

# RECLAMATION

*Managing Water in the West*

## Blue Mesa Reservoir Economic and Recreation Study

Data Collection and Survey Analysis

Final Report



U.S. Department of the Interior  
Bureau of Reclamation  
Technical Service Center  
Economics Group  
Denver, Colorado

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# **Blue Mesa Reservoir Economic and Recreation Study**

## **Background**

The re-operation of the Aspinall Unit on the Gunnison River located near Gunnison, Colorado, will be the subject of a future Environmental Impact Statement (EIS). The re-operation will occur to accommodate downstream U.S. Fish and Wildlife Service (Service) flow recommendations for endangered species in both the Gunnison and Colorado Rivers. The area most likely to be impacted is Blue Mesa Reservoir and the lower Gunnison River downstream. The recreation created by Blue Mesa Reservoir and the Gunnison River brings substantial economic activity to the area. Many towns and cities rely heavily on recreation and tourism as a source of revenues. In many cases, changes in downstream river flows and reservoir levels can impact economies adjacent to the water and hundreds of miles away. These changes have impacts on recreation satisfaction and spending in these areas.

## **Blue Mesa Reservoir Survey Objectives**

The main objectives of the survey and subsequent research are to discover (1) visitor satisfaction with current and changing reservoir recreation conditions, and (2) how changes in reservoir levels affect the quantity and quality of the recreation experience at Blue Mesa Reservoir. Subsequent research would consist of modeling both the quantity and quality of reservoir recreation at fluctuating water levels that are being considered to meet Service biological opinions. This effort will be valuable in adapting lake and river management to help maintain the greatest level of visitor satisfaction and economic benefits.

## **Study Area Description**

The Wayne N. Aspinall Unit is located on the Gunnison River in western Colorado in Gunnison and Montrose counties along a 40-mile stretch of the Gunnison River. The Unit is operated by the US Bureau of Reclamation, while the land and water areas of the reservoirs are managed by the National Park Service (NPS) as the Curecanti National Recreation Area. The Curecanti Unit developed the water storage and hydroelectric power generating potential along a 40-mile section of the Gunnison River in Colorado by the construction of three dams and powerplants: Blue Mesa, Morrow Point, and Crystal.

Blue Mesa Dam is on the Gunnison River about 30 miles below Gunnison, and 1.5 miles below Sapinero, Colorado. The study area consisted of Blue Mesa Reservoir located in the Curecanti National Recreation Area, west of Gunnison, Colorado. Blue Mesa Reservoir is part of the Aspinall Unit and is the largest reservoir in Colorado. It attracts over 1 million annual visitors and is a large contributor to the area's economy.

## **Recreational Activities at Blue Mesa Reservoir**

Although Blue Mesa Reservoir was constructed for and serves as a storage reservoir, it also serves many people seeking a variety of recreational activities including fishing, boating, swimming, windsurfing, and camping. There is no entrance fee at Blue Mesa but boating and fishing permits are required. Due to Blue Mesa's location, easy access from US highway 50 makes the Reservoir a popular attraction for locals and tourists alike.

## **SURVEY DESIGN AND ADMINISTRATION**

### **Survey Design**

Reclamation economists designed a survey instrument to collect data from recreators at Blue Mesa Reservoir. This survey (see Appendix A) was approved by the Office of Management and Budget (OMB #1040-0001) to be administered during the 2004 summer recreation season. The purpose of this survey was two fold. First was to obtain visitor satisfaction with current and changing reservoir recreation conditions and second was to learn how changes in reservoir levels effect the quantity and quality of the recreation experience. Contingent use and expenditure data will be used to estimate use values associated with the reservoir recreation. Specific information that was collected includes:

- Satisfaction of the recreation experience at various reservoir elevation levels,
- Total of itemized expenditures related to traveling to and from the site and using the reservoir (lodging, food, gas, equipment, etc.),
- Number of household-visits and person-days of visitors by type of activity,
- Contingent use of the reservoir based on water levels.

Photos were used to depict various reservoir elevation conditions and were obtained from National Park Service (NPS) staff and selected by NPS and Reclamation staff to depict various views of the reservoir to elicit the best response rates. Photos were selected based on variety of location, visitation/popularity, and views. As shown in Appendix B, the photos used represent two elevation scenarios at 7,500 ft. and 7,518 ft. The photos showed views of Beaver Creek picnic area, Iola boat ramp, Dillon Pinnacles, and the east end of Iola Basin at each reservoir elevation.

The survey was pre-tested twice. The first pre-test consisted of Western State College of Colorado undergraduate and graduate students (Western State is the local college located approximately 19 miles from Blue Mesa Reservoir in Gunnison). There was a focus group session afterwards in which feedback was obtained. Minor comments were

received regarding the scenarios, activities list and map labels. Comments that were seen as improvements to the survey were incorporated into the survey.

The second pre-test was conducted on weekend Blue Mesa Reservoir recreators. The pre-test was conducted by Booz, Allen, Hamilton (BAH) on May 16-18, 2003. Based on the comments received from the second pre-test, there were no further adjustments made to the survey.

### **Survey Administration**

The Blue Mesa Reservoir survey was an intercept survey that targeted visitors involved with a recreational activity associated with the reservoir. Visitors were defined as individuals that visit and/or participate in recreational activities at Blue Mesa Reservoir during the summer recreation season. Surveyors administered the intercept survey at selected sites at the reservoir. Since this was an intercept survey, there was no cover letter or subsequent correspondence with the respondent. Instead, surveyors were instructed to approach the respondent with script (see Instrument Administration, Section C) suitable to the activity they were participating in.

Reclamation staff sent a job position description to both Western State University and Colorado Workforce in Gunnison. Approximately 16 applications were received, 9 were contacted for an interview and 7 were interviewed. Two surveyors were selected and hired through a Reclamation contractor. NPS and Reclamation staff conducted a training session with the selected surveyors on survey administration and data entry, Park rules and use of Park radios, and safety considerations. Survey administration began May 28, 2004 and concluded on September, 28, 2004 with a total of 730 completed surveys.

For questions 7, 8, 9, and 14 (as indicated on the survey), the respondent was shown an 8-½ x 11 laminated card with a list from which to choose. The interviewer then transcribed the appropriate response. An 8-½ x 11 laminated map of the location area was shown to aid the solicitation of question 9 regarding expenditures within the local area. Laminated photos (also 8-½ x 11) of two reservoir elevation scenarios at 4 locations at the Reservoir were shown to respondents to elicit their satisfaction at these fluctuating conditions. The reservoir elevation that occurred on the day that the survey was administered served as an additional scenario.

The sample size goal is provided in Table 1. The goal was based on sampling theory<sup>1</sup>. It was the opinion of the project team given past experience that the goal was sufficient to provide meaningful estimates of visitor satisfaction and recreational use values.

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<sup>1</sup> Dillman, Don A. *Mail and Internet Surveys; The Tailored Design Method*. John Wiley and Sons, Inc., 2000.

<b>Table 1</b>		
<b>Sample Size</b>		
<b>Location</b>	<b>Completed Usable Surveys</b>	<b>Actual Surveys</b>
Blue Mesa Reservoir	1,000	730

The sampling goals by month are summarized in Table 2. While sampling took place over the summer season, efforts were made to increase sampling during periods of increased recreation. For instance, the primary recreation season at Blue Mesa occurs for 6 weeks between the last week in June and the first week in August. However, visitation is usually high over the Memorial Day weekend and fishing for Kokanee salmon peaks in the first or second week of June. These variations in recreational visits were taken into account when designing this sampling protocol.

The Reclamation project team closely monitored the progress of the surveyors in meeting these goals and made adjustments where necessary. The summer recreation season typically extends through the end of September into October especially if there are warmer temperatures. These late-season participants were important to the survey because they represented that unique group who may have different satisfaction levels at the varying reservoir elevations.

<b>Table 2</b>							
<b>Blue Mesa Reservoir Sampling Goals by Month</b>							
	<b>Memorial Day Weekend</b>	<b>June</b>	<b>July<sup>1</sup></b>	<b>August</b>	<b>Labor Day Weekend</b>	<b>Post-Labor Day</b>	<b>Total</b>
<b>Estimated</b>	90	250	340	250	50	20	1000
<b>Actual</b>	46	184	244	131	41	84	730

<sup>1</sup> Assumed survey would be administered over the three-day July 4<sup>th</sup> weekend with a goal of 80 to 90 surveys completed.

### **Survey Sites for the Intercept Surveys**

Surveyors administered the intercept surveys at Blue Mesa Reservoir during the summer recreational season. Two surveyors were assigned to the sites provided in Table 3. The sites were selected by NPS and Reclamation staff because they were identified as likely to attract visitors involved in recreational activities targeted for this study. This included recreators whose satisfaction is likely to be directly impacted by changing reservoir levels for such activities as fishing, boating, other water sports, camping, and sightseeing. The sites targeted included marinas, boat ramps, campgrounds, and trailheads. The administration of the intercept survey was distributed between these 10 sites over the surveying period. The actual distribution was based on the success of the surveyors in intercepting recreators whose satisfaction was impacted by the changes in reservoir levels

in numbers that met the sampling goals. For instance, if surveyors were having problems meeting the sampling goals at certain locations, those locations were sampled less frequently. However, every effort was made to sample from each location or alternate locations.

**Table 3  
Preliminary Survey Sites**

<b>Site</b>	<b>Location</b>	<b>Type of Facility</b>
Stevens Creek	Blue Mesa	Boat Ramp and Campground
Iola	Blue Mesa	Boat Ramp and Picnic Area
Elk Creek	Blue Mesa	Marina
Windsurfing Area	Blue Mesa	Windsurfing Area
Ponderosa	Blue Mesa	Boat Ramp
Dillon Pinnacles	Blue Mesa	Overlook/Trailhead
Lake Fork	Blue Mesa	Marina
Cebolla Creek	Blue Mesa	Campground
Wilson's Landing	Blue Mesa	Fishing Access
Beaver Creek	Blue Mesa	Picnic Area

Two additional locations, Gunnison Lakeside Resort and Blue Mesa Recreational Ranch located on Highway 50 between Gunnison and Blue Mesa Reservoir were added to the survey locations. These are privately-owned resorts where surveyors were able to administer the survey to a large number of people at one location.

**Database Entry**

Data entry was also performed by the surveyors, as they administered the survey. Booz, Allen, Hamilton created the database in which a simple form was used to enter the collected data. Several modifications were made to the database to insure accuracy of the data. These modifications are as follows:

- Question 7– In this question, respondents were asked to provide information to one of two questions regarding the length of stay on their recent trip to the Reservoir (e.g. number of hours spent or number of nights spent). In both cases, the database recorded non-answers as “zero”. An adjustment was made to replace the “zeros” for these non-answers to “blanks”.
- Question 12, 13, 14 and 15 – In all cases where individuals did not respond to a scenario, “zeros” were replaced with “blanks”.

Once data entry was complete, Reclamation economists converted the database into an Excel spreadsheet for further analysis. The results are discussed below.

**Data Analysis and Results**

Data analysis and results are based on a total of 730 completed usable surveys. In some instances, survey questions were not answered (e.g., household income) so the total

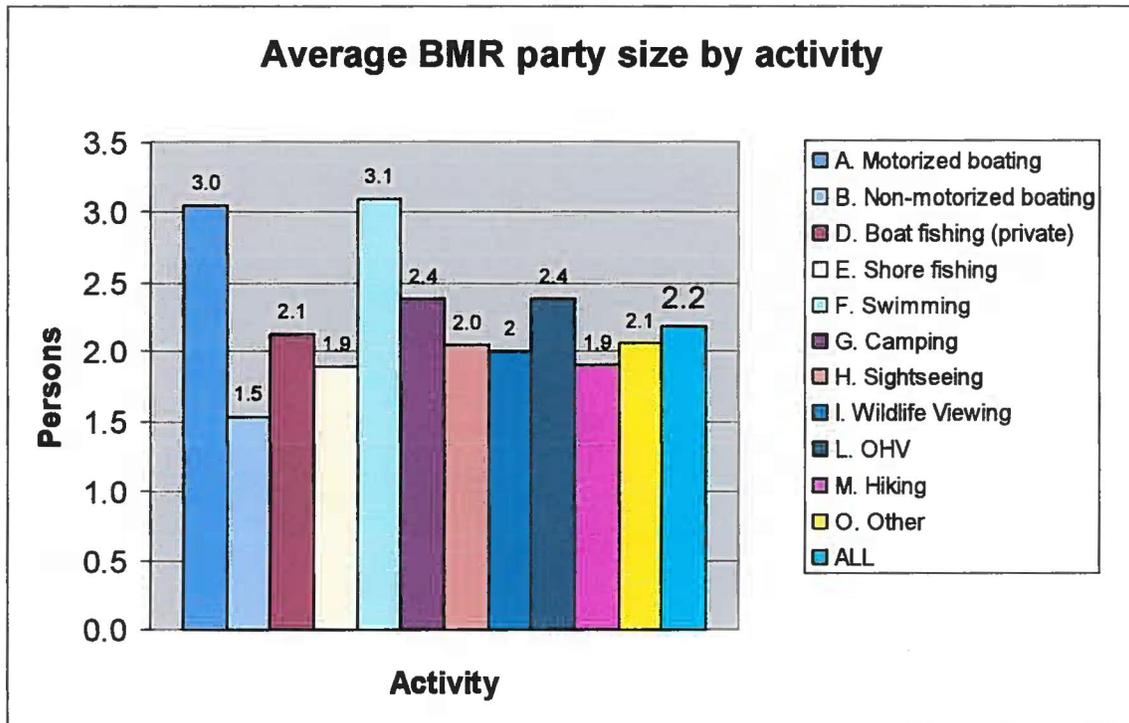
number of survey responses for each question may not equal 730. The results of the data analysis are organized into the same sections as the survey instrument.

### Household Information

The first section of the survey asked respondents questions regarding how many individuals from their household were with them on this trip. These questions included; where they started their trip from, was Blue Mesa their primary destination, how long they were staying, how many trips they typically take to Blue Mesa during a summer recreation season, and what were their accommodations during their visit.

