were compared to its main competitor REMI and were proven through several indirect performance criteria to be more plausible than those of REMI (Crihfield and Campbell, 1991).

Results

Commercial Sector

The total number of commercial rafters served in 2001 was 18,621 (GCROA, 2002). Commercial rafters of the Grand Canyon were responsible for \$18,640,000 worth of expenditures in the defined regional economy, with an average regional expenditure of \$1,001 per commercial rafter. Table 2 shows the industrial sectors receiving the most economic impact from commercial rafting. Portions of the initial expenditures are immediately lost to outside regions that can supply the Grand Canyon economy with goods that are not locally produced (e.g. boating equipment). Subtracting these imported goods from the original \$18,640,000 of regional expenditures resulted in a final demand impetus to the Grand Canyon regional economy of \$16,225,000. Including the indirect

and induced effects of these expenditures yielded a total effect of \$21,079,000 of output and led to the creation of some 357 annual jobs in the area.

Table 2. Most affected industries by Grand Canyon regional commercial¹ rafting expenditures for 2001

| Affected Industrial Sector | Regional Commercial Rafting Expenditures | Average Regional Expenditure Per Commercial Rafter |
|---|---|---|
| Amusement and Recreation Services | \$7,716,000 | \$414 |
| Federal, Non-military (NPS Franchise/Park Fees) | \$2,542,000 | \$137 |
| Eating and Drinking and Food Stores | \$1,826,000 | \$98 |
| Passenger Transportation | \$1,654,000 | \$89 |
| Miscellaneous Retail | \$1,621,000 | \$87 |
| Total for all Sectors | \$18,640,000 | \$1,001 |

¹The Grand Canyon regional economy is defined as Coconino County, AZ and the border towns of Kanab, UT and Peach Springs, AZ.

Multipliers were calculated for output, income, and employment effects of rafting expenditures. IMPLAN's Type SAM multipliers were chosen, which are comparable to Type III multipliers in that they account for the induced effects and incorporate employment-based Personal Consumption Expenditures (PCE) to model the induced effects. National household PCEs are estimated by IMPLAN for nine separate income groups and then are correlated to the number of households in each income group within the designed region. Multipliers are a very useful indicator of the extended effects associated with initial boating expenditures. The overall calculated multipliers represent

a ratio of total effects to direct effects. Multipliers and effects of commercial rafting are displayed in Table 3.

Commercial boaters were also responsible for \$236,000 of expenditures on the Hualapai reservation and \$5,000 of expenditures on the Navajo reservation. The majority of these expenditures were the result of exit fees charged to boaters/concessionaires crossing the Hualapai reservation from Diamond Creek (river mile 226), or exiting the river via

Table 3. Effects¹ and Multipliers of \$18,640,000 of Regional Expenditures by Commercial Boaters

| Economic Impacts | Direct Effects | Indirect Effects | Induced Effects | Total Effects | Type SAM Multipliers |
|--------------------------------------|-----------------------|-------------------------|------------------------|----------------------|-----------------------------|
| Total Output (\$) | \$16,225,000 | \$1,643,000 | \$3,211,000 | \$21,079,000 | 1.30 |
| Total Employment (jobs) | 283 | 23 | 51 | 357 | 1.26 |
| Total Labor Income (\$) ² | \$6,064,000 | \$558,000 | \$1,163,000 | \$7,785,000 | 1.28 |

¹Effects are presented in 1999 dollars.

²Total labor income includes employee compensation and proprietor income.

helicopters at the Whitmore Helipad. The Hualapai owns the Whitmore Helipad (river mile 187.5), which is leased by helicopter companies to ferry commercial customers off the river. Expenditures on tribal lands provided about six jobs. The Hualapai have their own rafting operation that takes customers from Diamond Creek to Lake Mead and 1991 data indicated that these commercial trips provided \$300 of regional expenditures per trip

(Douglas and Harpman, 1995). Impacts from Hualapai rafting operations were not included in this study.

Non-commercial sector

There were a total of 254 non-commercial river trips through the Grand Canyon in 2001, with a total of 3,620 people (GCNP, 2002). All 254 trip leaders were mailed an expenditure survey asking them to detail regional expenses; 179 usable surveys were returned. Four of the surveys were undeliverable, leaving the investigators with an effective response rate of 72%. Similar impact studies of recreation expenditures have incorporated mail surveys to discover the amount of regional spending. Response rates for past studies range from 25 percent to 45 percent (English and Bowker, 1996, Cordell *et al.*, 1990; Cordell *et al.*, 1992; Bergstrom *et al.*, 1990), with the exception of Johnson and Moore's (1993) study that received a 78% response rate. The hefty response rate from private Grand Canyon boaters decreased the chances of non-response bias and is indicative of a very concerned and interested user group. Non-response bias was also checked by including descriptive questions in the survey that could be compared to other private Grand Canyon boater studies. Answers to questions such as trip length, group numbers, and type of boat were quite comparable to responses yielded in other surveys of private boaters (Stewart *et al.*, 2000; Hall and Shelby, 2000).

