Fryingpan Valley Economic Study

Photo credit: Robin Henry

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1. ACKNOWLEDGEMENTS

This economic study, which has taken place over two very busy and exciting years, could not have been completed without the assistance and participation of so many people. Acknowledgement must first go to the 684 Fryingpan Valley visitors who took the time to contemplate their trip and fill out a visitor survey, the result of which is this extensive base of information. Also key to the project's success was the funding provided by the Colorado River Water Conservation District as well as the Ruedi Futures Study partnership support given by both the River District and the Ruedi Water and Power Authority.

As far as individuals, we would like to give thanks to those who tirelessly assisted with the project's fieldwork and data entry, including Lindsay Hoffman, Heather Henry, Erin Looney, Wendee Johnston, Lacey Gaechter, and Deana Pavwoski.

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Finally, the IMPLAN economic modeling was performed by Elizabeth Hornbrook Garner (Colorado State University Cooperative Extension). Professor John Loomis (Department of Agricultural and Resource Economics, Colorado State University) provided thoughtful and thorough peer review during various aspects of the study.

2. BACKGROUND

The Fryingpan Valley Economic Study is part of a broader study to understand and define the Valley's recreational activities and values, hydrologic conditions, water demands, and aquatic ecosystem health within the context of the management of Ruedi Reservoir. This broader study is termed the "Ruedi Futures Study" and is being undertaken by the Roaring Fork Conservancy, Colorado River Water Conservation District, and Ruedi Water and Power Authority. This economic study report represents an important product of the Ruedi Futures Study. The Fryingpan/Roaring Fork Fishery Study, which is being conducted by Miller Ecological Consulting, will provide another key outcome. The fishery study is geared toward understanding the existing habitat conditions and needs of the trout species that inhabit the lower Fryingpan and Roaring Fork Rivers. It is due for completion at the end of 2002.

A. Ruedi Reservoir and the Fryingpan River

The Fryingpan Valley, known for its stunning red cliffs, diversity of wildlife, and quality recreation opportunities, has undergone enormous change within the last several decades. It is the source of the Fryingpan River, which drains the 290 square-mile basin from Red Table Mountain, Nast Peak, and Hagerman Pass southwest to Basalt, where it joins the Roaring Fork River. An overview map of the area is presented in Figure 1. The Fryingpan River basin represents 20 percent of the area of the Roaring Fork watershed. It has seen the development of the Fryingpan-Arkansas Project – a multipurpose water diversion and delivery project that takes water through the Continental Divide. Up to 69,200 acre-feet of water are diverted annually from the Fryingpan River and other tributaries of the Roaring Fork River to the Arkansas River basin on the Eastern Slope.

Ruedi Reservoir, which has a capacity of approximately 102,000 acre-feet, is located about halfway up the Fryingpan Valley. It is a federally owned facility that is operated by the Bureau of Reclamation. It was completed in 1968, and serves as a water storage facility to compensate the Western Slope for Fryingpan-Arkansas diversions. Its water may also be used to support beneficial uses on the Western Slope, including municipal/industrial uses, agriculture, recreation, and fish and wildlife conservation

purposes (U.S. Department of Interior, Bureau of Reclamation, 1975). Ruedi Reservoir has become a well-established recreation destination, supporting activities such as boating, camping, and fishing; and also supplies power through a hydroelectric facility owned and operated by the City of Aspen.

The 14-mile stretch of the Fryingpan River that flows from Ruedi Dam to Basalt is managed by the Colorado Division of Wildlife as a "Gold Medal" trout fishery, a designation given to waters able to produce high numbers of trophy trout. In Colorado, approximately 170 miles of over 9,000 stream miles are granted this designation. The Fryingpan River is a nationally known fly fishing destination.

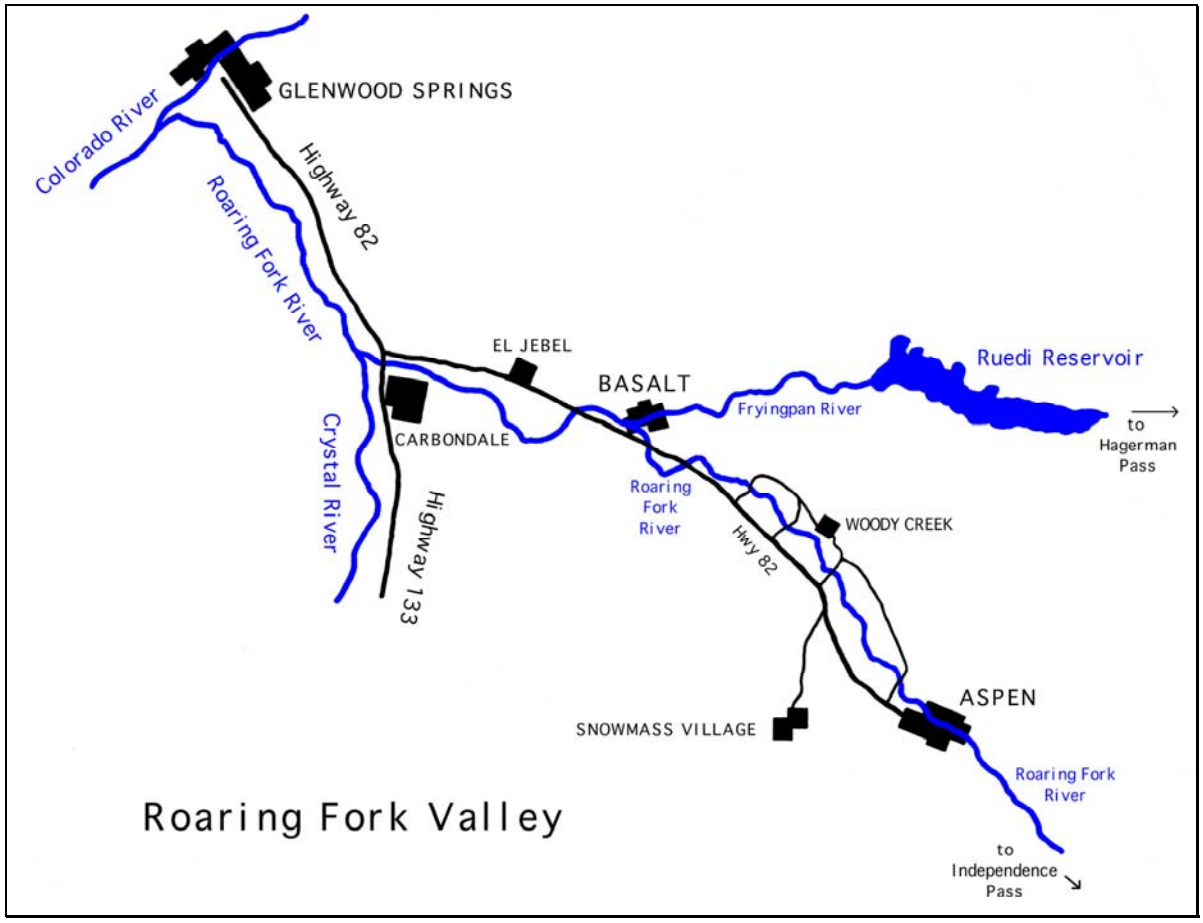


Figure 1

B. Purpose of the Study

The economy and environment of the Fryingpan Valley have changed due to the development of diversion and recreation facilities at Ruedi Reservoir. Residents and visitors have embraced the recreation activities created by the reservoir and supported by its management. There has been great interest in documenting visitor use and the related economic influences of these recreation activities. These recreation activities can be directly restricted by certain conditions, including high releases made from Ruedi into the Fryingpan and the levels of water in the reservoir, hence the interest in exploring the impact of various Ruedi operational policies. The economic study was designed to accomplish this purpose by providing useful baseline information for future decision-making processes related to the management of Ruedi Reservoir.

C. Study Area

The study's fieldwork focused on two specific physical areas within the Fryingpan Valley:

- The publicly accessible stretches of the Fryingpan River between Ruedi Dam and Basalt, which account for 7.5 miles of this 14-mile length of river, referred to in this study as the "lower Fryingpan River"; and
- Ruedi Reservoir, including all of the public facilities and access points around the reservoir, as well as the Aspen Yacht Club.

The broader Roaring Fork Valley, which includes the communities of Aspen, Snowmass Village, Basalt, Carbondale, and Glenwood Springs, provides the overall backdrop for the economic impact evaluation.

For the study's purposes, the lower Fryingpan River was broken into distinct stretches. See Figure 2 for a map showing several of the main access points. Vehicle pullouts along the Fryingpan Road and the road's shoulder provide access to the river from the north side of the river along the public stretches through Mile Marker 12 and the "Old Faithful" reach. The most upstream section of river within the study area extends from just below Baetis Bridge up to Ruedi Dam. This area is accessed via a dirt road to the Rocky Fork Trailhead and dirt roads on both sides of the river from Baetis Bridge to the dam. There are dozens of parking opportunities on both sides of the river, as well as picnic areas and restrooms on the south side.