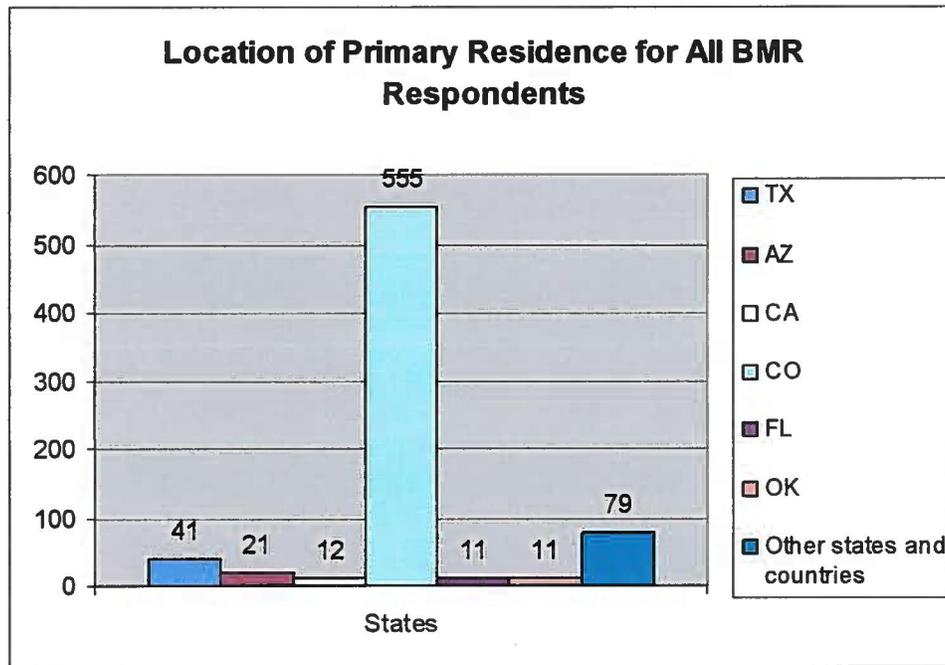
Question 1 asked respondents to report the number of individuals from their household that traveled to Blue Mesa Reservoir with them. The average number of individuals per household visiting Blue Mesa is summarized by type of activity as well as by total in Figure 1.

Figure 1



Respondents were also asked to provide information on the location of their primary residence. The town, state and zip code information were recorded and evaluated to see where Blue Mesa visitors live. The results are shown in Figure 2.

Figure 2



Over 500 visitors to Blue Mesa were from Colorado which translates into 76% of all visitors surveyed. Table 4 shows that the majority of surveyed Colorado visitors were from outside the study area of Gunnison, Montrose and Delta counties.

Table 4: Colorado Visitors

	Number	Percent
Colorado Visitors from within Study Area	191	34.4%
From Outside Study Area	364	65.6%
Total	555	100.0%

### Trip Information

The third question asked respondents if they started their trip from their primary residence. A follow-up question asked respondents to indicate where they had started their trip from if it was not from their primary residence. Table 5 shows that the majority of visitors started their trip from their primary residence.

Table 5: Trips from Primary Residence

	Number	Percent
Started trip from primary residence	692	94.8%
Did not start trip from primary residence	38	5.2%
Total	730	100.0%

Question 4 asked respondents if Blue Mesa Reservoir was their only destination on their trip as opposed to their primary destination. The difference between “primary” destination and “only” destination is that a “primary” destination means that one or more other sites were visited on that trip. However, if the respondent answered that Blue Mesa was their “primary” destination, it was assumed that most of their time was spent at Blue Mesa Reservoir. The results are summarized in Table 6 and show that approximately 74% of respondents indicated that Blue Mesa Reservoir was their only destination.

**Table 6: Blue Mesa Only Destination**

	Number	Percent
Number of "Yes" Responses	537	73.6%
Number of "No" Responses	193	26.4%
Total	730	100.0%

If respondents indicated that Blue Mesa was not their only destination, they were asked a follow-up question on whether or not Blue Mesa was their “primary” destination. The results from the 193 responses above are summarized in Table 7.

**Table 7: Blue Mesa Primary Destination**

	Number	Percent
Number of "Yes" Responses	79	40.9%
Number of "No" Responses	114	59.1%
Total	193	100.0%

Question 5 asked respondents the length of their stay at Blue Mesa Reservoir either in the number of hours if they were on a day trip or number of nights if they were on an overnight visit. The results are summarized in Table 8 and show that the average length of stay for a day-tripper and overnight visitor are 6.8 hours and 16.8 nights, respectively.

**Table 8: Blue Mesa Trip Length**

	Number	Percent	Average Length of Stay	Average Length of Stay with Outliers (> 79 days per trip) Removed
Day Trippers	149	20.4%	6.8 hours	
Overnight Visitors	581	79.6%	16.8 nights	7.9 nights
Total	730	100.0%		

The data contained some outliers that brought the length of stay per trip to a high number. Many of those surveyed indicated that they stay at Blue Mesa Reservoir for long periods of time. After removing the outliers of 80 days or more from the data, the average length of stay of overnight visitors dropped to 7.9 days, which is a more likely average length of stay. The outliers mostly stayed in RV Parks and were from out-of-state. Although the 35 outliers represented less than 5% of responses, they can skew the data somewhat by

increasing the average length of stay per trip. The data were plotted in Figure 3 to see what the trip length was by type of accommodation.

Figure 3

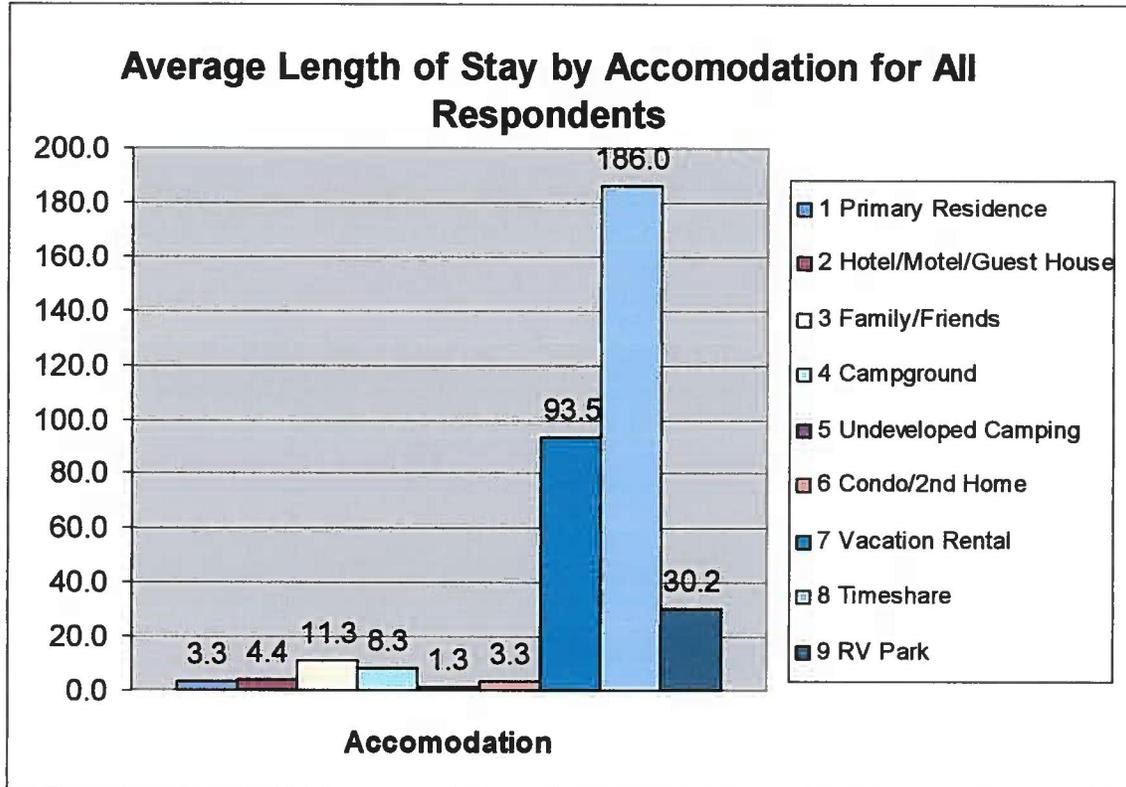


Figure 3 shows that people who stayed at a timeshare and vacation rental had the longest stay per trip. However, there were only 2 observations each for these types of accommodations. In addition, 2 observations had 360 days or more as their length of stay. One of those respondents indicated they stayed at their primary residence. This was not considered a “trip” and removed from the dataset for this part of the analysis. The other indicated that they stayed at a timeshare, which dramatically increased the average length of stay for that type of accommodation.

When the same outliers as above are removed from the data (>79 days per trip) the results are different. As shown in Figure 4, average length of stay by accommodation decreases for almost all accommodations. Those that stayed at an RV Park had the longest trip length under these conditions.

Figure 4

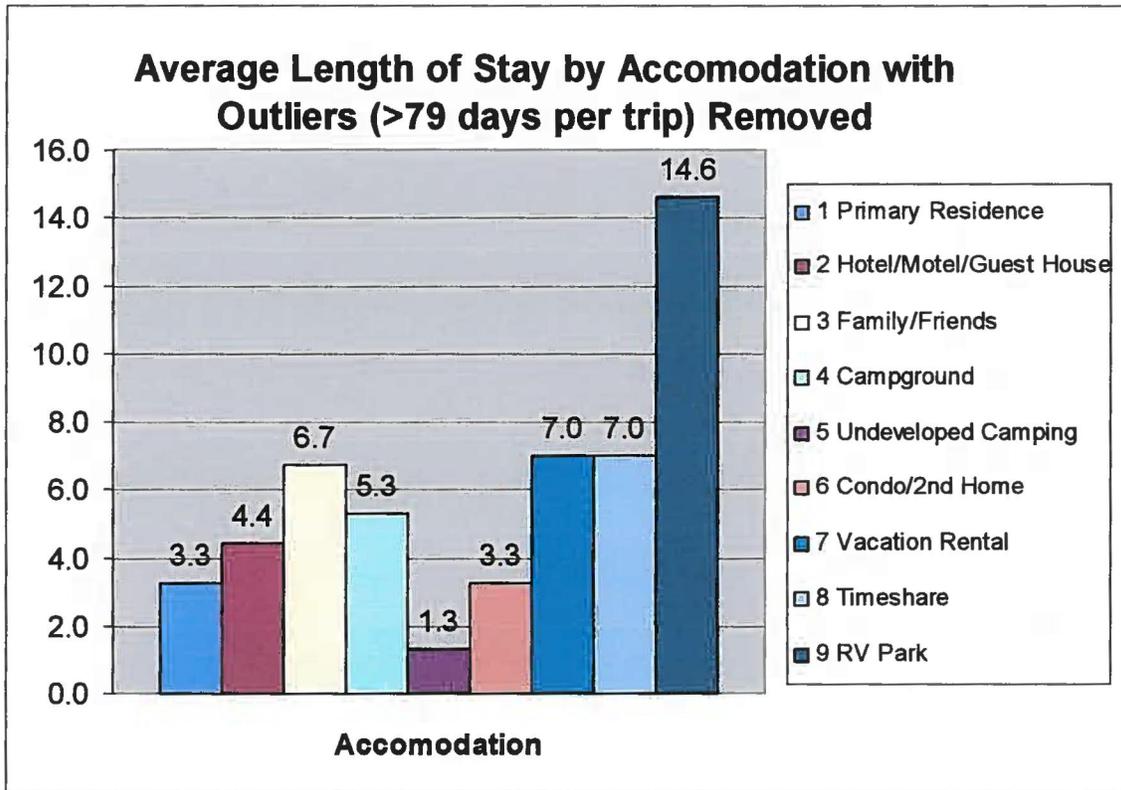


Figure 5: Comparison of Overnight Length of Stay With and Without Outliers

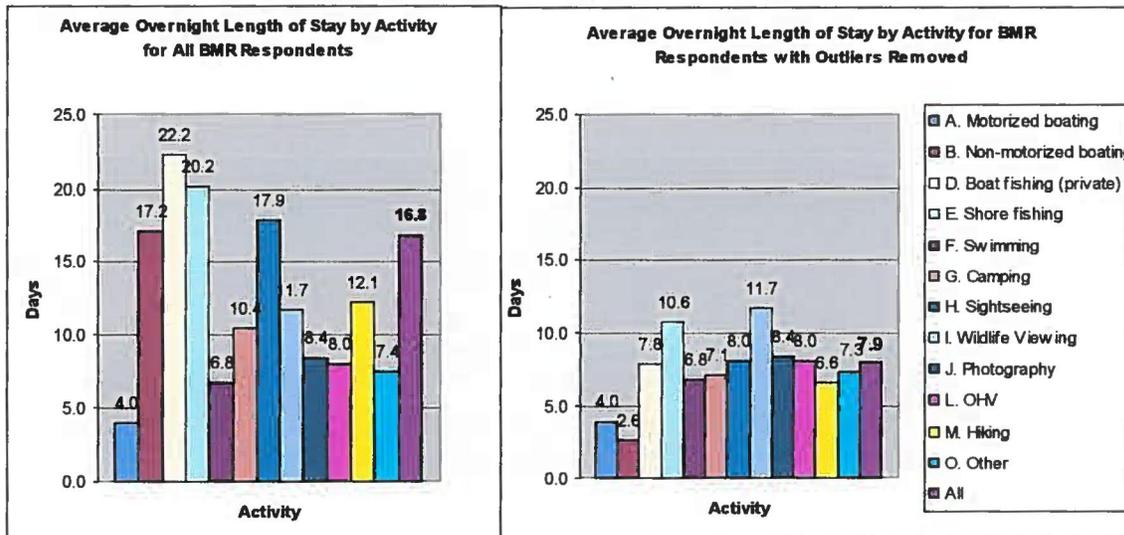


Figure 5 shows a comparison of the average length of stay per overnight trip by activity. When all responses are included, private boat anglers and shore anglers have the longest length of stay per trip. When the outliers of greater than or equal to 80 days per trip are removed from the dataset, wildlife viewers and shore anglers have the longest stay per trip. Respondents were then asked how many trips they would typically make to Blue

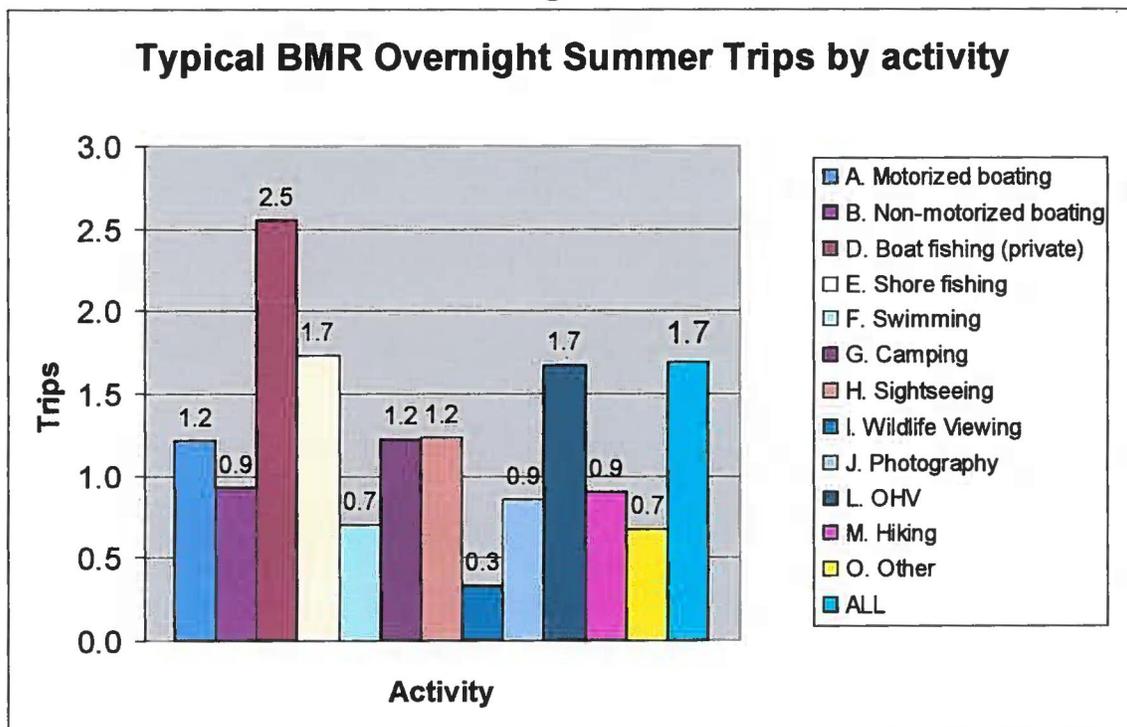
Mesa Reservoir during the summer recreation season (Memorial Day through Labor Day). As summarized in Table 9, the number of day trips averaged 2.6 trips per summer recreation season compared to 1.7 overnight visits.