Multiple destination trips can prove troublesome for allocating regional expenditures to a specific activity. Due to the lengthy trip time and the sheer awe of the Grand Canyon, rafting through the national park is inevitably the main and sole reason for boaters to

make their trip to northern Arizona. In the survey of private boaters, 95% of the respondents indicated that boating the Grand Canyon was the main reason for them coming to northern Arizona, with the remaining 5% indicating that they lived in the region. Knowing that rafting the Grand Canyon was the main reason for the trips allowed the authors to allocate all regional expenditures to that specific activity.

Non-commercial boaters were responsible for \$2,460,000 of regional expenditures. The most impacted industrial sectors are presented in Table 4. Once retail margins and imported goods were accounted for, the direct effect of final demand for the Grand Canyon regional economy was estimated at \$1,826,000. Direct, indirect, and induced

Table 4. Most affected industries by Grand Canyon regional¹ non-commercial rafting expenditures in 2001

| Affected Industrial Sector | Regional Non-Commercial Rafting Expenditures | Average Regional Expenditure Per Non-Commercial Rafter |
|---|---|---|
| Eating and Drinking and Food Stores | \$795,000 | \$221 |
| Recreational Equipment | \$619,000 | \$171 |
| Federal, Non-Military (Park fees) | \$373,000 | \$103 |
| Arrangement of Passenger Transportation | \$194,000 | \$54 |
| Lodging | \$133,000 | \$37 |
| Total for all Sectors | \$2,460,000 | \$680 |

¹The Grand Canyon regional economy is defined as Coconino County, AZ and the border towns of Kanab, UT and Peach Springs, AZ.

effects on output, employment and income can be seen in Table 5. Non-commercial boaters averaged \$680 of regional expenditures per boater.

Non-commercial boaters had over \$90,000 of expenditures on the Hualapai Reservation. The majority of these expenses were exit fees charged to rafters exiting the Grand Canyon at Diamond Creek. Minimal expenditures were made on the Navajo Reservation. Expenditures by non-commercial boaters on native lands supported three jobs on the reservations.

Multipliers generated for the non-commercial boating expenditures were very similar to multipliers for the commercial sector, as would be expected when dealing with primarily the same impacted industries in the same regional economy. The affected industrial sectors were also very similar for both private and commercial boating of the Grand Canyon. Whether a concessionaire is paid to outfit the entire trip, or a group of friends decides to navigate the river without a guide, the same essentials of food, gear, and preparation are needed.

Table 5. Effects¹ and Multipliers of \$2,460,000 of Regional Expenditures by Non-Commercial Boaters

| Economic Impacts | Direct Effects | Indirect Effects | Induced Effects | Total Effects | Type SAM Multipliers |
|--------------------------------------|-----------------------|-------------------------|------------------------|----------------------|-----------------------------|
| Total Output (\$) | \$1,826,000 | \$116,000 | \$394,000 | \$2,336,000 | 1.28 |
| Total Employment (jobs) | 29 | 2 | 6 | 37 | 1.28 |
| Total Labor Income (\$) ² | \$776,000 | \$40,000 | \$143,000 | \$959,000 | 1.24 |

¹Effects are presented in 1999 dollars.

²Total labor income includes employee compensation and proprietor income.

Commercial and Non-commercial Sectors Combined

Over 22,000 people rafted on the Colorado River through Grand Canyon National Park in 2001 (Grand Canyon National Park, 2002; Grand Canyon River Outfitters Association, 2002). The pursuit of this recreation resulted in an estimated \$21,100,000 of regional expenditures to the greater Grand Canyon economy. This economic stimulus creates further economic activity, as industries purchase more inputs to provide the final goods and services required by boaters. As economic activity increases, population and household income increases, further stimulating the regional economy. Accounting for these indirect and induced effects indicates that initial expenditures of \$21,100,000 result in a potential total impact of \$23,415,000 (in 1999 dollars) to the greater Grand Canyon economy. These total impacts support approximately 394 jobs in the region. Regional expenditures by Grand Canyon boaters represent almost 1% of the entire regional economic output.