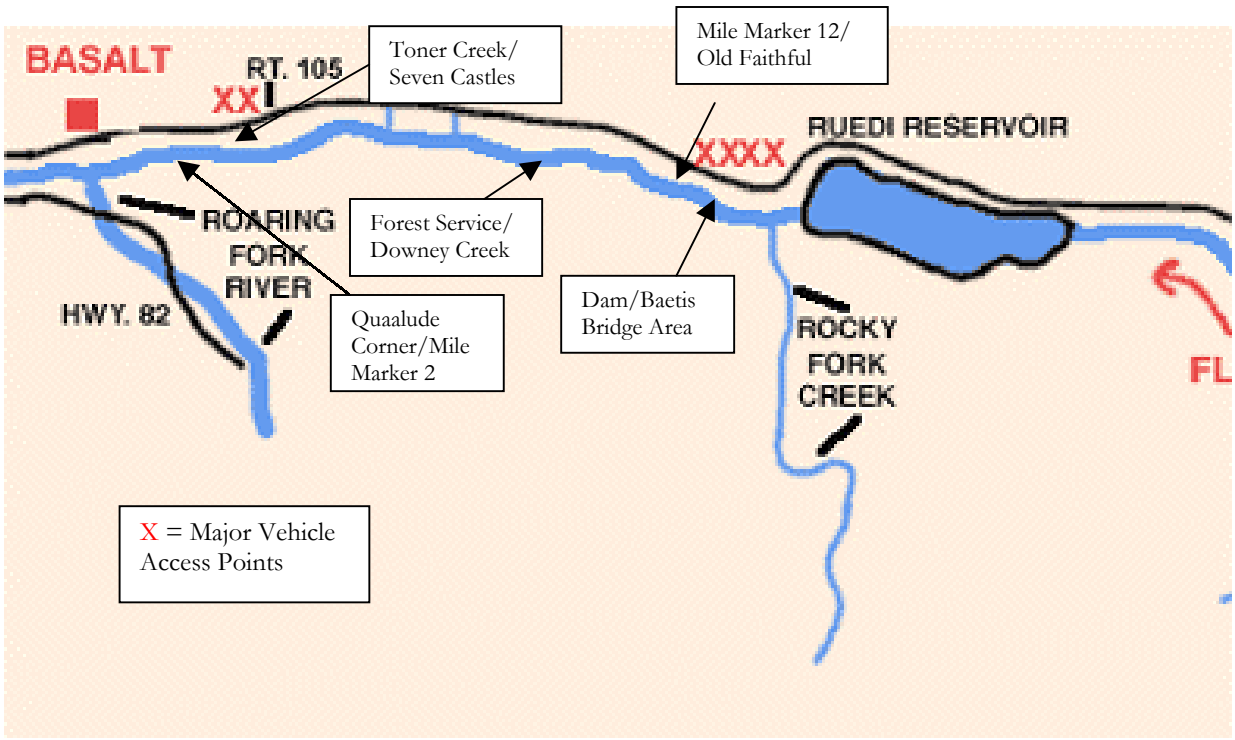


Figure 2
Publicly Accessible Stretches of the Lower Fryingpan River

Ruedi Reservoir includes the Ruedi Marina boat ramp area, which is a day use site and also has 12 campsites. Near the Marina are the Little Maud, Mollie B, and Little Mattie campgrounds, which have a total of 68 developed sites. The entire shore area from the Marina around the Ruedi Creek inlet is used by boaters, picnickers, anglers, and campers.

The Aspen Yacht Club is located along the north shore of the reservoir. It has 75 members (based on family memberships) and 45 boat slips. Freeman Mesa is a day-use site east of the Yacht Club, popular among sailboarders and picnickers. At the reservoir's east end is the Dearhamer boatramp, campground (13 developed sites), and day use area. The upper Fryingpan River enters the reservoir here, making it a popular fishing spot. Just around from Dearhamer along the south shore is the Black Bess day use area, which has picnic and rest facilities. The reservoir and these sites are depicted in Figure 3.

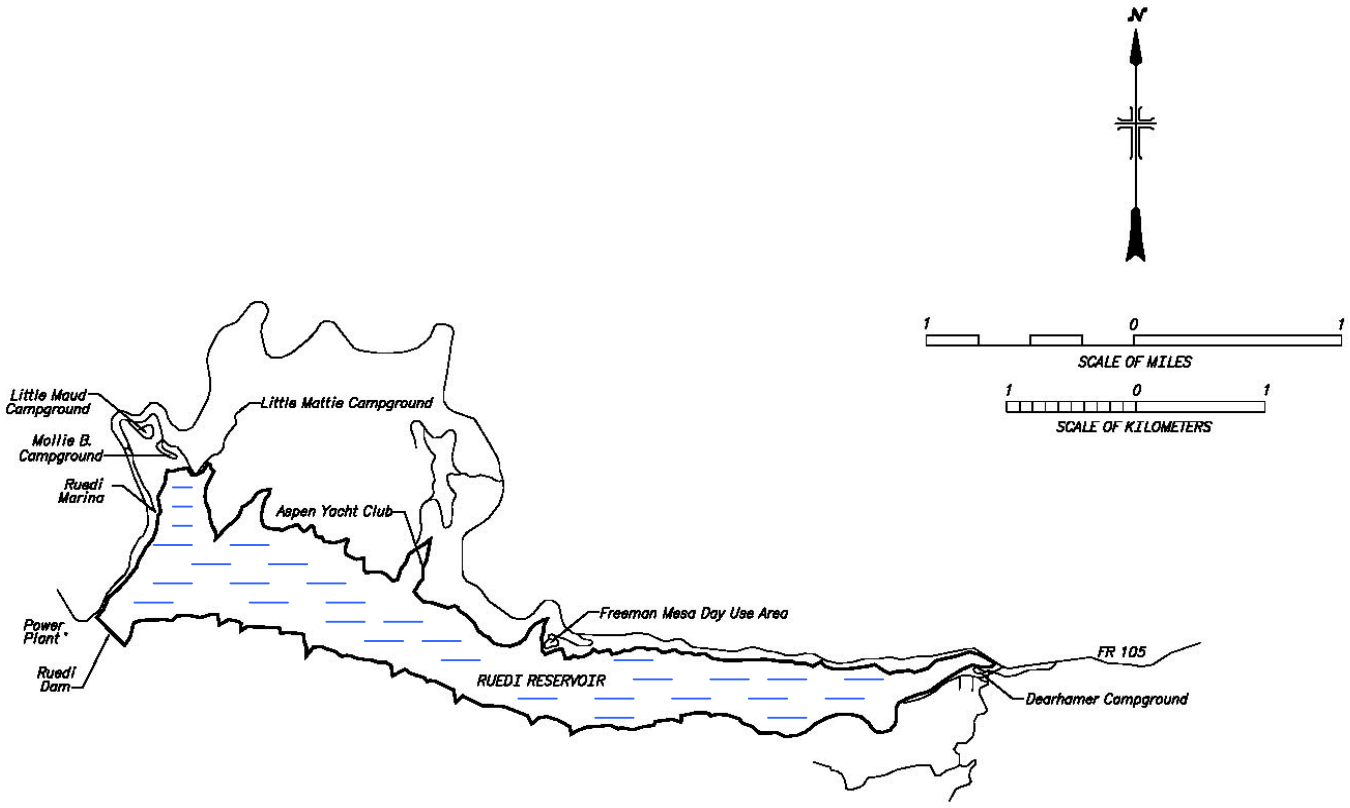


Figure 3
Ruedi Reservoir Recreation Sites

3. STUDY APPROACH

The study approach was based on the following three components, each of which will be addressed in this section:

- Development and implementation of a visitor survey to gather direct expenditure, demographic, trip pattern, as well as visitor preference and opinion data;
- Counting of lower Fryingpan River visitors during survey days; and
- Use of a secondary economic model to estimate total economic output, income, and employment effects, based on the direct expenditure data from the survey.

A. Visitor Survey

Two visitor surveys were developed – one for lower Fryingpan River users and one for summer season Ruedi Reservoir visitors. Questions were included to learn more about Fryingpan Valley visitors in a general sense, to find out about satisfaction levels and preferences, to solicit information about trip-related expenditures, to learn about how water levels influence visitation patterns, and to provide an open-ended forum for comments. Expenditure information was gathered for the Roaring Fork Valley and specifically for the Basalt area. The surveys are provided in Appendix A.

Visitors were contacted randomly on the river and reservoir, given a brief overview of the study, and asked to participate by filling out a survey and mailing it back. This written mail-in survey approach was adopted for several reasons. First, this approach was used so visitors could fill the survey out after their trip; thus helping ensure complete responses based on their entire experience. Second, given that prior to this study, very little information was available about Fryingpan Valley visitors, we felt it important to take advantage of a written survey format to gather as much data as possible. This would have been more difficult to administer in-person. Finally, the brief time it took to contact visitors and hand them a survey did not interfere with their recreational activities.

Only one respondent per household was solicited for the survey, and in an effort to collect the broadest sample possible, typically only one representative of each group was asked to participate. Respondents were asked for name and address information to allow for follow-up if surveys were not returned. One week after the contact date, a reminder post-card was sent to respondents. And five weeks after the contact date, if the survey was still not received, another survey was sent.

For the lower Fryingpan River, a total of 541 surveys were distributed and 397 returned, resulting in a response rate of 74 percent. For Ruedi Reservoir, a total of 406 surveys were distributed and 278 returned, for a response rate of 68 percent. Based on social science literature, these represent excellent response levels. According to Babbie (1991), 60 percent or higher response is good and 70 percent or higher response is very good (p. 267). Such high response rates allow for strong confidence in applying the results from the two survey samples to the entire population of visitors to the respective sites.

Out of a total of 596 contacts made on the Fryingpan, seven individuals refused (1 percent), while eight individuals (2 percent) refused out of 463 contacted at Ruedi Reservoir. The main reason given for not participating was that the visitor did not have time. A number of contacts represented visitors that had already been asked earlier in the study period to fill out the survey. These previously contacted visitors were not asked again to participate.

The number of survey days totaled 63 on the lower Fryingpan River, distributed from November 1, 2000 through October 31, 2001. There were 28 survey days at Ruedi Reservoir, starting May 23, 2001 and finishing on September 9, 2001. Survey days were spread as evenly as possible across all days of the week, with a higher number of survey days per month during the "on-season" months (May through September). Survey distribution and response statistics for sites along the lower Fryingpan River and at Ruedi Reservoir are shown in Table 1.

Table 1
Survey Distribution and Response Rates

Site	Surveys Given Out	% of Total Given Out	Responses	Response Rate
Lower Fryingpan River				
Dam to below Baetis Bridge	364	67 %	269	
Below Baetis Bridge to Basalt	177	33 %	128	
Total	541		397	***74 %***
Ruedi Reservoir				
Ruedi Marina	146	36 %	96	
Little Maud/Mollie B/Little Mattie Campgrounds	101	25 %	63	
Aspen Yacht Club	57	14 %	47	
Dearhamer Area	55	13 %	38	
Freeman Mesa	47	12 %	34	
Total	406		278	***68 %***

B. Lower Fryingpan River Counts

Given the many trips that were planned to administer the survey on the lower Fryingpan River, it was also decided to take advantage of this time on the river and count visitors along the publicly accessible stretches. No known direct visitor use information

had ever been previously collected for the Fryingpan River. Counts were made either during the drive up or down the Fryingpan Road, usually within a one-hour time period, and were tracked by stretch of the river (see Figure 2). Both visitors and vehicles were counted. If a vehicle was seen parked along a stretch, we attempted to locate the person(s) that belonged to the vehicle. The type of recreational activity being undertaken by the visitors was also tracked. The visitor use estimates that resulted from this effort are further described in Section 4.A.