Table 9: Number of Blue Mesa Reservoir Trips

	Trips
Day Trips	2.6
Overnight Visits	1.7

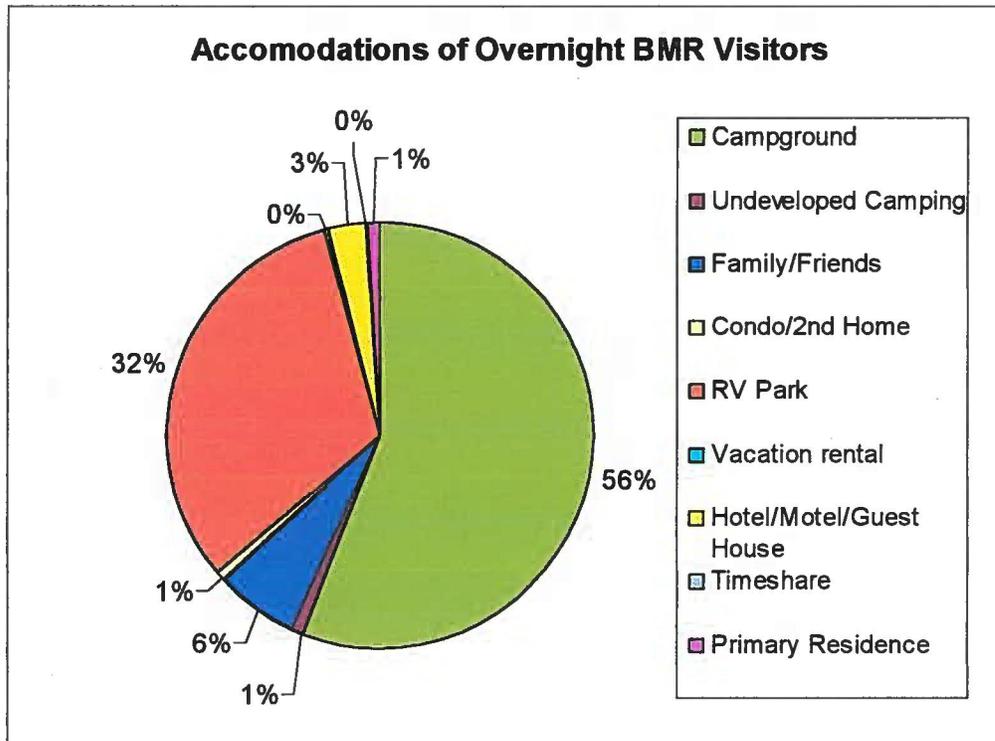
Additional analyses were performed to determine which activities generated the most overnight trips. As shown in Figure 6, boat fishing generates the largest number of overnight visits at 2.5 trips per summer recreation season.

Figure 6



Question 7 asked respondents to describe their accommodations on their trip to Blue Mesa Reservoir. This question was analyzed only for respondents who indicated that they were on an overnight visit and included 581 responses as indicated in Table 8. The results are summarized in Figure 7.

Figure 7



There were 5 respondents who indicated that they stayed at their primary residence as their overnight accommodation to Blue Mesa Reservoir and only 2 respondents each indicated staying at a timeshare and vacation rental. The campground and RV park were by far the most popular accommodations of those surveyed.

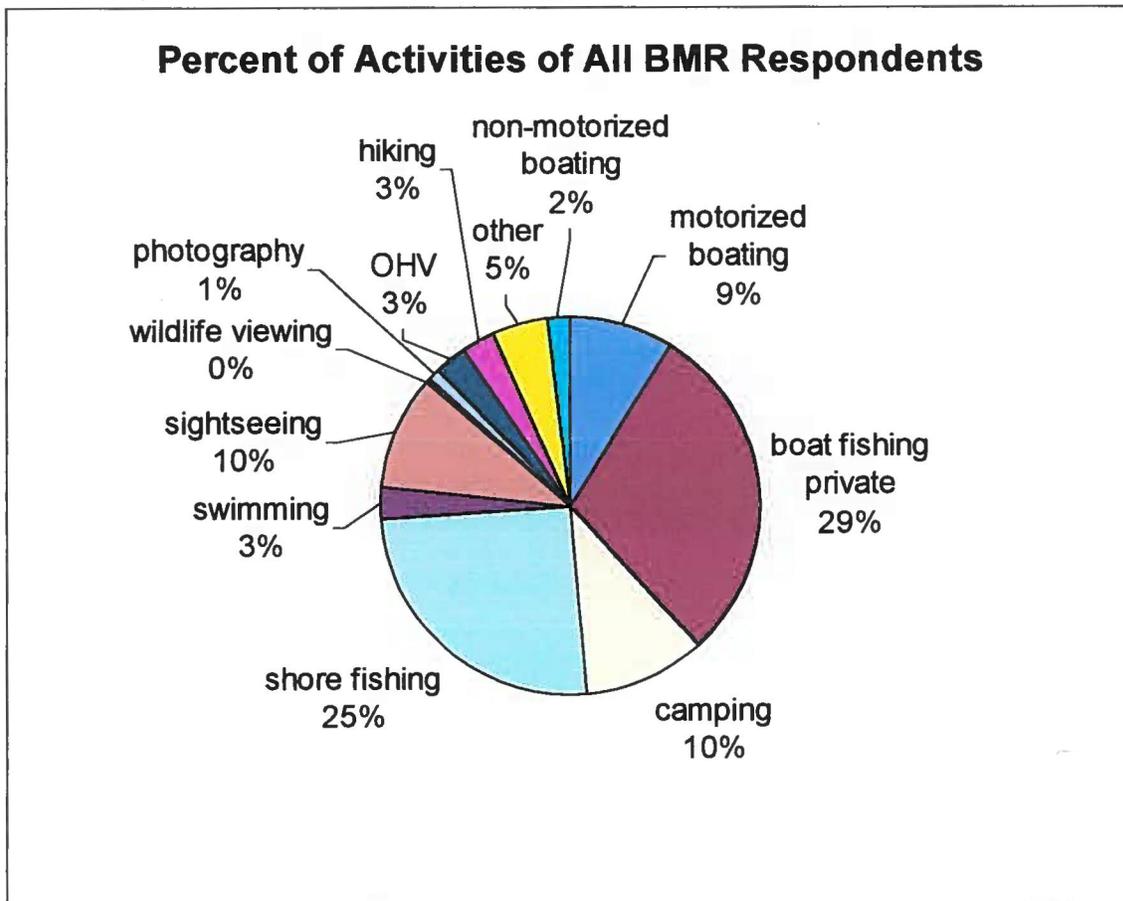
### Activities

The Activities section consisted of a single question that asked visitors their primary activity on their trip to Blue Mesa Reservoir. As mentioned previously, a list (see Appendix B) was provided to them so that the respondent could state the letter corresponding to their primary activity. Table 10 shows the number of respondents who participated in a particular activity while the results summarized in Figure 8 show the percent total of all surveyed Blue Mesa visitors. “Other” activities included hunting, sunbathing and cycling.

Table 10: Primary Activity of Blue Mesa Respondents

Activity	Number of Responses
Motorized boating	65
Boat fishing (private)	214
Camping	75
Shore fishing	186
Swimming	20
Sightseeing	70
Wildlife viewing	3
Photography	7
OHV	21
Hiking	20
Other	34
Non-motorized boating	15
Total	730

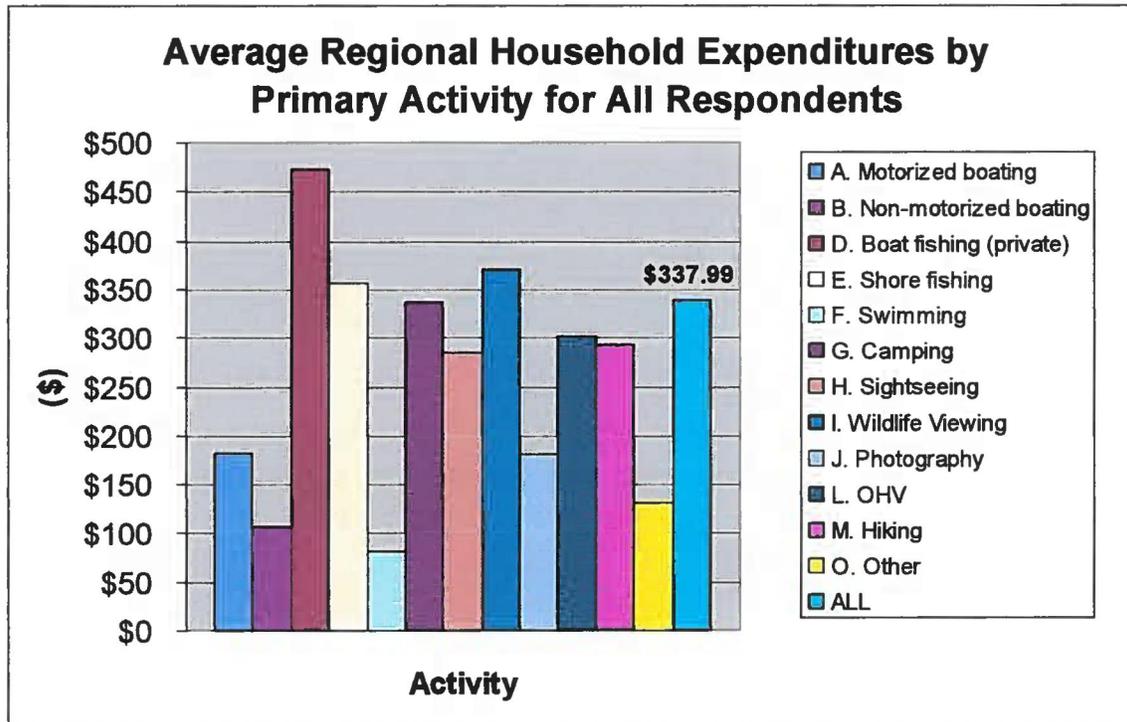
Figure 8



## Trip Expenditures

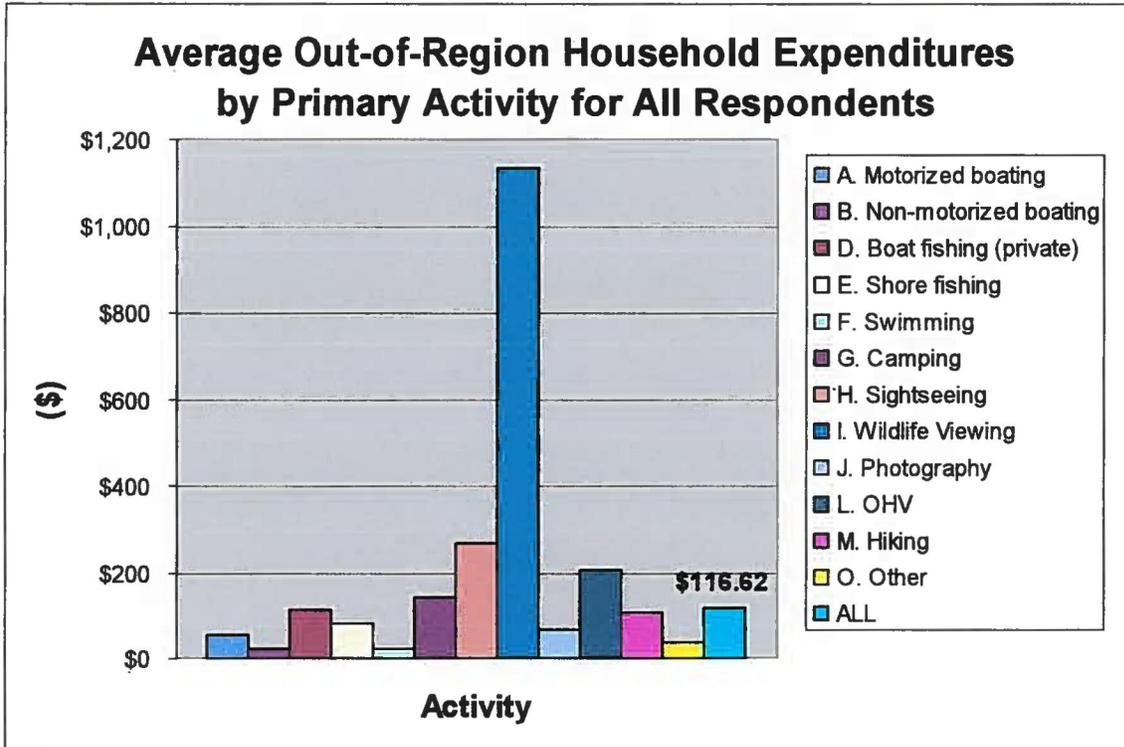
The next section of the survey asked respondents a series of questions regarding their household round-trip expenditures. The responses to these questions were analyzed to determine average regional household expenditures by primary activity (Figure 9), average out-of-region household expenditures by primary activity (Figure 10), and average regional and out-of-region household expenditures by type of trip taken i.e., day trip versus an overnight trip (Table 11). Regional versus out-of-region is defined by the location map found in Appendix B.

Figure 9



The average regional household expenditure across all activities is \$338. On average people that boat fish (private) spend the most and those that engage in swimming at the reservoir spend the least.

Figure 10



The results for average out-of-region household expenditures are quite different with average expenditures across all activities just under \$117. The highest expenditures were by people who ride OHV's and the lowest expenditures were again by people who use the reservoir for swimming.