Discussion

Comparing the multipliers of Grand Canyon boaters with those of previous studies of recreation in Table 1 reveals considerably lower multipliers. All previous river studies used larger economic impact regions, and were typically conducted in more urbanized regions. However, Douglas and Harpman's (1996) employment multiplier of 1.31 for the Colorado River is very comparable to the employment multipliers of 1.26 and 1.28 produced in this study. The other studies' use of multiple counties and states as their

regional economic zones inevitably produces higher multipliers, as the increased areas contain more industry transactions. The calculated multipliers for Grand Canyon river runners could be considered conservative, but provide a more realistic depiction of the extended effects of recreation and tourist expenditures in rural areas in the United States.

Of the prior river studies, only the Middle Fork of the Salmon (English and Bowker, 1996) has comparable regional expenditures per rafter. The length of time needed and the ruggedness of both the Colorado River and the Middle Fork of the Salmon make them true expeditions, requiring an immense amount of gear and supplies as well as preparation.

Impacts vs. Benefits

Most regional impacts are not considered benefits to the national economy because they represent transfers of income from other states. These pecuniary impacts represent a loss in sectors of other regional economies. However, in regions with persistent unemployment such as the Appalachian Mountains and rural areas of the Four Corners region in the Southwest, portions of the recreational impacts can be considered as a national benefit (Loomis and Walsh, 1997). This is very important to consider when seeking federal funds for a new or changing recreational project on federal land. The majority of Grand Canyon boaters come from all over U.S., with 5% coming from international countries, and about 5% living in the region. Because of persistent regional unemployment, the transfer of income to the greater Grand Canyon region would be considered as overall benefit to the national economy.

Leakage

Loomis and Walsh (1997) define leakage as the difference between total sales and local value added, and specifically as the payment for wholesale and retail products and services brought in from outside the region, plus the interest, profits, rents, and taxes paid outside the region. A certain amount of leakage is unavoidable, particularly in rural areas where tourists often desire goods and services not produced in the local area. In the case of Grand Canyon boating, much of the boating equipment needs to be imported to the region because there is a deficiency of boat-building and equipment production in the greater Grand Canyon area. However, analyzing the commercial sector of Grand Canyon rafting reveals a leakage of \$16.6 million (\$28.9 million in gross receipts – \$12.3 million in total value added) or 57% of total sales. This high leakage rate suggests that a greater portion of commercial rafting expenditures could be retained in the region.

Commercial Boating Expenditures vs. Non-Commercial Boating Expenditures

Commercial boaters pay an average of \$250 a day to raft through the Grand Canyon, and due to the high percentage of motorized trips, spend fewer days on the river than non-commercial boaters. With the high per day cost, the authors expected commercial boaters to make significant contributions to the regional economy, and this was confirmed. On the other hand, little was known or expected concerning the regional economic contributions of non-commercial boaters. Our results suggest that non-commercial boaters also make significant contributions to the regional economy. Analyzing the regional impacts on a per day basis shows commercial boaters generate

\$161 of regional expenditures per user day, while non-commercial boaters average \$45 of regional expenditures per user day. Focusing strictly on these per day economic impacts would support greater allocation of river permits to commercial concessions. However, the main focus and mission of the National Park Service (NPS) is not the consideration of economic impacts, but the conservation of scenery, natural and historic objects, and wildlife, to leave them unimpaired for the enjoyment of future generations (National Park Service Organic Act, 1916). To provide enjoyment to current generations, concessions are granted to private individuals to supply services and accommodations to tourists visiting national parks. Giving non-commercial boaters a more equitable share of river permits (say 50/50) does not have to correlate with a reduction in regional economic impacts. For example, it is against the rules for non-commercial boaters to hire a guide to help them navigate through the Grand Canyon. Relaxing the guidelines imposed upon non-commercial trips would introduce more free-market activities to the world of Grand Canyon boating. Commercial customers would still line up to pay for fully outfitted and catered trips, while non-commercial boaters could choose from an array of options from do-it-yourself, to hiring one guide, to hiring multiple guides, cooks, and other laborers. Increasing the freedom of choices associated with non-commercial boat trips would increase regional economic activity. The topic of NPS concessions and their role in regional economies is another area in need of future research.

Rafting through Grand Canyon National Park has been shown to have positive impacts on the greater Grand Canyon economy and proven to have extended effects on 220 regional industrial sectors. The importance of these impacts is magnified in a region

experiencing high rates of poverty and unemployment. Isolating expenditures on the Hualapai and Navajo Reservations substantiated that recreation in Grand Canyon National Park can be beneficial for surrounding tribal members and their relationship with the national park. With water rights being of the utmost importance in the Southwest, sustainable and non-consumptive uses of the Colorado River present an excellent option for rural economic development.