C. Water Levels

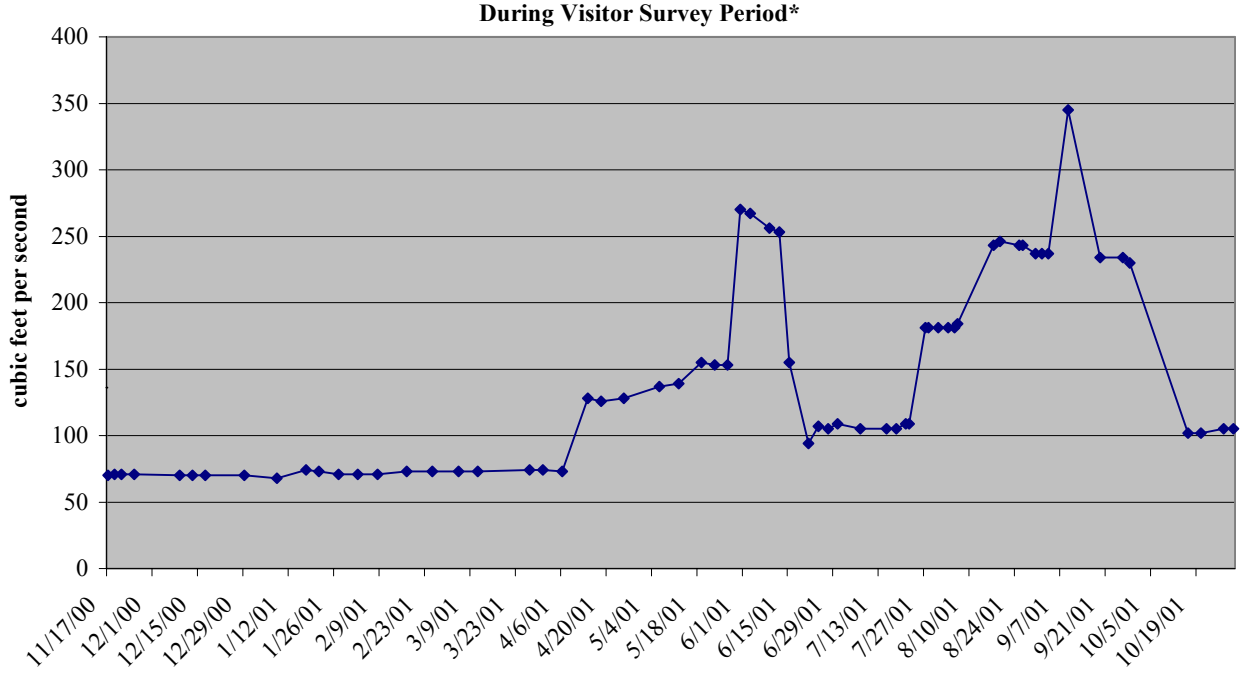
The operating principles established for Ruedi Reservoir require that releases from the reservoir result in Fryingpan River streamflows that, between November 1st and April 30th, equal or are above 39 cubic-feet per second (cfs) or the inflow, whichever is smaller; and between May 1st and October 31st are above 110 cfs or inflow, whichever is smaller. Over the years, as angling has become more popular, angler access in the lower Fryingpan River has become an issue, with some documentation that wadeable area becomes restricted above 250 cfs (U.S. Department of Interior, Bureau of Reclamation, 1989). The Bureau of Reclamation generally has used the target range of 250-300 cfs as a guideline for summer management of releases from the reservoir. Since 1989, Ruedi has been contributing water to the Colorado River Endangered Fish Recovery Program, and due to releases for this program, the lower Fryingpan River has exceeded flows of 250 cfs during the months of July, August, and/or September in eight out of the last 13 years (U.S. Department of Interior, Bureau of Reclamation, 2002).

Based on historic data (1975-1998), average Fryingpan flows have remained between 100 and 150 cfs during winter months, with a peak at around 300 cfs in June, flows between 200 and 250 cfs in July, and a drop to between 150 and 200 cfs for August through October. During the study's field season, the Fryingpan River experienced a peak in late summer streamflows related to provision of water from Ruedi for endangered fish recovery. As shown in Figure 4, the highest flow experienced by survey respondents was 345 cfs on September 9, 2001. The winter flows during the 2000/2001 study season remained below historic averages at around 70 cfs.

Management of Ruedi Reservoir has historically resulted in an average minimum reservoir level of around 60,000 acre-feet in April, the storage of spring runoff starting in May with peak summer reservoir levels reached by mid to late July (at or close to capacity), and a slight drop to around 95,000 acre-feet by Labor Day. In 2001, due to a below normal snowpack, inflows into Ruedi Reservoir were only 65 percent of average. This created a unique situation where Ruedi did not "fill." The reservoir was at 80,000 acre-feet on Memorial Day, reached a maximum of 96,190 on July 21st, and by Labor Day had dropped to around 90,000 acre-feet (see Figure 5 – based on provisional data from the Colorado Division of Water Resources).

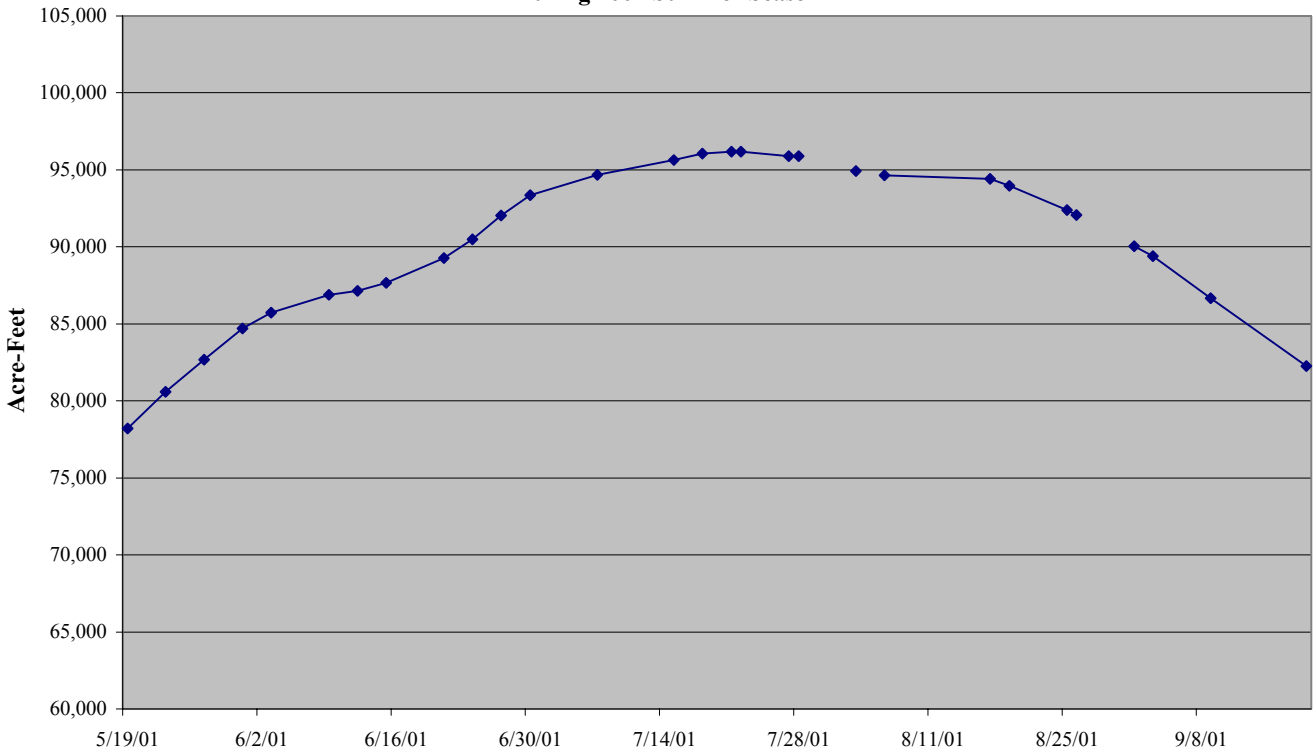
There are three boat ramps at Ruedi – the main Ruedi Marina boat ramp, which is operable until the reservoir drops below a capacity of 52,000 acre-feet, and the Dearhamer and Aspen Yacht Club boat ramps, which cannot be used when the reservoir has around 85,000 acre-feet of water or less.

Figure 4
Fryingpan River Streamflows
During Visitor Survey Period*



***source: USGS 09080400 Fryingpan River near Ruedi, CO**
Provisional Data

Figure 5
Ruedi Reservoir Storage Capacity
During 2001 Summer Season



D. Secondary Economic Impact Model

The final aspect of the study was choosing and applying a model to estimate the total economic output, and income and employment related to recreation in the Fryingpan Valley. The two surveys provide a detailed set of direct expenditure data, which together with the visitor use estimates, allow for analysis of total annual direct spending brought into the Roaring Fork Valley, and more specifically the Basalt area, by Fryingpan River and Ruedi Reservoir visitors. This data is then modeled to generate estimates of the total output and income – or direct spending plus the chain of additional resulting economic activity, commonly referred to as the "multiplier effect." The model also assesses the increased income and number of jobs related to the economic inflows. Results are available by economic sector, which creates a better understanding of how the economic effects are distributed within the local and regional economy.

IMPLAN (Input-Output Model for Planning and Analysis) software was chosen for this task. IMPLAN represents a secondary economic model with data templates at the county level. It is used frequently by agencies and land managers who are evaluating the economic effects of various land use activities, including agriculture and recreation. Section 7 provides a detailed reporting of the economic impact analysis.

4. VISITOR USE

A. Lower Fryingpan River

Visitation estimates for the public stretches of the lower Fryingpan River were made based on actual counts conducted during 63 survey days between November 1, 2000 and October 31, 2001. Counts were made of all individuals seen along or on the publicly accessible portions of the river during the drive either up or down the Fryingpan Road. The counts thus represent "snapshots" of visitor use (a term which would be used repeatedly throughout this section), generally within a one-hour period of time, along the river. Any visitor that was seen along the river was counted, regardless of the total amount of time spent on the river. Thus, these counts reflect all visitors to the lower Fryingpan, including those that might just be passing through and stopping for a few minutes.