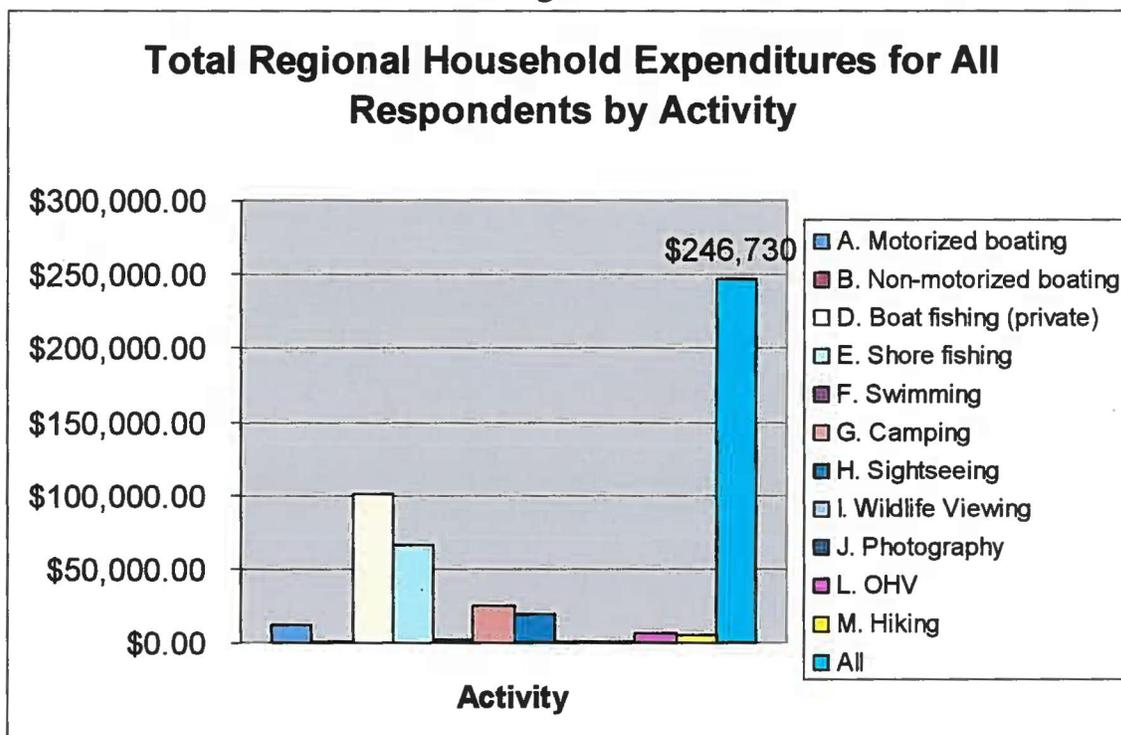
Table 11: Household Expenditures by Type of Trip

Day Trip		Overnight trip	
Avg. regional	Avg. out-of-region	Avg. regional	Avg. out-of-region
\$42.76	\$4.80	\$413.70	\$145.29

As shown in Table 11, for both day trip and overnight visits, out-of region household expenditures are less than regional household expenditures. People that take overnight trips spend far more than those who spend the day at Blue Mesa Reservoir.

Figure 11 shows the total household expenditures of respondents by activity. This figure shows that private boat anglers spent the most money on average and in total, but wildlife viewers who spend the second greatest amount on average spent a very small amount of money in total in the region. Also shown is the amount of money spent in the region by the 730 respondents.

Figure 11



### Contingent Use

Section D of the questionnaire asked respondents a series of questions regarding different elevation levels of the Reservoir. Scenario 1 was presented to the respondents as that day's reservoir elevation. The respondent was then asked to indicate the number of trips and days per trip they would take at that elevation level. That is, if Blue Mesa Reservoir were to remain at "today's" elevation over the summer recreation season, how many trips and how many days per trip would you make? The water elevation on the days that respondents were surveyed ranged from 7,478 ft. to 7,499 ft. Respondents were then asked to rate the quality of their recreational experience under the scenario using a five point Likert Scale with 1 representing "low quality" and 5 representing "high quality". The same questions were asked again using photos and narrative illustrating a 7,500 ft. elevation level and a 7,518 ft. elevation level. The results are summarized by total and type of activity in Figures 12-20.

As depicted in these photos (Appendix B), the lake levels at 7,500 ft. expose beach area providing more camping and shore fishing area, but also expose mud flats and extend boat ramps which would detract from the views at the reservoir and perhaps displace some of the ramps. At elevation 7,518 ft., those exposed areas are covered by water leaving less area for certain activities but improving the views at the reservoir and making the ramps more accessible. This information was not provided to respondents because a bias may have been created by doing so. The purpose was for the respondent to weigh the pros and cons of the different reservoir elevations and evaluate them according to their primary activity.

Figure 12

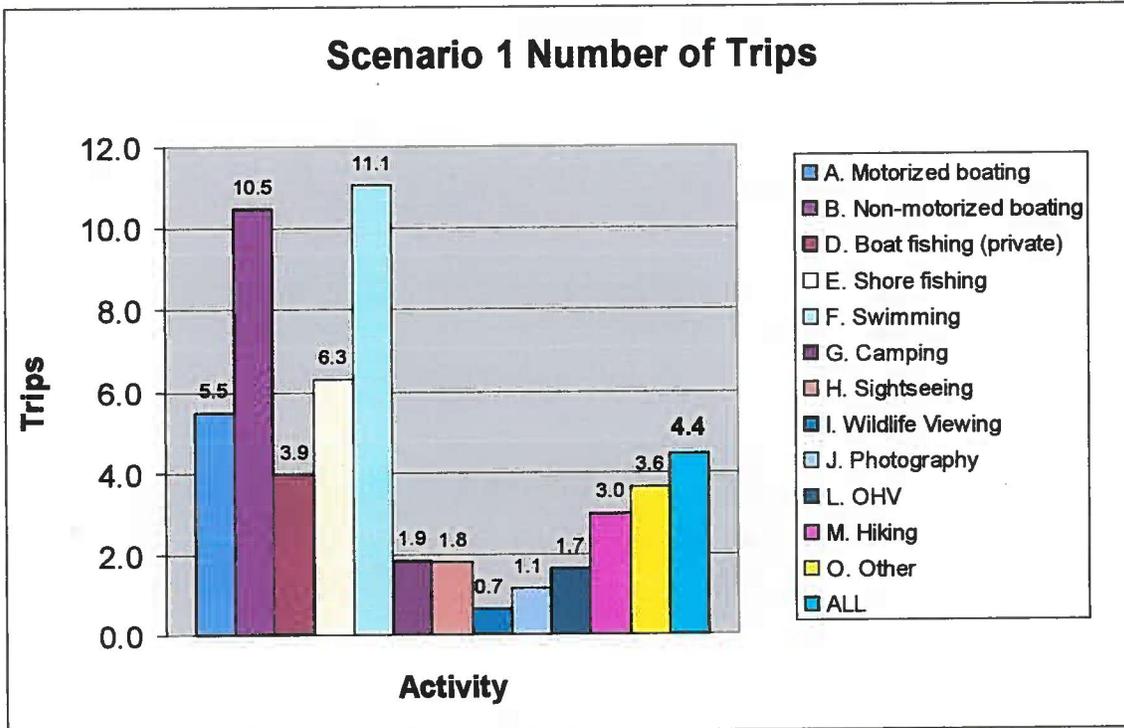


Figure 13

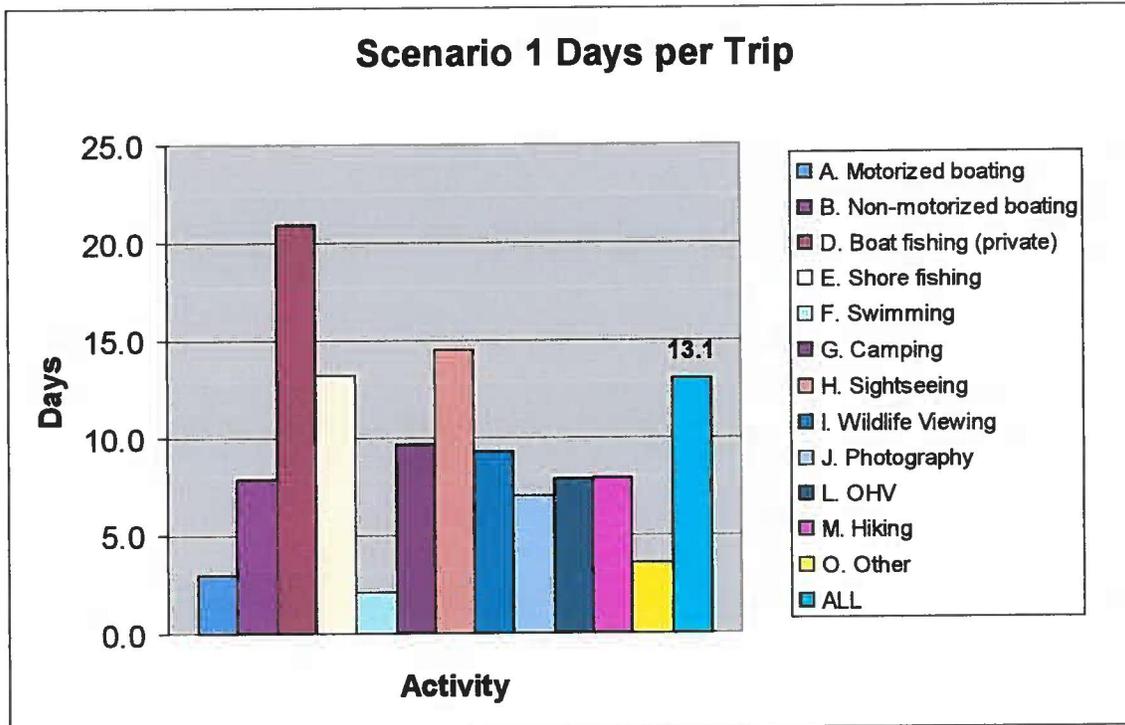
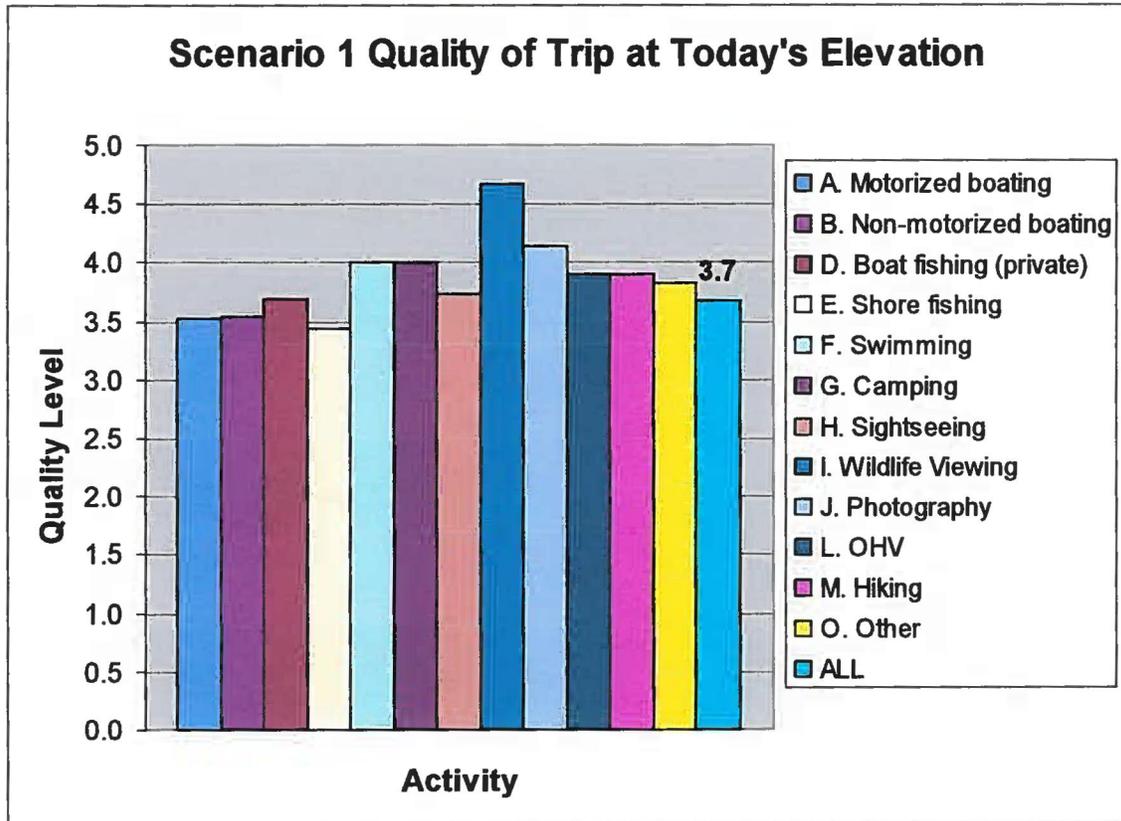


Figure 14



Under the first scenario, respondents said that on average they would take 4.4 trips to Blue Mesa Reservoir at 13.1 days per trip under the current day's elevation level. On average, the quality of their recreation experience was 3.7 on the Likert Scale. Figure 12 shows non-motorized boaters would take the most number of trips at that day's elevation and wildlife viewers would take the fewest number of trips. Figure 13 illustrates that although private boat anglers would not necessarily take the most number of trips under scenario 1, they would stay the longest. The quality ranking under scenario 1 is greater than 3 for all activities with wildlife viewers having the highest quality experience.