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Appendix A: Non-Commercial Survey Instrument



OMB # (1024-0224)

NPS# (02-015)

Expiration Date (2/28/2003)

Regional Economic Survey of Non-commercial Boaters

Dear Grand Canyon Boater,

The College of Ecosystem Science and Management at Northern Arizona University (NAU) is conducting a regional economic impact analysis of boating in the Grand Canyon and Grand Canyon National Park. Because Flagstaff is in the same county (Coconino) as the Grand Canyon, the local economy has become highly dependent on visiting tourists and recreationists. There are many issues surrounding boating in the Grand Canyon; your help in detailing your regional expenditures will shed more light on the contributions of non-commercial boaters to our local economy. All individual surveys will be kept confidentially, and used only in aggregate totals. As one of the few non-commercial boaters to use the Grand Canyon this past year, your response is needed. Please take a few minutes to answer the following questions. If you have any questions please call me collect at 928/523-8275 or email me at eeh2@dana.ucc.nau.edu. Your participation is completely voluntary and would be greatly appreciated.

Sincerely,

Evan E. Hjerpe
Principal Investigator
College of Ecosystem Science and Management
(928) 523-8275

Part A (Topic Area 2 – Trip/Visit Characteristics)

All questions pertain to your 2001 trip through the Grand Canyon.

- 1.) How many people were in your personal group? _____
- 2.) How many days were spent boating in the Grand Canyon? _____
- 3.) Where did you put-in (start your trip)? Lee's Ferry Phantom Ranch

4.) Where did you take-out (end your trip)? Diamond Creek Lake Mead

Phantom Ranch Other (please specify) _____

5.) What type of boating trip did you take? Oar powered raft

Motor powered raft Kayak/Oar Other _____

6.) Was boating the Grand Canyon your main reason for coming to *Northern Arizona*?

If not, what was the main reason for your trip to Northern Arizona?

Part B (Topic Area 4 – Individual Expenditures)

The following questions will ask you to detail the amount of money your group spent in the surrounding economic communities on your recent trip of boating through the Grand Canyon. *Please estimate the total spent in each category for your entire group.* Because this is a regional impact study, we are strictly concerned with expenditures in Coconino County and the bordering towns of Peach Springs and Kanab (the “Grand Canyon” regional economic zone). Coconino County encompasses the towns of Flagstaff, Sedona, Williams, Lee’s Ferry (Marble Canyon), Page, Fredonia, Cameron, and Grand Canyon. *All of the following questions, except question 6, refer to expenditures in any part of the regional economic zone as defined above.* Please make the best possible estimate to the nearest dollar.



Type of Expense

Amount spent by your entire group

- 1.) Lodging in regional economic zone before and after your trip (hotels, campsites, etc) _____

- 2.) Food and Beverage in regional economic zone:
 - A.) Groceries for trip (meals, snacks, beer, etc.) _____

 - B.) Food and drink consumed at local restaurants and bars _____

- 3.) Transportation in regional economic zone:
 - A.) Flights in or out of regional economic zone (if not applicable please note) _____

 - B.) Rental vehicle's used to transport people/equipment to and from the Grand Canyon _____

 - C.) Fuel purchased in regional economic zone for transportation in region and on Colorado river _____

 - D.) Vehicle parts, repairs, maintenance, etc. _____

- 4.) Equipment Rentals and Purchases in regional economic zone:
 - A.) Boating-related equipment (boats, oars, motors, dry sacks, life vests, etc.) _____

 - B.) Other recreational equipment (sleeping bags, tents, packs, etc.) _____

 - C.) Clothing (t-shirts, shoes, sandals, etc.) _____

5.) Miscellaneous expenditures in regional economic zone (film, souvenirs, guide books, etc.)

6.) Please specify (how much and for what) any of the above expenditures that occurred in Peach Springs or Cameron (also include Haulapai or Navajo labor, reservation fees/permits, etc.).

(Topic Area 7 – Individual Opinions on Park Management)

Are there additional comments you would like to make concerning private boating in the Grand Canyon?

Thank you for your time. Please place completed survey in the provided self-addressed stamped envelope and drop in the mail.

PRIVACY ACT and PAPERWORK REDUCTION ACT statement:

16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by park managers to better serve the public. Response to this request is voluntary. No action may be taken against you for refusing to supply the information requested. Your name is requested for follow-up mailing purposes only. When analysis of the questionnaire is completed, all name and address files will be destroyed. Thus permanent data will be anonymous. Data collected through visitor surveys may be disclosed to the Department of Justice when relevant to litigation or anticipated litigation, or to appropriate Federal, State, local or foreign agencies responsible for investigating or prosecuting a violation of law. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

Burden estimate statement: Public reporting for this form is estimated to average 15 minutes per response. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, WASO Administrative Program Center, National Park Service, 1849 C Street, Washington, D.C. 20240.