Vehicles were also tallied during these "snapshot" counts. During the on-season, at a given point in time, there were as many as 35 vehicles counted from the Dam to just below Baetis Bridge; and from below Baetis Bridge to Basalt, as many as 37 vehicles were counted at a given time along various pullouts and road shoulders.

We also conducted several counts over a larger part of a day at the Dam/Baetis Bridge area in order to gain perspective on how much of daily visitor use a "snapshot" count represents. Total annual visitor use was estimated by applying other available count information for the Dam/Baetis Bridge area to our "snapshot" one-hour counts in order to come up with average full-day counts. Average visitor use was calculated for weekends and weekdays and the off-season and on-season. A distinction was also made between two areas: the upper section of the river from the dam to below Baetis Bridge and the

public stretches from below Baetis Bridge to Basalt. Table 2 provides the additional partial and full-day count data for the stretch of the lower Fryingpan River from the dam to below Baetis Bridge that was utilized in the total annual use estimates.

Table 2
Dam/Baetis Bridge Partial and Full-Day Count Data

Day	Date	Time of Count	# of Visitors	# of Vehicles	Count Done By:
Saturday	Feb. 16, 2002	10 am – 4:30 pm	53	30	USFS*
Thursday	Aug. 30, 2001	3 pm – 6 pm	38	21	This Study
Saturday	Aug. 18, 2001	11 am – 6 pm	139	84	This Study
Friday	July 27, 2001	9:45 am – 5:15 pm	110	63	This Study

***USDA, Forest Service, National Recreation User Survey (Wellner, 2002)**

The above data were used in determining factors for converting "snapshot" count averages into full day count averages. For example, the full-day weekend on-season count of 139 was divided by the average weekend on-season "snapshot" count of 31 to obtain a factor of four. In other words, it is assumed that on these days there were four times as many visitors at the Dam/Baetis Bridge area during a day as were counted during the "snapshot." Table 3 provides a complete summary of average "snapshot" count data, as well as total visitor use estimates. A factor of four is used for on-season weekday and weekend days in the Dam/Baetis Bridge area, as well as off-season weekend days.

No actual full-day count data is available for the public stretches of the river downstream of the Baetis Bridge area. A factor of two is used to estimate full-day use for this area, which has a lower capacity for access than does the Dam/Baetis Bridge area. This ratio seems reasonable given the fact that count data were taken both in the mornings and the afternoons – hence splitting the day into "two" parts. This ratio is also used for the Dam/Baetis Bridge area on off-season weekdays, given the lack of additional count data to determine otherwise.

Table 3
Visitor Use on Public Stretches of the Lower Fryingpan River

	Off-Season *(October1 – April 30)*						On-Season *(May 1 – September 30)*						**Total Annual Visitor Days**
	# of Count Days	Count Avg.*	Full Day Conversion Factor**	Average per Day	# of days	Total Off-Season Visits	# of Count Days	Count Avg.*	Full Day Conversion Factor**	Average per Day	# of days	Total On-Season Visits	
Dam to below Baetis Bridge: Visitors/WkD	14	12	2	24	150	*3,600*	16	27	4	108	106	*11,448*	15,048
Dam to below Baetis Bridge: Visitors/WkE	14	15	4	60	62	*3,720*	19	31	4	124	47	*5,828*	9,548
Below Baetis Bridge to Basalt: Visitors/WkD	14	6	2	12	150	*1,800*	16	22	2	44	106	*4,664*	6,464
Below Baetis Bridge to Basalt: Visitors/WkE	14	6	2	14	62	*744*	19	26	2	52	47	*2,444*	3,188
Totals	28				212	***9,864***	35				153	***24,384***	**34,248**

WkD = Weekday
WkE = Weekend Day
* The count average reflects a count taken over a ½ - 1 hour time period.
**Based on the assumption of a.m. and p.m. shifts of visitors from below Baetis Bridge to Basalt and from the Dam to below Baetis Bridge during off-season weekdays, and full-day count data from the Dam to below Baetis Bridge during off-season weekends and the on-season (see below).

Of the 34,248 total annual visitor day estimate, 72 percent of visits are in the Dam/Baetis Bridge area and the remaining 28 percent are downstream to Basalt. Seventy-one percent of visitor use is concentrated during the on-season. It should be stressed that this visitor use estimate reflects only those users on publicly accessible stretches of the river. There are additional visitor days on the river in the form of fishing and other activities on privately accessed parts of the river, which include a significant number of days of private guiding. No clear estimate of this type of visitor use is presently available for the Fryingpan.

In addition, the visitor use estimate should be considered as conservative, given that anglers often fish during early morning and late evening hours, times which were not covered in the counts used in the analysis. Snapshot and full-day counts tended to focus on a time period between 9am and 6pm. In considering the likelihood of an additional two hours of active angling during the on-season, especially to cover the late evening insect hatches and after-work local crowd, a 20 percent increase (representing the additional portion of a typical on-season angling day not covered by the counts) in the on-season count estimates would provide a guide for an upper range. This accounts for a possible added range of 4,880 visitor days.

Of the Fryingpan River visitors counted, 86 percent were anglers. The remaining 14 percent of visitors were participating in activities such as picnicking, playing with dogs in the river, watching anglers, walking, and sitting beside the river. It should be noted that 96 percent of survey respondents indicated that the primary purpose for their visit to the lower Fryingpan was angling. This percentage is higher than the overall percentage for visitors counted because on a number of occasions the survey was given to a member of the party who was not angling, but the angler ended up filling out the survey.

Commercially guided angling trips are common on the lower Fryingpan, a practice that is regulated by the U.S. Forest Service (USFS). Four permitted guide services have been allocated a total of 1,521 angler days per year on the public stretches of the lower Fryingpan. In the year 2001, according to USFS data, a total of 1,337 service days were reported by permitted outfitters as being used (Allred, 2002). Given this data, based on a total annual estimate of angler days of 29,450 (86 percent of 34,248),

commercial trips would account for 5.2 percent of total angler days on the lower Fryingpan.

B. Ruedi Reservoir

During the 2001 summer season, when and where possible, the concessionaire staff at Ruedi checked that visitors paid for appropriate permits and also counted the number of people per party. However, these total visitor day estimates should be viewed as conservative. There are gaps because concessionaire staff were only able to accurately track the number of people per party within the campgrounds and at the Ruedi Marina, and weren't always present to administer these sites. In self-pay areas (such as Freeman Mesa, Black Bess, and the Dearhamer day use area) users did not always comply with the fee process, and thus were not counted at all – and number of people per party were not tallied at these sites. Visitors just passing through and stopping for a few minutes are also not represented in these site estimates, given that they did not register through the USFS permit/fee process.

Based on statistics from the USFS White River National Forest, visitor day counts at Ruedi for the 2001 summer season are shown in Table 4.

Table 4
Ruedi Reservoir Visitor Use:
2001 Summer Season

Site	# of Visitor Days
Ruedi Marina Day Use	4762
Freeman Mesa Day Use	346
Black Bess Day Use	651
Dearhamer Campground	1493
Little Maud Campground	1583
Mollie B Campground	4018
Little Mattie Campground	2003
Ruedi Marina Campground	450
Total Visitor Days	**15,306**

*USDA, Forest Service, 2002

In addition, these estimates do not include the Aspen Yacht Club, for which comprehensive use information is not available. The Yacht Club generally hosts one or

two regattas every summer, with the two-day regatta in the summer of 2001 drawing 60 boats and 250-300 people, many of whom were non-local.

Campground visits account for 62 percent of all visitor use, and day use represents the other 38 percent. The campgrounds and day use sites at Ruedi Reservoir represent over half of all of the sites managed by the USFS within the White River National Forest's Sopris Ranger District. In addition to the Ruedi sites, the USFS also manages one campground in the upper Fryingpan Valley (Chapman) and four campgrounds in the Crystal River Valley.

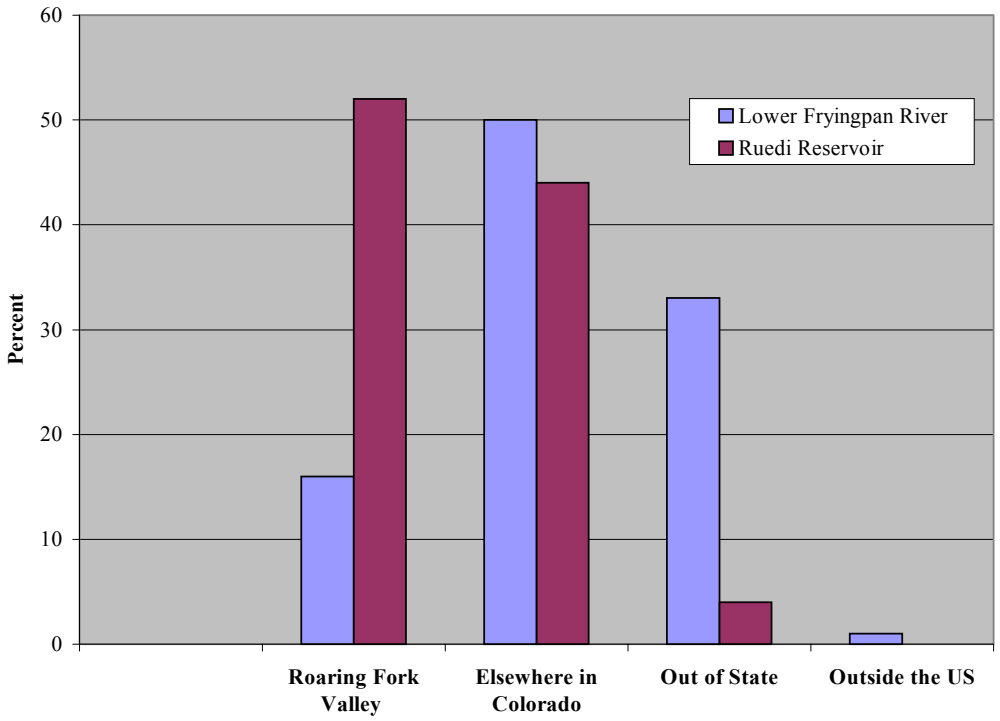
The next two sections contain results from the visitor survey data. A full set of descriptive statistics are provided with the surveys in Appendix A.