Figure 15

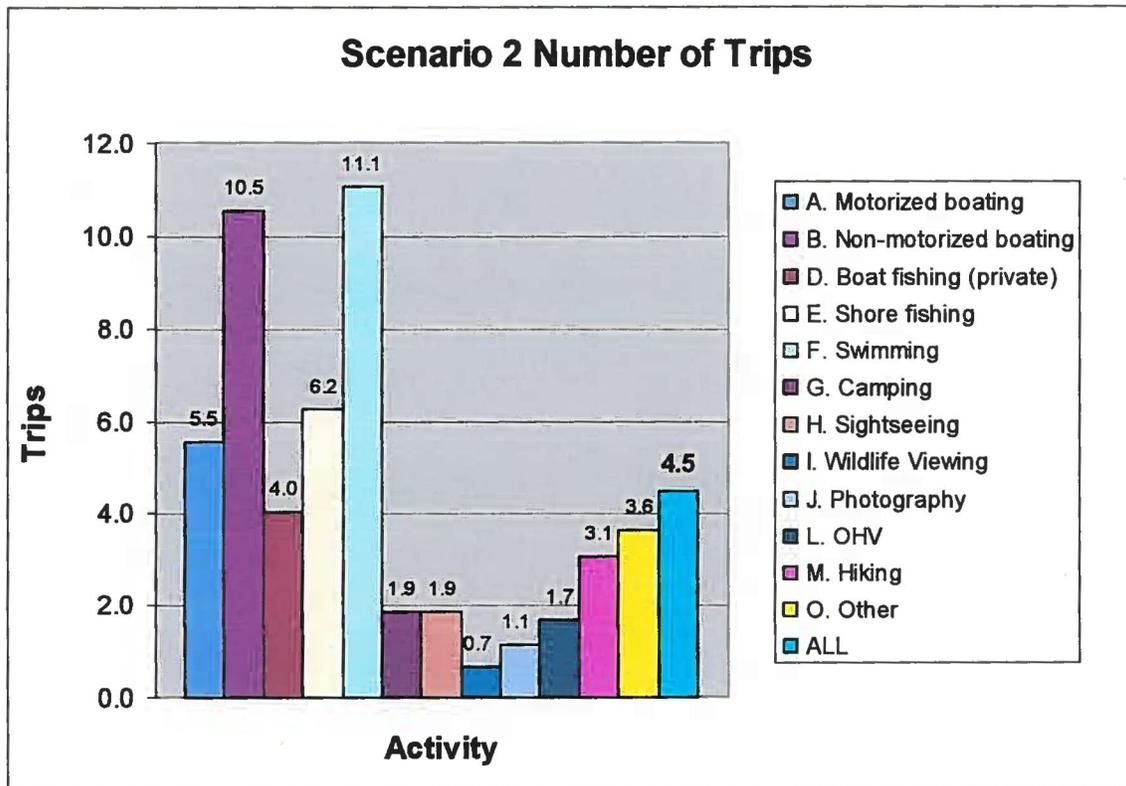


Figure 16

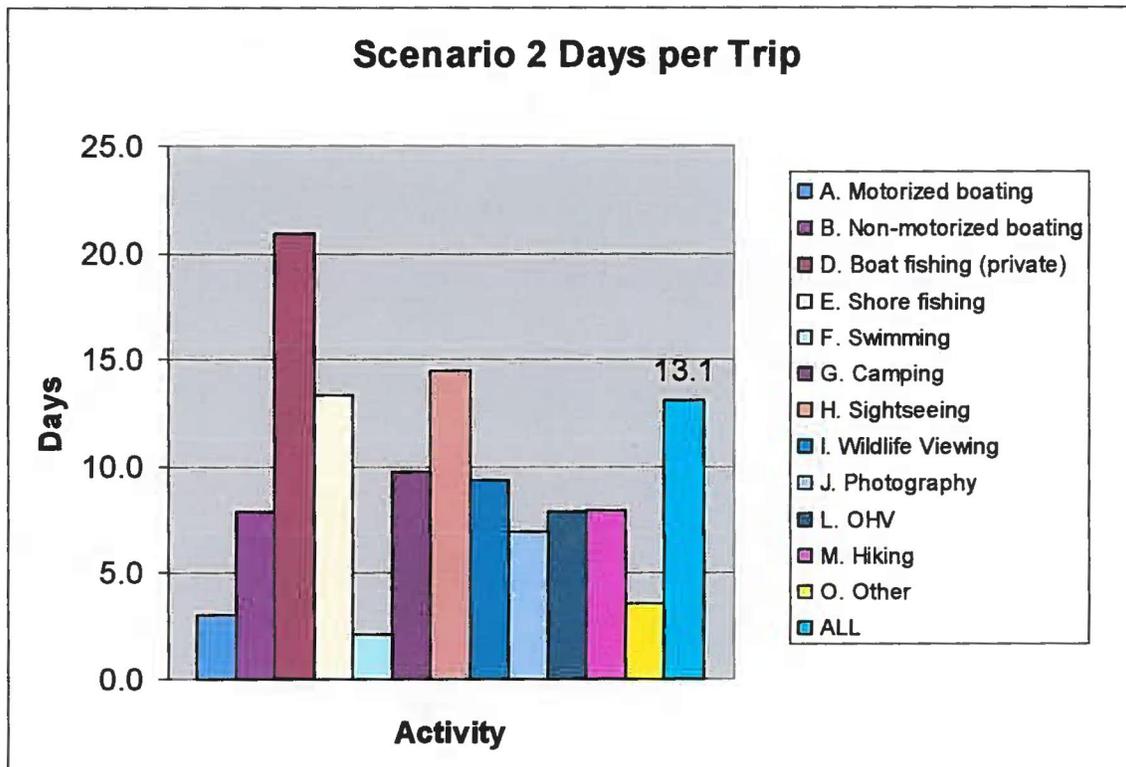
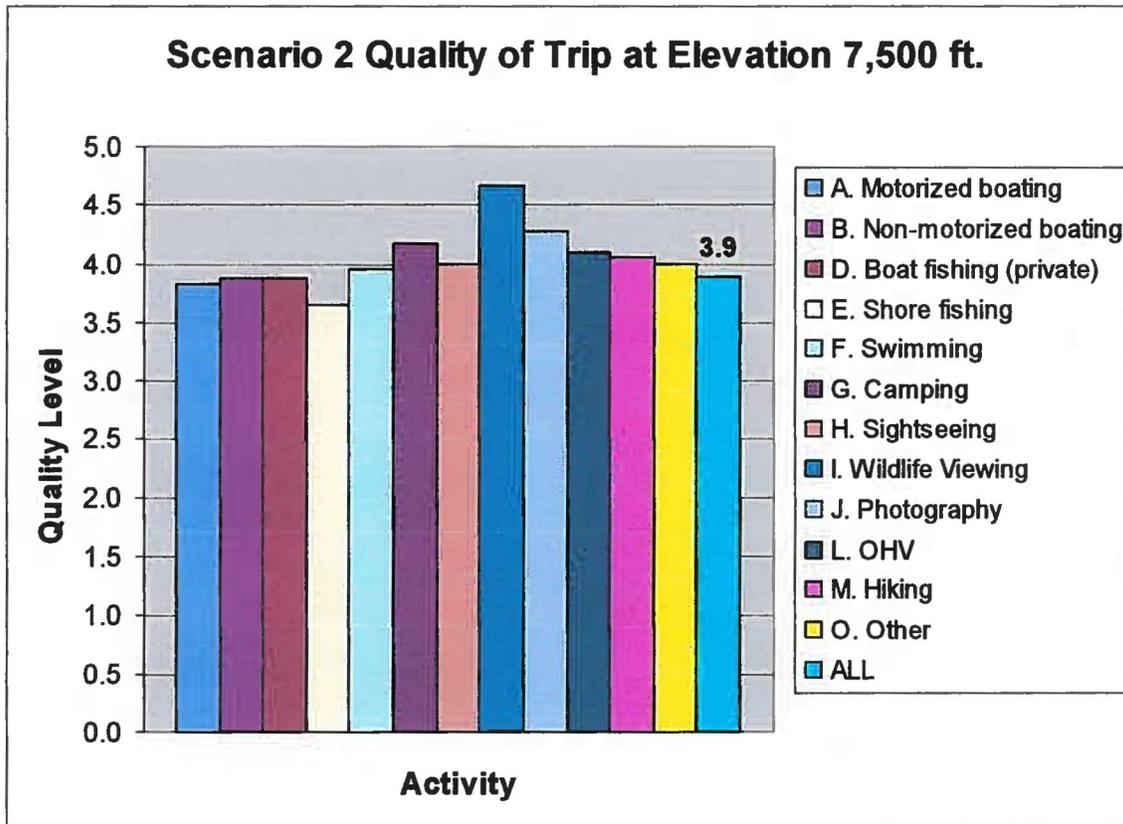


Figure 17



Under scenario 2, respondents said that on average they would take 4.5 trips to Blue Mesa Reservoir at 13.1 days per trip at an elevation level of 7,500 ft. On average, the quality of their recreation experience was 3.9 on the Likert Scale, a little higher than for scenario 1. Figure 15 shows non-motorized boaters would take the most number of trips at 7,500 ft. elevation and wildlife viewers would take the fewest number of trips, just as scenario 1 showed. Figure 16 illustrates that private fishing boaters would take the longest trips under scenario 2. The quality ranking under scenario 2 is 3.9 for all activities with wildlife viewers having the highest quality experience.

Figure 18

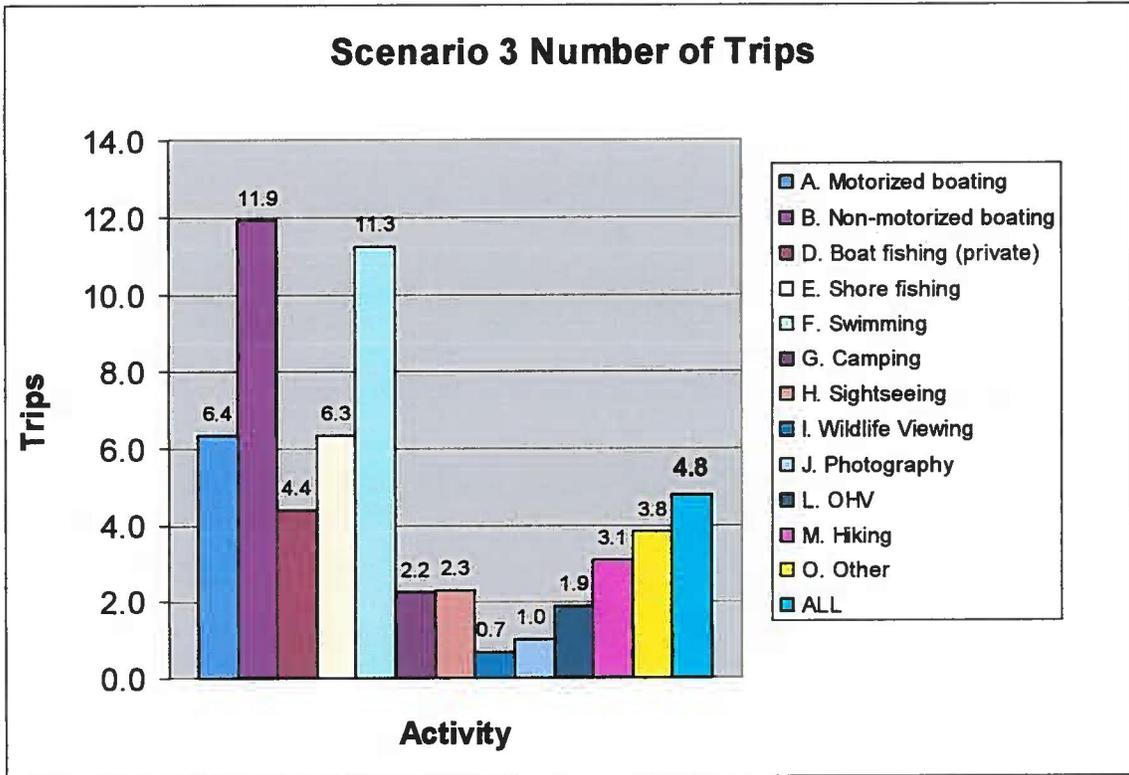


Figure 19

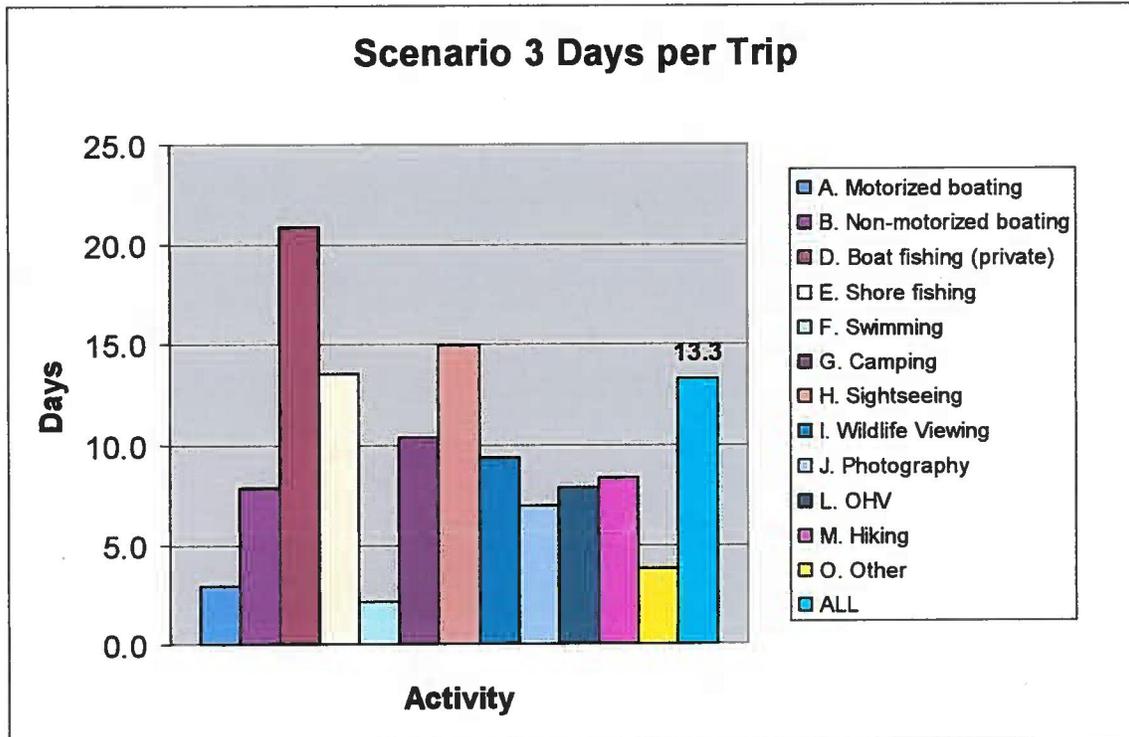
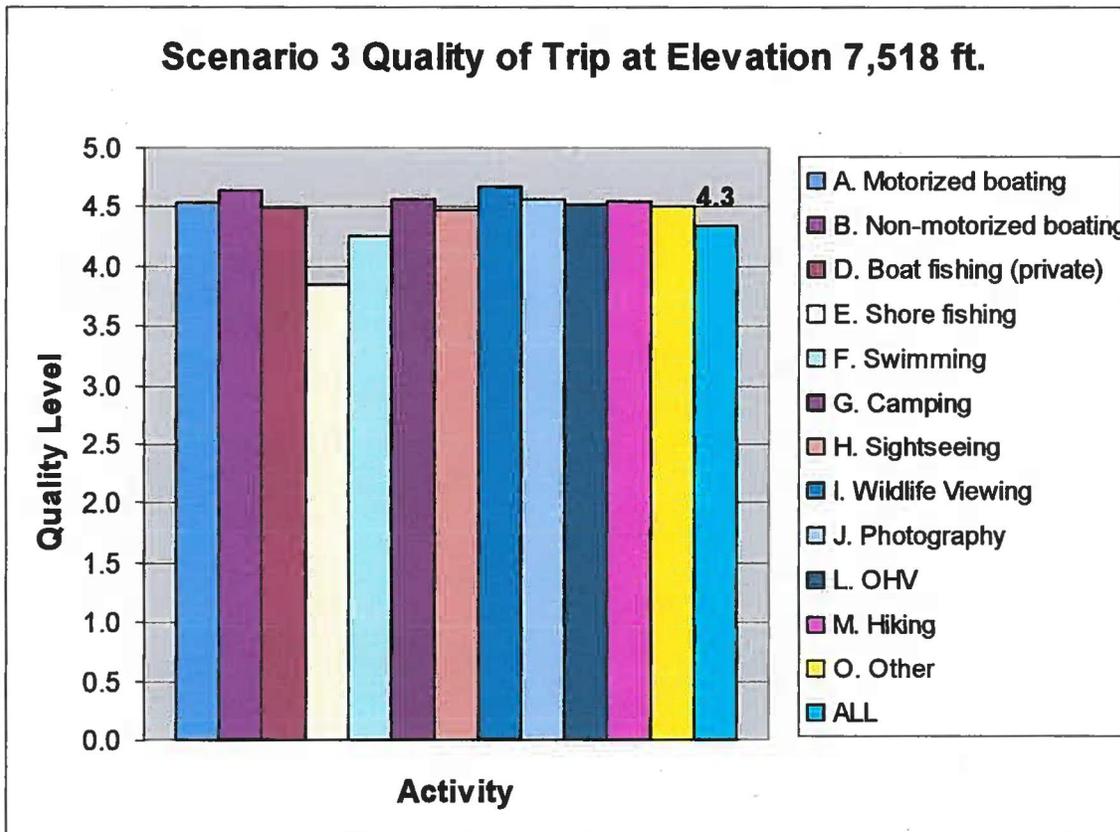


Figure 20



Under scenario 3 elevation levels, respondents said that on average they would take 4.8 trips to Blue Mesa Reservoir at 13.3 days per trip. On average, the quality of their recreation experience was 4.3 on the Likert Scale which is the highest of the three scenarios. Figure 18 shows non-motorized boaters would take the most number of trips at 7,518 ft. elevation and wildlife viewers would take the fewest number of trips, just as scenarios 1 and 2 showed. Figure 19 illustrates that private fishing boaters would take the longest trips under scenario 3. The average quality ranking under scenario 3 is 4.3 for all activities with wildlife viewers having the highest quality experience.