5. WHO IS VISITING THE FRYINGPAN VALLEY?

A. General Demographics

The river and reservoir each represents a distinct set of recreation visitors. Not surprisingly, anglers accounted for an overwhelming 96% of those surveyed on the river, while reservoir respondents participated in a variety of activities including fishing, water-skiing, sailing, motor-boating, jet-skiing, canoeing/kayaking, sailboarding, camping, picnicking, and hiking. Figure 6 displays the area of origin for river and reservoir respondents. A key difference between the two sites is seen here, with 84 percent of river respondents coming from outside of the Valley, compared to 45 percent of reservoir respondents being non-local.

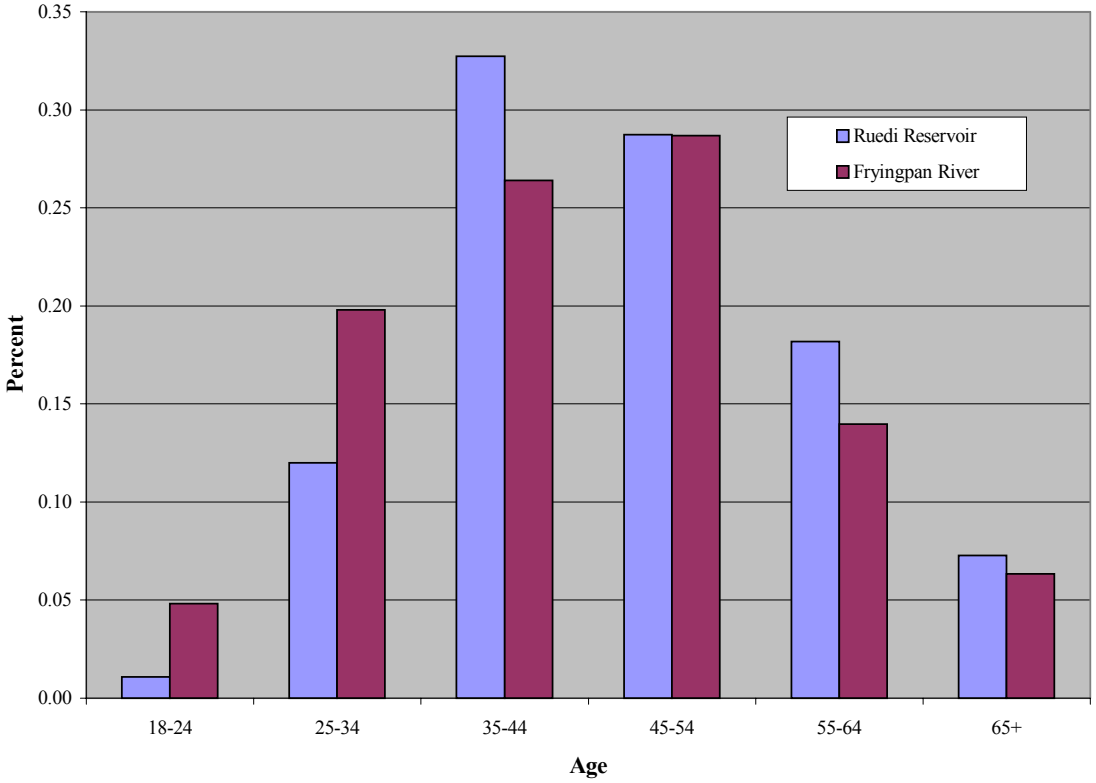
Figure 6
Origin of Fryingpan Valley Survey Respondents



Of those respondents who were non-local, a large proportion (66 percent) of Fryingpan River respondents indicated that visiting the Fryingpan was the main purpose for their visit to the Roaring Fork Valley. Twenty-one percent said visiting the Fryingpan was one of several important reasons for making their trip to the Valley. These respective results for Ruedi non-local respondents were 64 percent and 23 percent.

As the surveys were targeted to adults, who were the people making trip decisions, the following demographics represent adult visitors. Age distributions are presented in Figure 7. Average ages for Fryingpan River and Ruedi Reservoir respondents are 45 and 47 respectively. A dramatic difference in visitors is shown in gender, with 91 percent of lower Fryingpan respondents being male, compared to 58 percent at Ruedi.

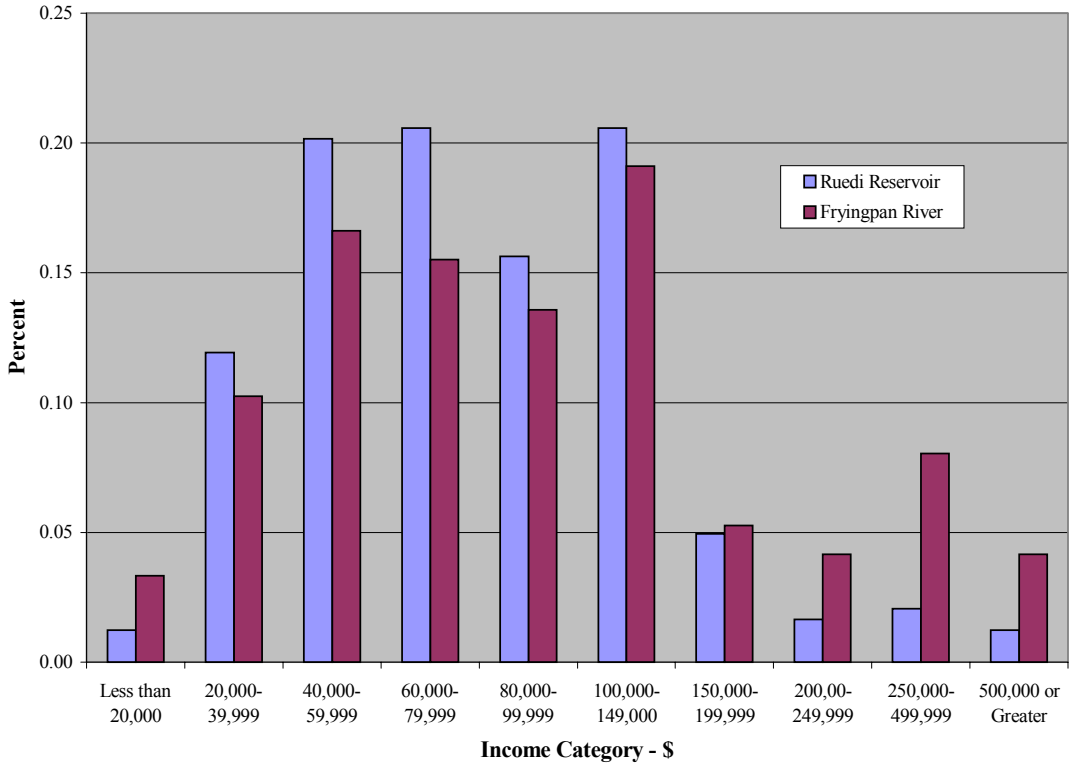
Figure 7
Age Distribution of Fryingpan Valley Survey Respondents



The average household income results represent a relatively affluent level, with an average of $128,500 for lower Fryingpan respondents and $93,600 for Ruedi respondents. Distributions are shown in Figure 8. As a basis for comparison, in the Aspen Chamber Resort Association's study of non-winter visitors that was conducted during the year 2000, the average household income was $158,000 (Leisure Trends Group, 2000). Sixty-four percent of Fryingpan River respondents have a college degree or post-graduate schooling, compared to 50 percent for Ruedi respondents.

A broad overview of these demographics indicates that the average Fryingpan River visitor is a non-local male, middle-aged angler with a high level of education and household income. Ruedi Reservoir visitors tend to be middle-aged, local residents with fairly high income and education levels, drawn to Ruedi for a variety of recreational activities.

Figure 8
Income Distribution for Fryingpan Valley Survey Respondents



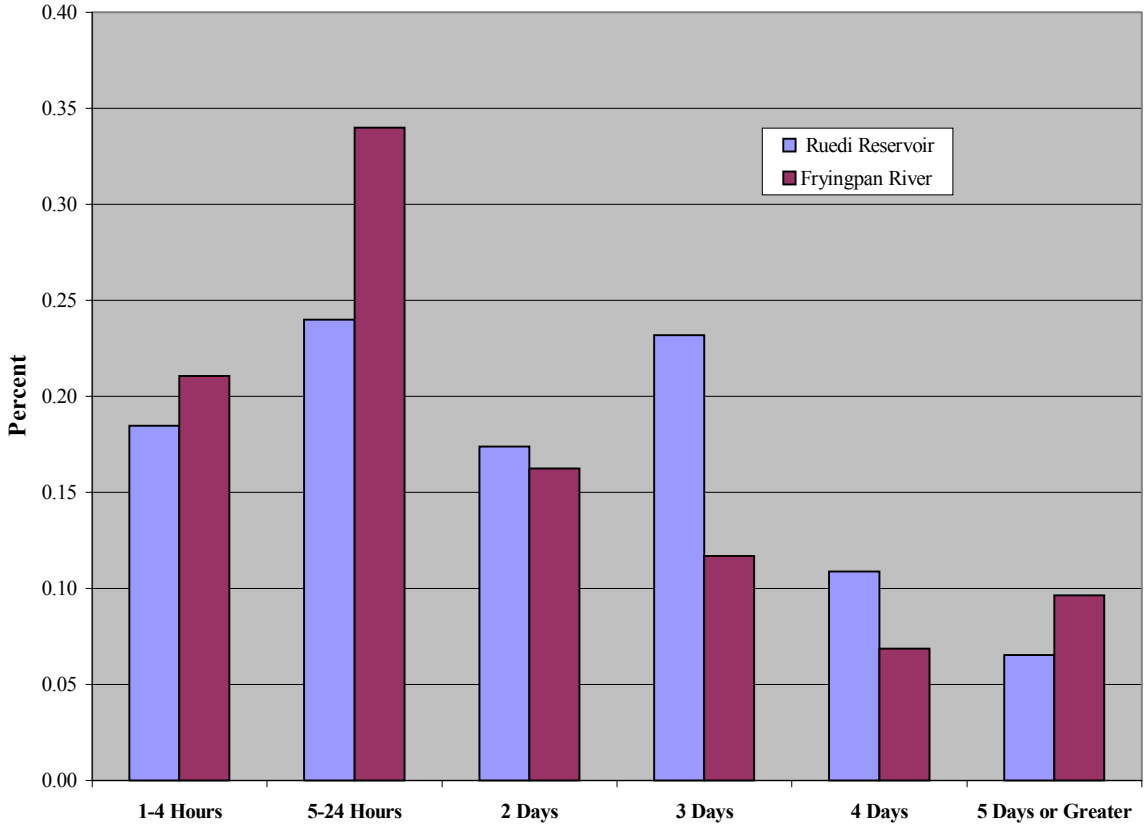
6. VISITOR PATTERNS, ACTIVITIES, AND PREFERENCES

A. Visitor Patterns

The Fryingpan Valley draws a loyal base of visitors, with 76 percent of Lower Fryingpan respondents indicating they had visited the Fryingpan previously and an even higher percentage of Ruedi respondents, 81 percent, representing repeat visitors. In terms of frequency of trips taken, repeat Fryingpan respondents had visited an average of 5.2 times during the 2000 summer season (May through September). Ruedi Reservoir again was higher, with an average of 6.6 trips taken during the 2000 summer season, ranging broadly between zero and 70. Average trip length both at Ruedi and on the lower Fryingpan was just over two days.