### Scenario Comparison

Figures 21-23 show the number of trips, days per trip and quality ranking for the three scenarios in a side-by-side format for comparison purposes.

Figure 21

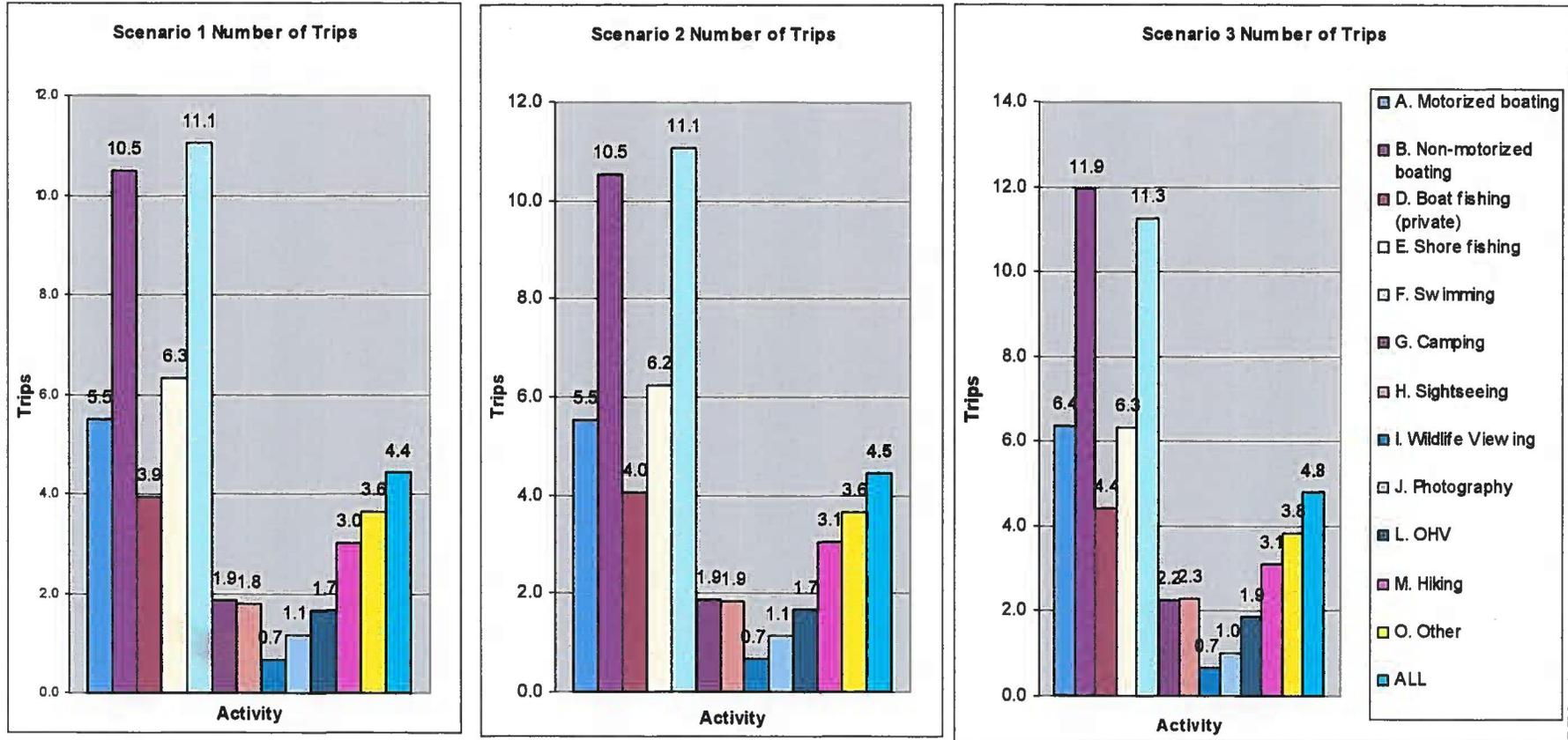


Figure 22

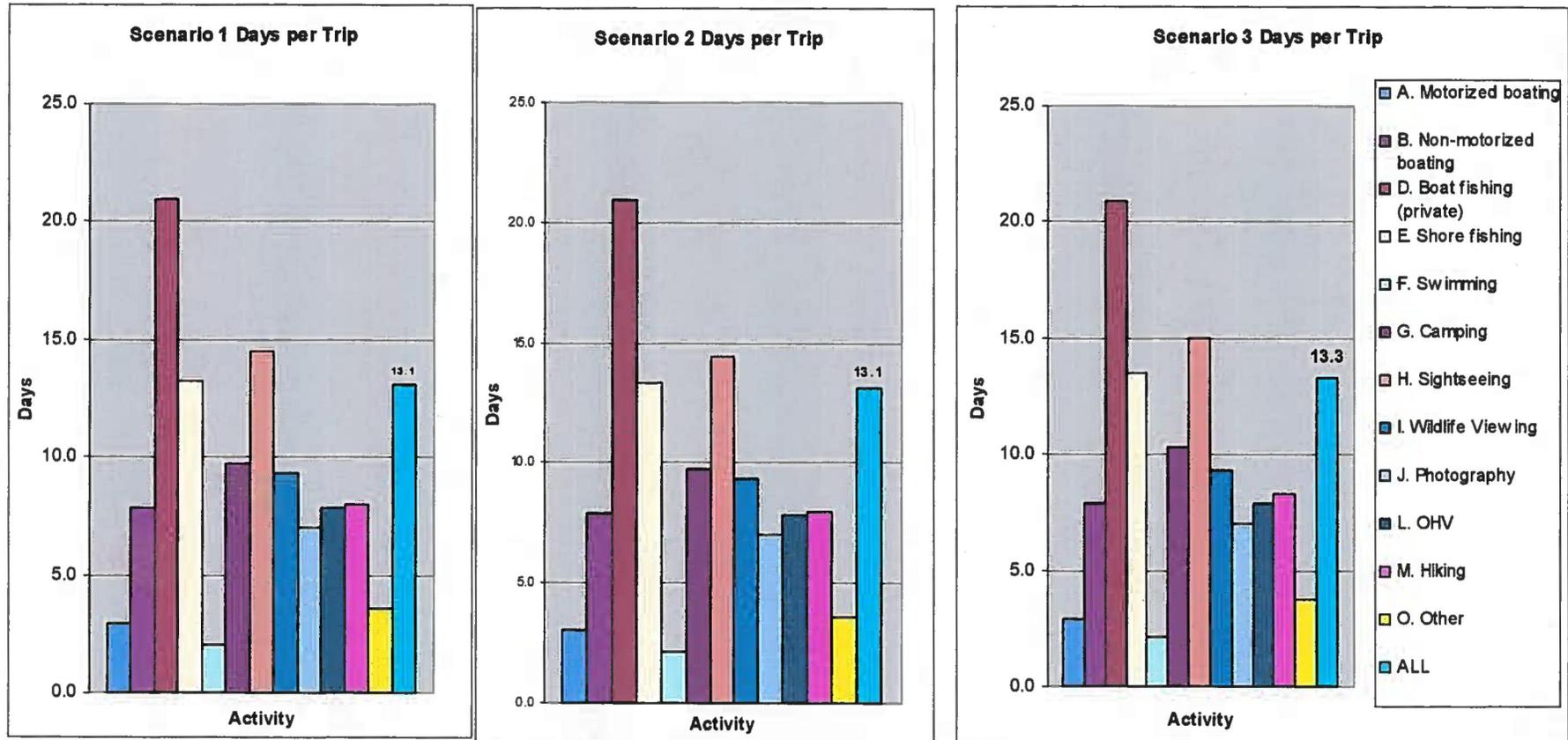
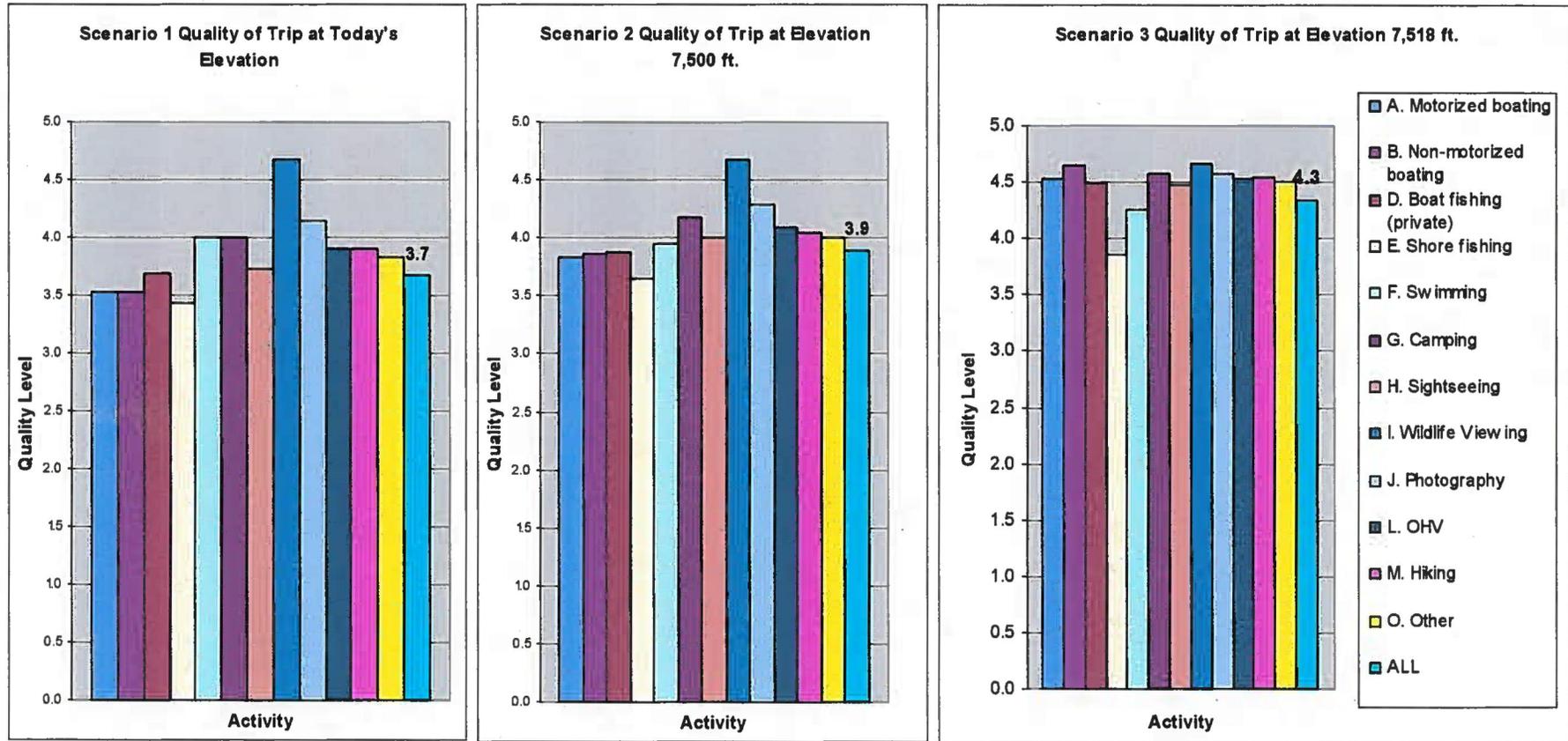


Figure 23



When comparing the results from the three scenarios, some interesting trends appear. First, the average number of trips increases slightly as elevation increases. Also, the number of trips by activity is fairly constant across the three scenarios. Next, on average, the days per trip taken are also fairly consistent across the three scenarios as well as by days per trip by activity. The quality rankings increase slightly as elevation levels increase. However, scenario 3's quality rankings by activity are different than scenarios 1 and 2 which are very similar to one another. The difference is that respondents across all activities ranked 7,518 ft. elevation as being of a higher quality.

For motorized boaters, scenario 1 was likely to produce almost (0.9 trips) 1 less trip than if the elevation of the reservoir were at 7,518 ft and approximately 1.5 fewer trips for non-motorized boaters under those same conditions. It is important to note here that non-motorized boaters were reported to take the most trips annually to the Reservoir. Respondents that engage in the other activities reported a change of less than 1 trip between scenarios. The quality of the recreation experience increased for motorized boaters from scenario 1 to scenario 3. That is, as the reservoir rose in elevation, motorized boaters ranked the quality of their experience higher by 1 point on the Likert scale. Non-motorized boaters ranked the quality of their experience 1.1 points higher from scenario 1 to scenario 3. Less than a 1 point change in quality was reported for all other activities between scenarios.

The two categories that reported to spend the most money per trip in the region are private boat anglers and wildlife viewers. Both of these categories reported less than a 1 trip change and less than a 1 point change in quality between scenario 1 and scenario 3. That means that people who engage in these activities, along with most of the other activities, will not be negatively impacted by fluctuations in reservoir levels and thus, regional expenditures may not be significantly impacted by water level fluctuations. In addition, quality levels generally increase as elevation levels increase. However, the data support that visitor satisfaction with the recreation experience at lower elevation levels, is still good. That is, there were no quality rankings below average under any of the scenarios.

Although private boat anglers and wildlife viewers reported to spend the most per trip, wildlife viewers took the fewest overnight trips to Blue Mesa. Because the number of respondents for private boat anglers and shore anglers were so much higher than for other activities, people who engaged in these two activities actually spent the most money in the region. The quality of the recreation experience went up for these two activities as reservoir levels increased.