As shown in Figure 9, a majority of Fryingpan River respondents participated in one-day trips. Ruedi visitors were more evenly balanced across both one-day and multi-day trips.

Figure 9
Fryingpan Valley Respondent Trip Length



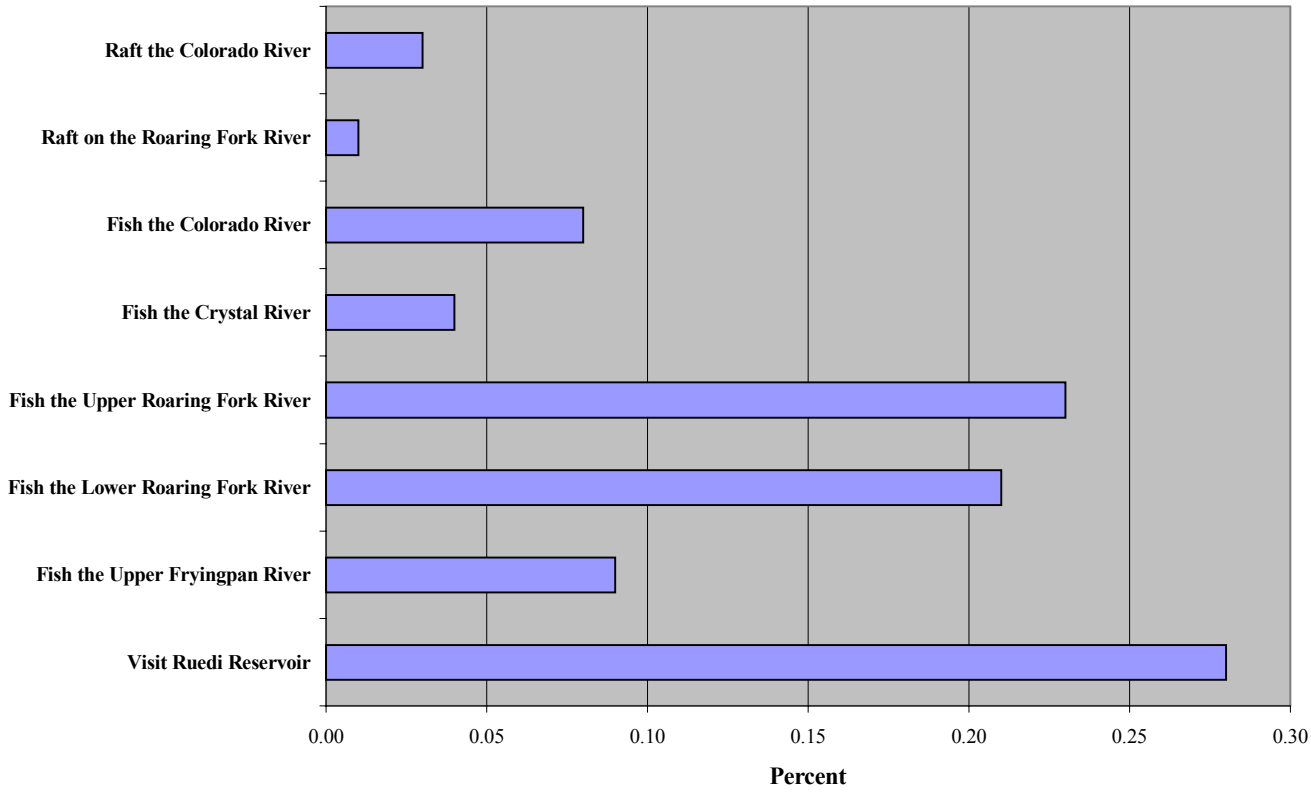
Across both the lower Fryingpan and Ruedi respondents, the most frequent party size was two. Ruedi had an average party size of 4.2, and had several large groups (with a maximum group size of 50), with 6 percent of respondents in groups of 10 or more. The average lower Fryingpan party size was 2.6.

B. Visitor Activities

As noted previously, most lower Fryingpan respondents were engaged primarily in angling. A majority of Fryingpan angler respondents were nymph fishing (58 percent), followed by dry fly fishing (33 percent), and 6 percent of respondents indicated they used

both techniques during their trip to the river. These respondents generally considered themselves intermediate to expert in their angling skill level (91 percent). Only three respondents said they were complete novices. Non-local Fryingpan River visitors were asked what other activities they engaged in while in the Roaring Fork Valley. The percent response to the various categories is presented in Figure 10.

Figure 10
Other Activities of Fryingpan River Respondents
(Non-locals)



Ruedi Reservoir respondents participated in an array of recreation activities during their time at the reservoir, as described in Table 5.

Table 5
Ruedi Reservoir Recreation Activities

Activity	% of Respondents	Activity	% of Respondents
Sailing	20	Sailboarding	5
Water Skiing	19	Jet Skiing	10
Motor Boating	30	Boat Camping	4
Photography	25	Hiking	17
Fishing from shore	33	Sightseeing	35
Fishing from boat	20	General Camping	50
Picnicking	16	Fishing the Fryingpan Above Ruedi	14
Viewing Wildlife	25	Fishing the Fryingpan Below Ruedi	16
Kayaking/Canoeing	7		

The combination of the distinctly separate watercraft activities of sailing, motor boating, kayaking/canoeing, and sailboarding make up the predominant general recreation category – with 62 percent of respondents engaging in these water-based boating activities. Camping and fishing also represent popular activities.

C. Reservoir Level and Streamflow Preferences

Several survey questions asked Ruedi Reservoir respondents about their general preferences and sensitivity to reservoir levels, including the following:

Depending on the reservoir level, different amounts of shore are available for recreation purposes. During this trip, would you say that: (Check One)

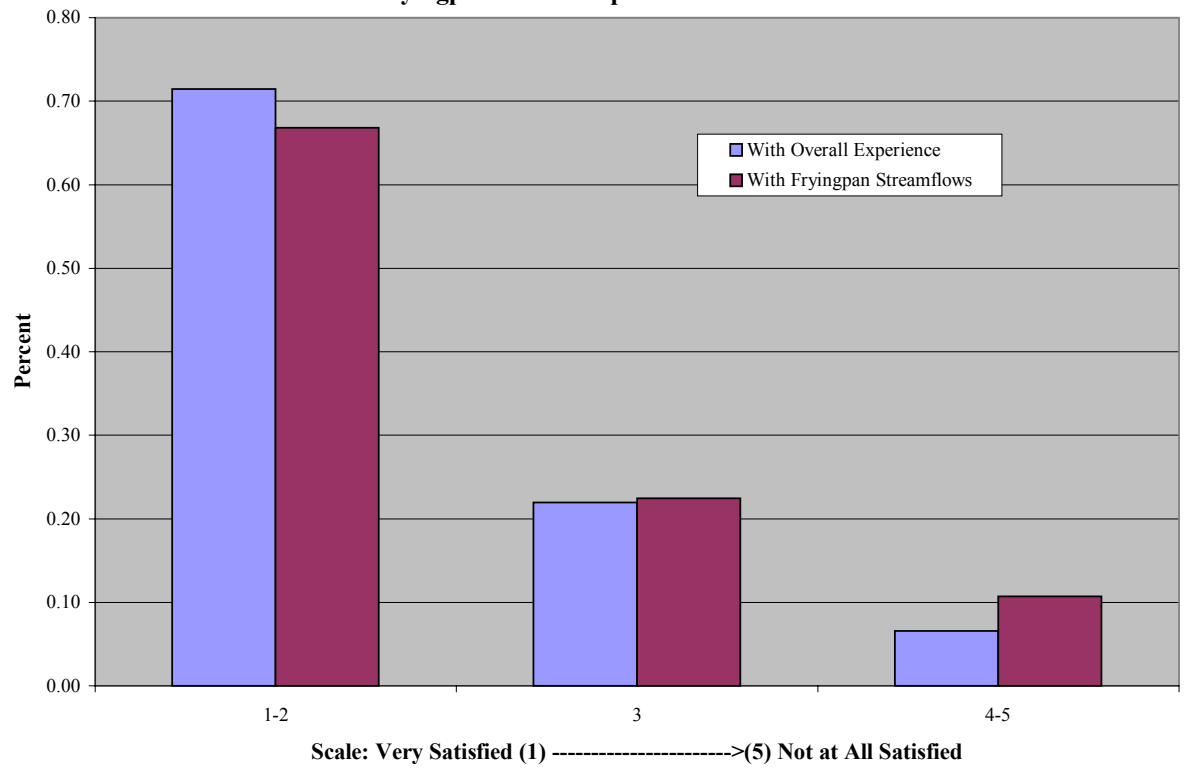
- There was an adequate area of shore available 52%
- There was not enough shore available 7%
- There was too much shore 14%
- Shore area did not affect my experience one way or another 27%

The results to this question (shown above) correspond with those from an inquiry about reservoir levels, as 52 percent of respondents also indicated that the reservoir level was "about right" during their trip. However, over a third of respondents (35%) said the level was "too low." When respondents were asked if they would still make their trip to Ruedi if it were 10 feet lower than the level they experienced on their trip, 69 percent said "yes."

In looking at the Fryingpan River survey responses to general questions about streamflow preferences, results indicate a visitor group that is sensitive to water levels – in this case streamflows. Of the 96 percent of respondents whose primary activity was

fishing, 67 percent indicated that if streamflows in the Fryingpan River during their trip were at a level that restricted them to bank fishing or to a guided trip to a private area that had better in-stream access, they would choose to **not** still make the trip. Results for Fryingpan River respondent satisfaction levels are shown in Figure 11. Satisfaction levels are generally high for river respondents, although the number of respondents not satisfied with streamflows is almost double the proportion that were not satisfied with the overall experience.

Figure 11
Fryingpan River Respondent Satisfaction Levels



D. The "What If" Questions

In addition to the more general water level questions discussed in Section 6.C., we asked a series of "what if" questions known as contingent behavior questions in order to assess how major differences in water management affect recreation visitation. These questions are frequently used to evaluate changes in recreation visitation to changes in

management that are either outside the range of anything currently experienced, or that occurred so long ago or with such infrequency that one cannot rely on past behavior.

One Fryingpan River survey question asked the following:

If you knew prior to your trip that streamflows on the Fryingpan River might vary from half as large as what you experienced to twice as large as what you experienced on this trip, would this affect your decision to visit the Fryingpan River next year?

- Yes 63%
- No 37%

Of the 62 percent who responded "yes," 61 percent indicated that they would not visit the Fryingpan if streamflows were double what was experienced on the trip and 60 percent indicated that they would not visit the Fryingpan if streamflows were half of what was experienced on the trip. Only 27 percent of respondents answered "no" to both, indicating that they would not visit the Fryingpan River in the following year if they knew that streamflows were either double or half of what was experienced on their trip. These results indicate that anglers are sensitive to streamflows – which can influence their visitation patterns to a given river or stream.

Seventy-two percent of reservoir respondents indicated that they would not change the number of total trips to Ruedi if they had learned at the beginning of the summer season that the reservoir would remain above 95,000 acre-feet through Labor Day. The majority of the 28 percent who said they would change the number of trips indicated that they would take more trips. When looking at the question asking if respondents would change the total number of trips to Ruedi if they learned at the beginning of the summer season that Ruedi was expected to drop below 85,000 acre-feet by Labor Day, 46 percent said they would change the number of trips – with all but three respondents indicating they would take fewer trips.

These summary results represent a starting point for looking at the effects of water levels and streamflows on visitor patterns and preferences. A future more in-depth analysis of the contingent behavior data generated from this study, while out of the scope of this report, would provide extremely useful information on this topic.

E. Other Factors Influencing Visitation

Because of Ruedi's chilly water temperatures earlier in the summer season, a survey question was posed asking respondents if water temperature influences the timing of their trips to Ruedi. A majority of respondents (78 percent) indicated that water temperature is not a factor in determining trip timing.

When asked about congestion, 14 percent of lower Fryingpan River anglers said that it was "very crowded" at the point on the river where they were contacted, and 55 percent said it was "somewhat crowded." Interestingly, as a follow-up, only eight percent said that the number of other anglers "substantially lessened the quality of the angling experience" and 36 percent said that the number of other anglers "somewhat lessened the quality of the angling experience." This indicates that although angling conditions might be crowded, this does not necessarily detract from the quality of the experience. There were a number of written comments made, however, concerning overcrowding and impacts it has on both the resource and the recreational experience. Some respondents also noted that they only fish the lower Fryingpan in the winter due to overcrowding in the summer. These comments, along with an extensive assortment of other open-ended comments, have been compiled for use by management agencies and other interested parties (Appendix B).

7. ECONOMIC IMPACT RESULTS

A. Direct Spending

The visitor surveys provided very detailed information on expenditures made within the Roaring Fork Valley by Fryingpan River and Ruedi Reservoir visitors. New economic activity that can be attributed to Fryingpan Valley river and reservoir recreation is generated by those coming to the Roaring Fork Valley from elsewhere, i.e. tourists. Dollars spent by local residents visiting the Fryingpan River or Ruedi Reservoir do not represent new economic activity, as they would have been spent in other ways within the Valley, and thus are not considered within the analysis. More specifically, data was used only for the respondents who were tourists, and only for those tourists who

indicated that visiting the lower Fryingpan River or Ruedi Reservoir was either the main purpose or one of several important reasons for their trip to the Roaring Fork Valley. These respondents represented 74 percent of the total Fryingpan River sample and 40 percent of the Ruedi Reservoir sample. By focusing on tourists coming to the Roaring Fork Valley specifically to visit the lower Fryingpan and Ruedi Reservoir, we can make an accurate and solid link between these water resources and the visitor spending for which they are directly responsible.

One-hundred percent of expenditures were used for those respondents indicating that visiting the lower Fryingpan or Ruedi Reservoir was the "main purpose" for their trip to the Roaring Fork Valley. For respondents who indicated that visiting these sites was "one of several important reasons" for coming to the Roaring Fork Valley, the expenses were apportioned according to the time spent on the river or at the reservoir as a proportion of the total time spent in the Roaring Fork Valley.

Total direct spending in the study area was calculated by multiplying the average per person daily expenditure by the estimated annual tourist visitation to the lower Fryingpan and Ruedi Reservoir coming to the area primarily to visit these sites. Because visitors staying overnight tend to have different expenditure patterns and levels than do those on day trips, average expenditure data for this study was distinguished between those who were staying in some form of commercial accommodation and those who were not. Visitors spent money on a variety of items related to their trip, including lodging, groceries, gas, restaurants, retail purchases, guide fees, and campsite/day use fees. Average per person per day expenditures by category for Fryingpan River respondents are presented in Figures 12 and 13.

Figure 12
Percentage of Expenditures by Category:
Fryingpan River Respondents with Commercial Overnight Stay
(average expenditure per visitor per night: $135.62 in Roaring Fork Valley)

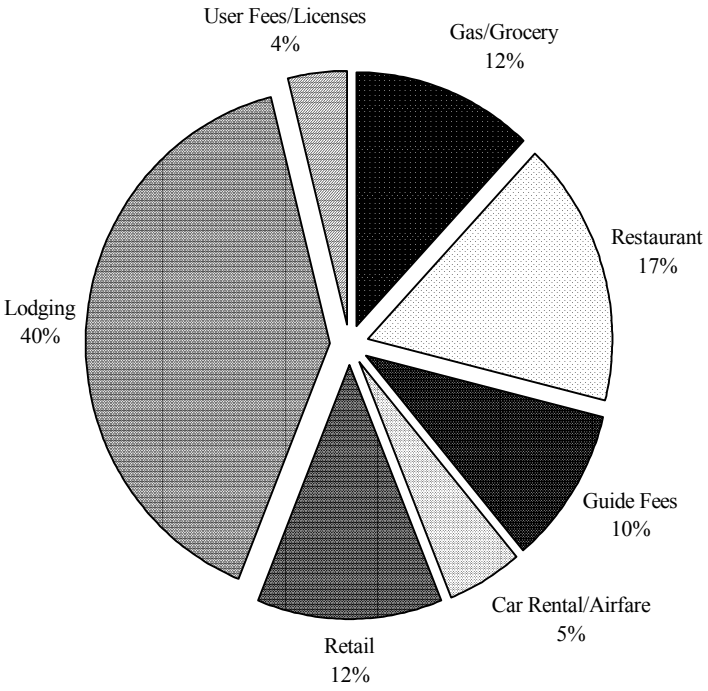
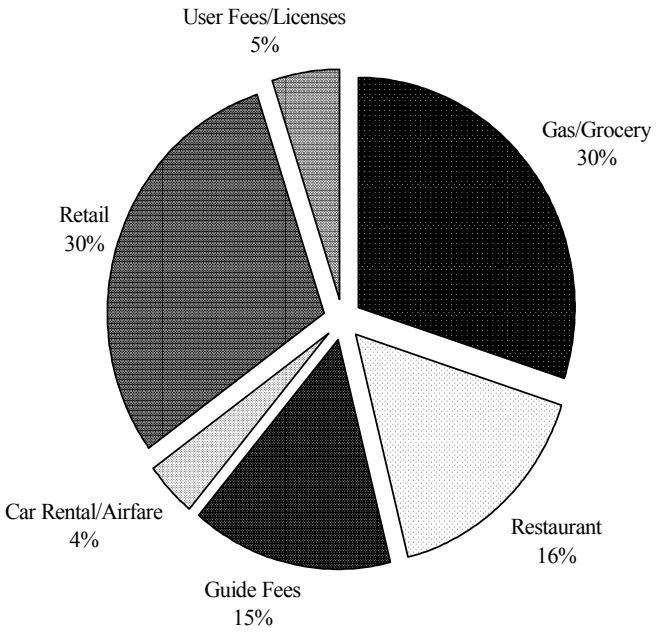


Figure 13
Percentage of Expenditures by Category:
Fryingpan River Respondents without Commercial Overnight Stay
(average expenditure per visitor per day: $49.21 in Roaring Fork Valley)



As shown in Table 6, the lower Fryingpan River generates 95 percent of the new economic spending brought in by Fryingpan Valley recreation, contributing $2,608,465 annually in direct spending to the Roaring Fork Valley. Ruedi Reservoir contributes $147,067 in a summer season, a much smaller amount because most Ruedi visitors are local, and those visitors that are non-local have relatively low expenditures typical of camping trips (50 percent of Ruedi respondents were camping). In addition, Ruedi visitation is less than half of the visitation that occurs on the lower Fryingpan River. These total direct spending figures should be treated as on the low end, given the conservative nature of the total visitor use estimates for both the lower Fryingpan River and Ruedi Reservoir.