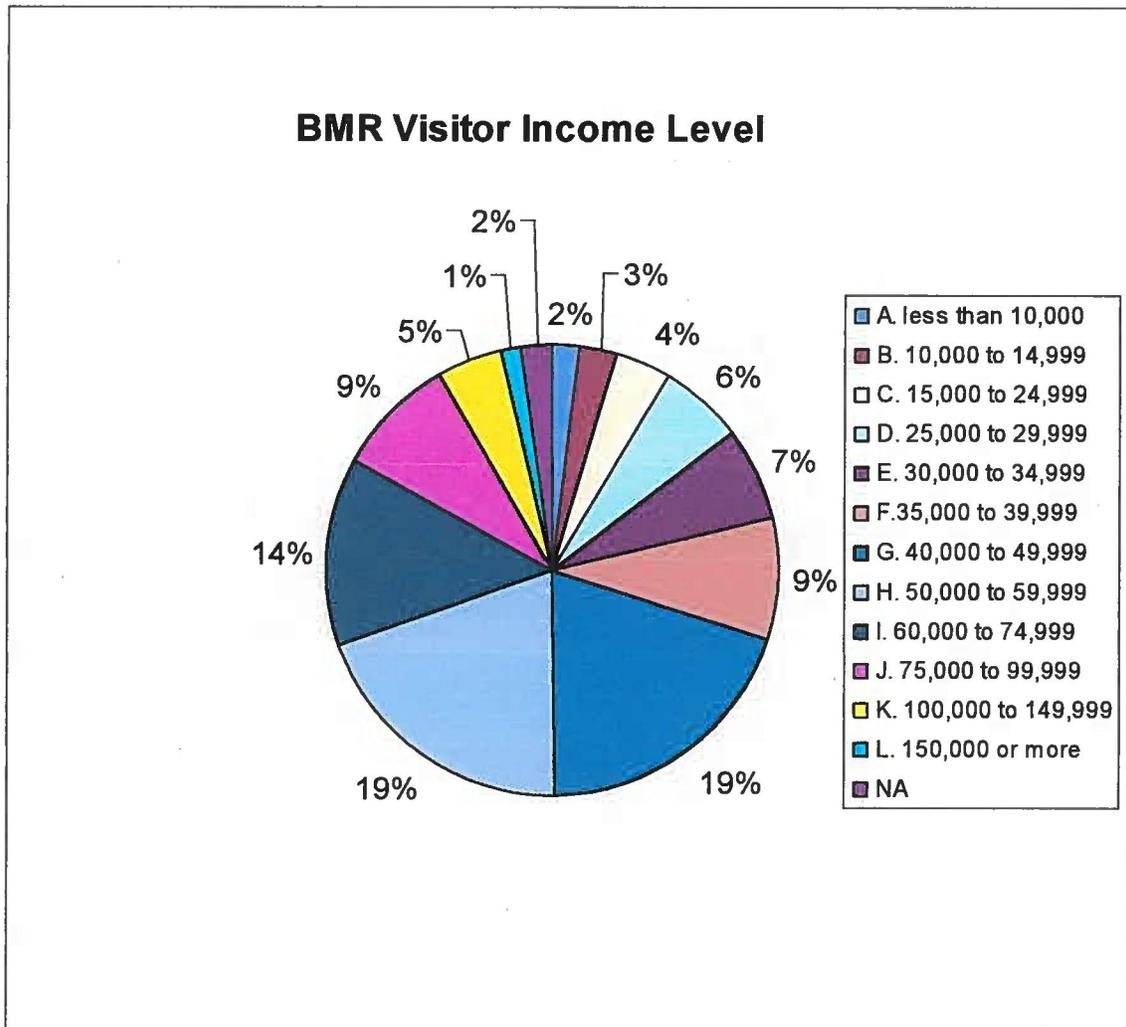
The next phase of the research will model the data to determine impacts to regional expenditures and visitation from fluctuating reservoir levels. From the data, an econometric model will be created which estimates the relationships between satisfaction and other variables such as reservoir elevations. This preliminary analysis shows that impacts may be minimal but further analysis and modeling will determine the statistical relationship between the variables. The results can be used as a tool by decision-makers and recreation managers responding to changing reservoir conditions to assist in formulating re-operation alternatives to maximize visitor satisfaction and minimize regional recreational and economic impacts. The information would also assist in designing mitigation strategies for the types of reservoir activities impacted. This

research will further substantiate the value of recreation areas and the benefits provided to visitors through Reclamation-managed resources in the region.

### Demographics

The last section of the survey asked respondents two questions pertaining to total household income and respondent's age. Respondents were asked to estimate their total annual household income before taxes. The results for the 713 respondents who provided this information are summarized on a percent basis in Figure 24.

Figure 24

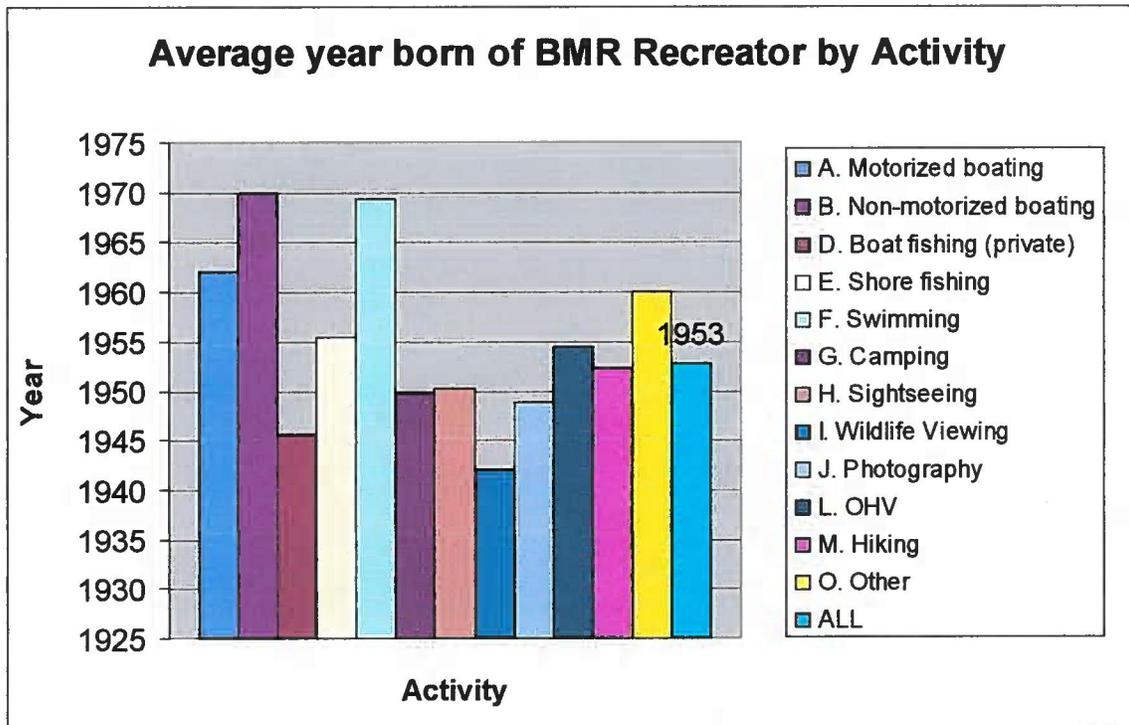


Using the mid-point for each range and the frequency of responses per income range, a weighted average annual household income was calculated to be approximately \$54,000.

The survey concluded by asking respondents the year that they were born. The results of this question were analyzed to gain information on average age of respondents. Figure 25 shows the distribution across age by primary activity for all 730 respondents. The figure shows that non-motorized boaters and swimmers seem to be in the youngest age

category while wildlife viewers are in the eldest age category. The average age of respondents was determined to be 51.

Figure 25



### Lessons Learned

1. The actual time it took to survey the respondents was somewhat underestimated. The time it took to establish a rapport with the respondent was underestimated, rather than the survey itself. In addition, it was discovered that most visitors were willing to talk for an even greater length of time than was allocated.

In addition, because Blue Mesa is such a large reservoir with the survey locations spread throughout the area, the surveyors had to drive from one survey location to another in order to get a variety of respondents participating in various activities on a daily basis. This driving time added time to the overall project that was not previously allocated. These two factors prevented the surveyors from meeting the monthly sampling goals in Table 2.

2. A good working relationship with NPS personnel aided in the success of the survey. Not only did the Park Service provide contact radios and training for the surveyors, the surveyors served as additional people in the field which contributed to the safety of the visitors.
3. The weather at Blue Mesa reservoir can be very unpredictable, as was discovered on the opening weekend of the survey, Memorial Day weekend. The cold

temperatures and windy conditions deterred visitors and prevented the surveyors from reaching their sampling goals for that weekend. However, more surveys were collected over the post-Labor Day weekend than was originally planned for.

4. Using contract personnel is preferable to involving current Park staff. Park employees have their own duties and responsibilities and don't have the time to perform an additional task which required extra time and concentration. Contract personnel were more committed to the specific task and survey goals because that is what they were hired to do.
5. It was effective to use local residents who could add flexibility to the schedule due to unforeseen circumstances such as weather conditions which impact visitor use.
6. Seek OMB approval well in advance of when the survey needs to be administered. This not only makes for a better survey and administration process, it's the only way to legally administer a survey to the public.

## **APPENDIX A: SURVEY**

### Blue Mesa, Crystal and Morrow Reservoirs Recreation Survey

**ASK RESPONDENT TO LOOK AT YELLOW CARDS, PAGES 1&2 AND TO READ ALONG**

Interviewer: \_\_\_\_\_ Location: \_\_\_\_\_

Date: \_\_\_\_\_ Today's Elevation \_\_\_\_\_ ft.

#### SECTION A: HOUSEHOLD INFORMATION

1) Including yourself, how many individuals from your household are with you on your visit to **BLUE MESA RESERVOIR**? \_\_\_\_\_

2) Please provide the city, state and zip code where your primary residence is located

City, state, zip \_\_\_\_\_

Country (if other than US) \_\_\_\_\_

3) Did you start your trip from your primary residence?

Yes (Go to Question 4)

No (Go to Question 3a)

3a) Please provide the nearest city, state and zip code where you started your trip to **BLUE MESA RESERVOIR**

City, state, zip \_\_\_\_\_

Country (if other than US) \_\_\_\_\_

4) On this trip, is **BLUE MESA RESERVOIR** the only destination?

Yes (Go to Q5)

NO (Go to Q4a)

4a) Is **BLUE MESA RESERVOIR** your primary destination?

Yes (Go to Q5)

NO (Go to Q4b)

4b) What other areas/attractions do you plan to visit on your trip?

5) How long are you staying at **BLUE MESA RESERVOIR** during this visit?

	<b>Day Trip (No. of Hours)</b>	<b>Over-night Trips (No. of Nights)</b>
<b>Length of Stay</b>		

6) Including this trip, how many trips do you typically make to **BLUE MESA RESERVOIR**, during the summer recreation season (e.g. Memorial Day through Labor Day)?

	<b>Day Trips</b>	<b>Over-night Trips</b>
<b>Number of Trips</b>		

**ASK RESPONDENT TO LOOK AT WHITE CARD, PAGE 3 WITH ACCOMMODATIONS LIST**

7) If you stayed overnight, where did you stay on this trip to **BLUE MESA Reservoir**?

<b>Letter of Overnight Accommodation</b>	
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**SECTION B: ACTIVITIES**

**ASK RESPONDENT TO LOOK AT BLUE CARD, PAGE 4 WITH ACTIVITIES LIST**

8) What is the primary recreation activity for you and members of your household at **BLUE MESA RESERVOIR**.

<b>Letter of Primary Activity</b>	
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**SECTION C: TRIP EXPENDITURES**

We would now like to ask you a couple of questions regarding this TRIP to visit **BLUE MESA RESERVOIR** for recreation. Please answer the following two questions regarding your experience.

**ASK RESPONDENT GREEN CARD, PAGE 5 WITH EXPENDITURES AND EXPENDITURES MAP, PAGE 6.**

- 9) Refer to the map provided. Please indicate your best estimate of how much money you and members of your household will have spent on the items listed in the following table on this TRIP to **BLUE MESA RESERVOIR** for recreation. Please include roundtrip expenditures.

Trip Expenditure Category	Roundtrip Expenditures Spent Locally (Shaded Area of Map)	Roundtrip Expenditures Spent Outside Shaded Area
A. Boat Fuel	\$	\$
B. Bait and Tackle	\$	\$
C. Boat Permit	\$	\$
D. Equipment rental	\$	\$
E. Lodging	\$	\$
F. Camping and Entrance Fees	\$	\$
G. Auto Gas	\$	\$
H. Auto Rental	\$	\$
I. Air Fare	\$	\$
If there are expenditures for air fare ask for the <b>landing location</b>		
J. Restaurant/lounge purchases	\$	\$
K. Grocery and convenience store food, beverages and other items	\$	\$
L. Outfitters, guides and tour packages	\$	\$
M. Souvenirs, gifts and entertainment	\$	\$
N. Other trip related expenses (please specify):	\$	\$

**SECTION D: CONTINGENT USE**

- 10) **Scenario 1 INTERVIEWER:** We would like to get your opinion on your recreational experience under current conditions. The reservoir elevation today is [**state daily elevation**]. Please indicate the **number of trips and days per trip** you or members of your household would take collectively during the summer recreation season (e.g. Memorial Day through Labor Day) to participate in **your primary activity** if reservoir conditions were as they are today.

	Number of Trips	Days per Trip
<b>Primary Activity</b>		

10a) **INTERVIEWER:** Please rate the quality of your primary recreation activity **UNDER TODAY'S CONDITIONS** from 1 to 5 with 1 being the lowest quality and 5 being the highest quality.

	Lowest Quality				Highest Quality
	1	2	3	4	5
<b>Primary Activity</b>					

**INTERVIEWER:** Blue Mesa Reservoir is part of the Aspinall Unit. The US Bureau of Reclamation is considering several options to change operations of the Aspinall Unit on the Gunnison River. The Aspinall Unit is located in Gunnison and Montrose Counties and includes three dams that are the subject of this study: Blue Mesa Dam, Morrow Point Dam and Crystal Dam.

The Blue Mesa Reservoir is one area likely to be impacted by the change in operations. The impacts include lower reservoir levels at certain times during the year. The questions below are designed to elicit your opinion on how your recreational experiences would change with a change in dam operations.

11) **Scenario 2:**

**ASK RESPONDENT TO LOOK AT PICTURES OF SCENARIO 2, PAGES 7-10.**

**INTERVIEWER:** We would like to ask you two questions regarding your recreational experience if the reservoir level were approximately **7,500 feet** in elevation. The following pictures help describe what the reservoir would look like under these conditions. Please indicate the **number of trips and days per trip** you or members of your household would take collectively during the summer recreation season (e.g. Memorial Day through Labor Day) to participate in **your primary activity** if reservoir conditions were 7,500 ft.

	Number of Trips @ 7,500 ft.	Days per Trip @ 7,500 ft.
<b>Primary Activity</b>		

11a) **INTERVIEWER:** If the surface level of the reservoir is at **ELEVATION 7,500 feet**, please rate the quality of your primary recreation activity from 1 to 5 with 1 being the lowest quality and 5 being the highest quality.