Table 6
Direct Expenditures Made by Fryingpan Valley Visitors

	Avg. Expenditure per Day: RFV ($)	Avg. Expenditure per Day: Basalt Area ($)	Total Annual Expenditures: RFV ($)	Total Annual Expenditures: Basalt Area ($)
Lower Fryingpan River Visitors **without** Commercial Overnight Stay	49.21	29.16	471,896	279,629
Lower Fryingpan River Visitors **with** Commercial Overnight Stay*	135.62	63.27	2,136,569	996,761
Subtotal			*2,608,465*	*1,276,390*
Ruedi Reservoir Visitors **without** Commercial Overnight Stay	26.16	9.75	44,045	16,416
Ruedi Reservoir Visitors **with** Commercial Overnight Stay*	23.21	13.35	103,022	59,257
Subtotal			*147,067*	*75,673*
Totals			**$ 2,755,532**	**$ 1,352,063**

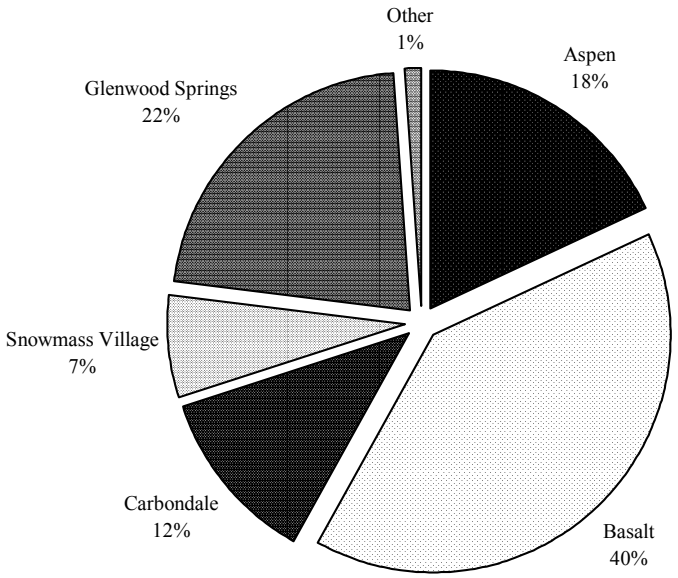
*includes camping if fee paid

Of the total direct spending within the Roaring Fork Valley, 49 percent occurs in the Basalt/El Jebel area. And as seen in Figure 14, which provides a breakdown of where in the Roaring Fork Valley Fryingpan River respondents spent nights in commercial accommodations, Basalt is the most popular lodging location. These expenditures, as described earlier, are explicitly tied to the publicly accessible stretches of the lower Fryingpan River and to Ruedi Reservoir, representing new economic activity generated solely from these recreational amenities. There is also spending occurring from visitors who are coming to the Roaring Fork Valley for other purposes, and just happen to make a trip to the Fryingpan River and/or Ruedi Reservoir; however, this spending cannot be attributed directly to these sites. In this analysis and report we are focusing on the water-based recreation visitation that would be most directly affected by changes in water management. Other visitors coming to the area primarily for non-water based recreation will likely not be affected by changes in water management, and will continue to come to the area under a wide range of possible water management scenarios.

As an example of how this direct spending relates to local gross sales, for Basalt's lodging sector, 2001 gross sales were $944,750 (Gustine, 2002). The specific annual direct spending on lodging related to lower Fryingpan River recreation is $292,000 – accounting for 31 percent of the total. Total gross sales in Basalt in 2001 were an estimated $87 million, based on sales tax collections. The economic sectors represented within these gross sales

estimates include automotive, restaurant and bar, lodging, retail sales, sporting retail, finance, home sales, utilities, and building – with retail sales representing the largest category ($15.24 million or 18 percent of the total) followed by building ($11.67 million or 13 percent of the total) (Gustine, 2002).

Figure 14
Where Lower Fryingpan River Respondents Stay
48 percent of respondents stayed in commercial accomodations
Average length of stay: 3.4 nights



In looking at other river-based recreational activities in the Roaring Fork Valley, economic impacts were assessed for commercial river rafting activities on the Roaring Fork River for the year 2001, with an estimate of $328,600 in direct spending across approximately 3,500 visitor days (Colorado River Outfitters Association, 2001). Although the lower Fryingpan River direct spending results are for both commercial and private trips, they represent an impressive amount when compared to the well-established commercial rafting industry.

B. Total Economic Output, Income, and Employment Effects

The direct spending results detailed in the above section provide extremely useful information about the magnitude and types of economic inflows generated by Fryingpan Valley recreation activities. However, there are additional economic impacts related to these expenditures. These occur in the form of the indirect and induced effects that result when the local businesses and their employees use their revenues from visitor spending to purchase goods and services from other local businesses. In other words, initial direct expenditures made by tourists produce a "multiplier" effect throughout the local economy, the sum of which represents the total economic output.

The total value of the direct, indirect, and induced economic effects depends on a number of factors, including the number of non-local visitors, the type and magnitude of their direct expenditures, the structure and diversity of the local economy, and the quantity of goods and services that are purchased by local businesses and households within the local economy (USDI, National Park Service, 1996). The secondary economic modeling approach utilized the IMPLAN Social Accounting and Impact Analysis Software (IMPLAN Group, 1996). The resulting estimates of total economic output are shown in Table 7. The average multipliers are 1.43 for the Roaring Fork Valley and 1.37 for the Basalt/El Jebel area (multipliers vary by economic sector, with each described in the modeling results contained within Appendix C). The Basalt/El Jebel area accounts for 46 percent of the total economic output generated in the Roaring Fork Valley.

Table 7
Total Economic Output

	Roaring Fork Valley	**Basalt/El Jebel Area**
Lower Fryingpan River: Total Economic Output*	$3,721,407	$1,701,919
Ruedi Reservoir: Total Economic Output*	$200,754	$97,712
Totals	$3,922,161	$1,799,631

*direct spending plus indirect and induced effects

To understand the economic impacts from a different perspective, income and employment effects related to Fryingpan Valley visitor spending were also modeled with IMPLAN. Within the Roaring Fork Valley, $1.52 million annually in total income (for businesses and employees) and an estimated 69 jobs are linked to the economic activity generated by lower Fryingpan River visitors. Ruedi recreation activities are responsible for creation of $86,750 in total income annually and four jobs. The total income and employment effects for the Basalt area are about half of what was reported for the Roaring Fork Valley.

The detailed IMPLAN model runs, which include the industry sectors modeled, the output, income, and employment effects by each sector, and the multipliers, are provided in Appendix C.

8. CONCLUSIONS AND FUTURE CONSIDERATIONS

A. Study Conclusions

This study has revealed a wide range of information about Fryingpan Valley visitors as well as specific results about economic impacts related to their recreation activities. Some key conclusions based on this work include the following:

- The 7.5 miles of publicly accessible river on the lower Fryingpan represent a significant tourist destination, particularly influencing the local economy. For the Town of Basalt, with a population of approximately 2,700, the Fryingpan Valley recreation activities represent a well-defined economic influence, contributing $1.8 million annually in total economic output.
- There is a dramatic difference between the direct spending and resulting economic output generated by lower Fryingpan River visitors and Ruedi Reservoir visitors.
- A majority of Fryingpan River visitors come from outside the Roaring Fork Valley specifically to fish on the Fryingpan River, and as part of their trip, tend to spend nights in commercial accommodations which creates average per visitor per day spending as high as $135. Ruedi Reservoir visitors tend to be local, and those that are non-local have modest direct spending patterns because they often are camping.

- Commercial lodging represents an extremely important component of lower Fryingpan River visitors' expenditure patterns, especially as a proportion of Basalt's total lodging sales.
- Angling on the lower Fryingpan River draws tourists to the Basalt area during the off-season as well as the on-season. Annual off-season (October through May) visitor days on the public stretches of the lower Fryingpan are estimated to be 9,800.
- Lower Fryingpan River recreation supports sources of income and a number of jobs across several different economic sectors both throughout the broader Roaring Fork Valley and within the Basalt/El Jebel area.
- While about half of the economic activity related to Fryingpan Valley recreation activities is felt in the Basalt area, spending by Fryingpan Valley visitors also occurs throughout the Roaring Fork Valley, as exemplified by the variety of towns in which visitors stayed overnight in commercial accommodations.
- Ruedi Reservoir serves as a popular water-based recreation site for Valley locals – a majority of which are repeat visitors who make frequent trips during the summer season. Ruedi provides a wide variety of recreational activities, and is especially popular for watercraft/boating activities and camping.
- About half of Ruedi Reservoir respondents would take fewer trips if the reservoir followed a specific pattern of declining water levels throughout the season, which would not have significant economic implications, but represents the sentiments of a loyal, local set of users.
- The open-ended comments covered many different aspects of visitor opinions; however, a few distinct categories emerged. There were a number of comments expressing the desire to return to the Fryingpan Valley and enjoyment of the trip. Another group of comments referred to the lack of public access to the lower Fryingpan River, often which were combined with comments about the problem of overcrowding. A final distinct comment category reflected opinions about Ruedi Reservoir water levels being too low and related issues.

B. Future Research Considerations & Opportunities

- Over a third of lower Fryingpan River respondents indicated that changes in streamflows, either higher or lower, from what they experienced on their trip would influence the number of trips they would make to the lower Fryingpan River. Given the direct spending and related economic output levels that this study has established for lower Fryingpan River recreation, such changes in visitor patterns could signify a pronounced economic effect on the local economy. A detailed analysis of the contingent behavior data, including the determination of "threshold" levels which represent shifts in visitor behavior, would provide insight about the economic impacts related to different proposed streamflow regimes.
- Because this study represents the first time that visitor counts were made on the lower Fryingpan River, it would be worth while to continue monitoring use in the future, expand visitor count periods, and update count numbers.
- The economic impact results provide an understanding of the economic activity related to Fryingpan Valley recreationists. It would be useful to look at other recreational activities in the area (e.g. golf, hunting, kayaking/rafting, fishing on the Roaring Fork River) in order to give perspective on the economic value of the lower Fryingpan River and Ruedi Reservoir.
- Sufficient data was collected through the visitor surveys for the undertaking of a willingness-to-pay analysis, which would provide information on the total economic value of Fryingpan Valley recreation activities.
- The data generated through this study allows for more refined examinations of visitor profiles, such as looking closely at where visitors are from and incorporating this type of information into marketing efforts. In addition, information about the connection between Fryingpan Valley visitors and specific local businesses would enrich and strengthen the economic impact profile.
- Based on the number of comments received regarding lack of public access along the lower Fryingpan River, a specific evaluation of land ownership along the Fryingpan River, comparison of visitor use between private and public access areas, and an assessment of potential opportunities to acquire or develop access easements is strongly encouraged.

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