	Lowest Quality				Highest Quality
	1	2	3	4	5
<b>Primary Activity</b>					

12) **Scenario 3:**

**ASK RESPONDENT TO LOOK AT PICTURES OF SCENARIO 3, PAGES 11-14.**

**INTERVIEWER:** We would like to ask you two questions regarding your recreational experience if the reservoir level were approximately **7,518 feet** in elevation. The following pictures help describe what the reservoir would look like under these conditions. Using the following table, please indicate the **number of trips and days per trip** you or members of your household would take collectively during the summer recreation season (e.g. Memorial Day through Labor Day) to participate in **your primary activity** if reservoir conditions were 7,518 ft.

	<b>Number of Trips @ 7,518 ft.</b>	<b>Days per Trip @ 7,518 ft.</b>
<b>Primary Activity</b>		

12a) **INTERVIEWER:** If the surface level of the reservoir is at **ELEVATION 7,518 feet**, please rate the quality of your primary recreation activity from 1 to 5 with 1 being the lowest quality and 5 being the highest quality

	<b>Lowest Quality</b>				<b>Highest Quality</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Primary Activity</b>					

**SECTION E: DEMOGRAPHIC INFORMATION**

**ASK RESPONDENT TO LOOK AT ORANGE CARD, PAGE 15 WITH INCOME LEVELS**

14) Please indicate which letter comes closest to your **total household income before taxes in 2002**. (This information is used for statistical purposes only so it is important that you answer this question.)

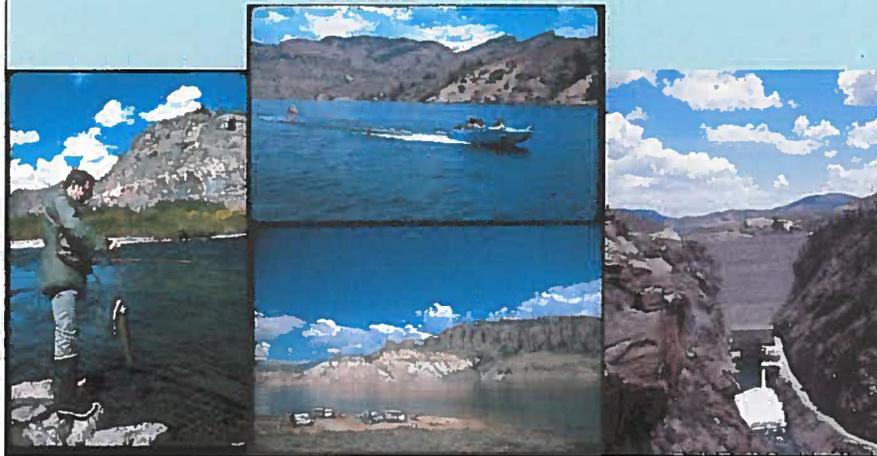
**INCOME LEVEL LETTER** \_\_\_\_\_

15) What year were you born? \_\_\_\_\_

Thank you for your participation.

**APPENDIX B: PHOTOS, CARDS, AND LOCATION MAP**

# Blue Mesa Reservoir Survey



## PAPERWORK REDUCTION ACT STATEMENT

The purpose of this information collection is to provide the Bureau of Reclamation information related to your satisfaction with current and changing reservoir elevations at Blue Mesa Reservoir. Your response to this request is voluntary. No action may be taken against you for refusing to supply the requested information. Public burden for the collection of this information is estimated at about 12 to 15 minutes per response. A Federal 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 Office of Management and Budget (OMB) control number. Our OMB control number for this information collection is 1040-0001, expiring January 31, 2005. Comments regarding this collection of information should be directed to the Bureau of Reclamation, Attention: Dawn Munger, D-8270, Bldg. 67, Denver Federal Center, PO Box 25007, Denver, CO, 80225.

**PRIVACY ACT STATEMENT**

No Privacy Act information is being collected and complete anonymity is guaranteed. Information collected will be compiled in a statistical database so no direct link to an individual who responds to this questionnaire will be available.

**ACCOMMODATIONS LIST**

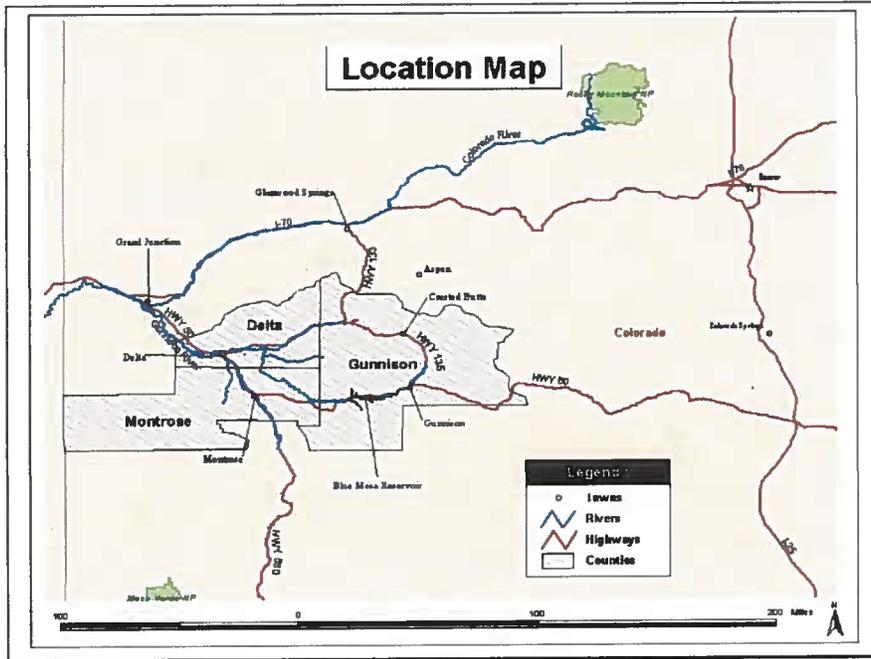
- 1 Primary residence
- 2 Hotel/Motel/Guest House
- 3 Home of family/friends
- 4 Campground
- 5 Undeveloped Camping (e.g. beach)
- 6 Condominium or second home (own)
- 7 Vacation Rental
- 8 Time Share
- 9 RV Park
- 10 Other (Please specify)

### ACTIVITIES LIST

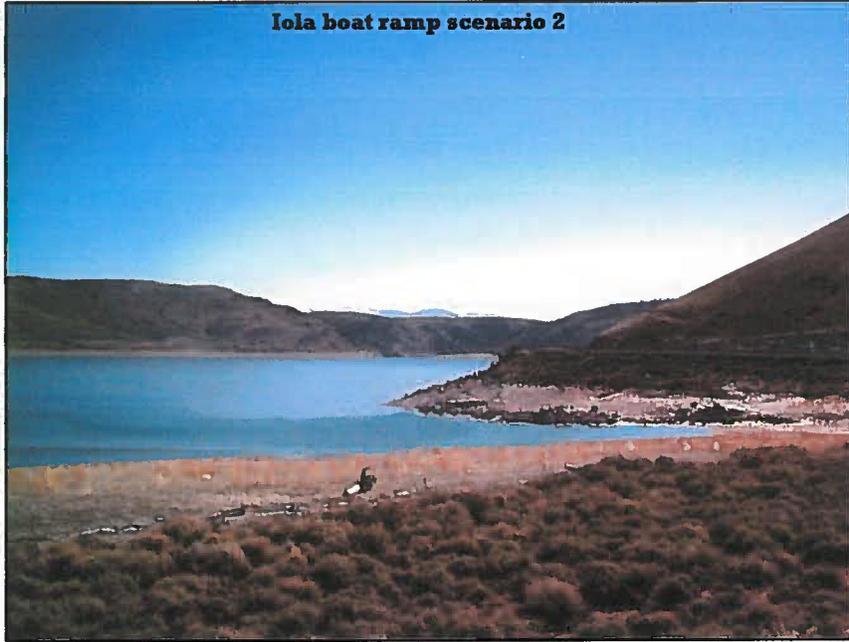
- A. Motorized Boating (e.g. water skiing, wake boarding, tubing)
- B. Non-motorized Boating (e.g. sail, canoe, kayak, sea kayak, shell, raft, wind surf)
- C. Boat Fishing (Guide)
- D. Boat Fishing (Private)
- E. Shore Fishing
- F. Swimming
- G. Camping (developed and undeveloped)
- H. Sightseeing
- I. Wildlife Viewing and Interpretation
- J. Photography
- K. Hang Gliding
- L. Off-highway vehicles
- M. Hiking
- N. Scuba/Snorkeling
- O. Other (please specify)

### ESTIMATED TRIP EXPENDITURES

Trip Expenditure Category	Roundtrip Expenditures Spent Locally (Shaded Area of Map)	Roundtrip Expenditures Spent Outside Shaded Area
A. Boat Fuel	\$	
B. Bait and Tackle	\$	
C. Boat Permit	\$	
D. Equipment rental	\$	
E. Lodging	\$	
F. Camping Fees	\$	
G. Auto Gas	\$	
H. Auto Rental	\$	
I. Air Fare	\$	
Landing location		
J. Restaurant/lounge purchases	\$	
K. Grocery and convenience store food, beverages and other items	\$	
L. Outfitters, guides and tour packages	\$	
M. Souvenirs, gifts and entertainment	\$	
N. Other trip related expenses (please specify):	\$	



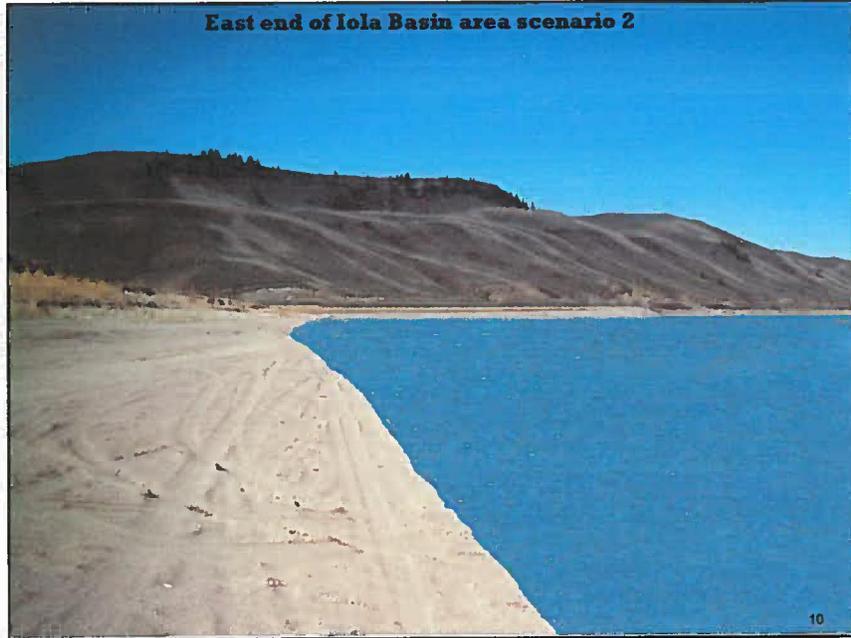
**Iola boat ramp scenario 2**



**Dillon Pinnacles scenario 2**



**East end of Iola Basin area scenario 2**



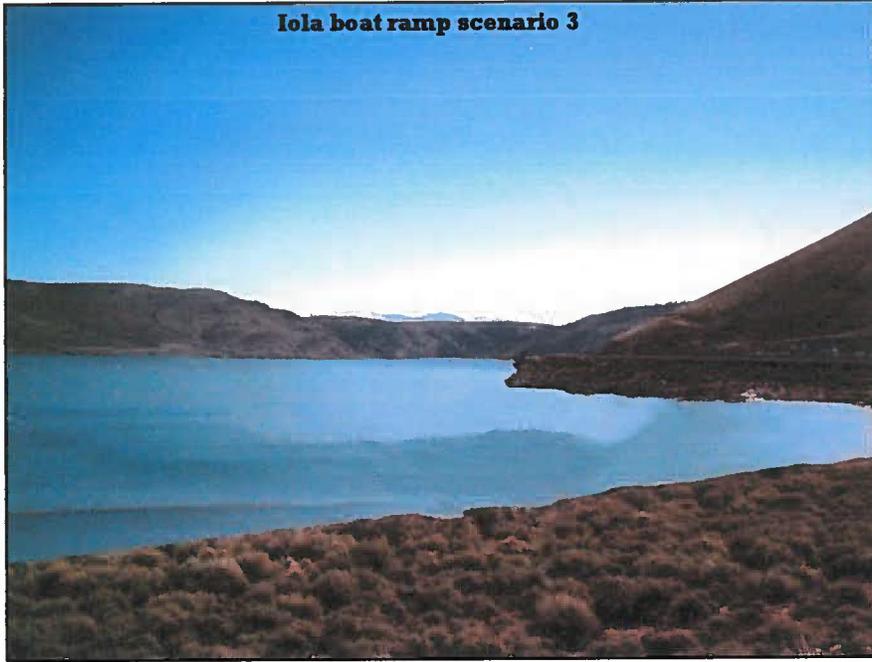
10

**Beaver Creek picnic area scenario 3**



11

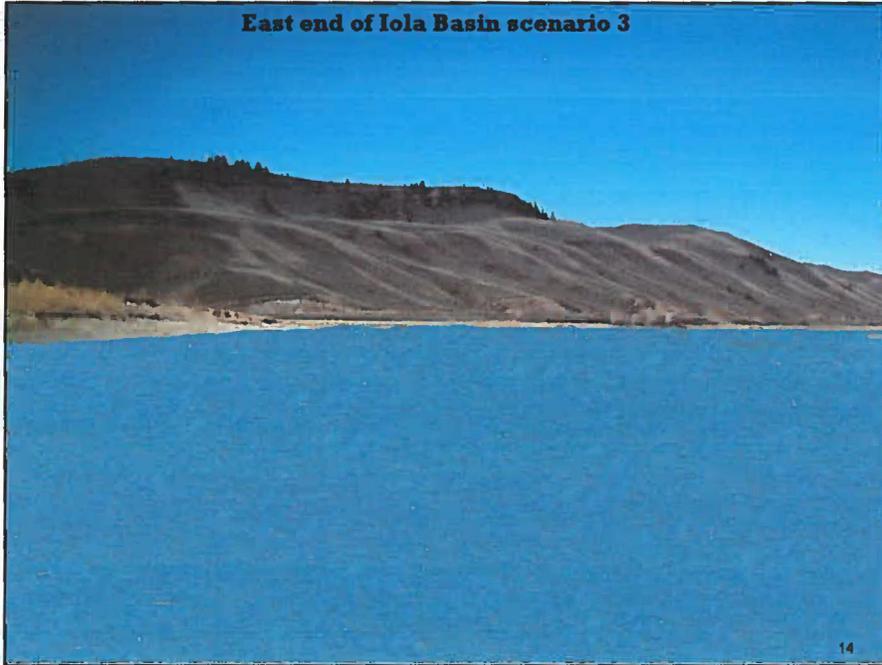
**Iola boat ramp scenario 3**



**Dillon Pinnacles scenario 3**



**East end of Iola Basin scenario 3**



14

**ANNUAL HOUSEHOLD INCOME**

*(PLEASE GIVE ONLY THE LETTER OF YOUR INCOME CATEGORY)*

- A. LESS THAN \$10,000
- B. \$10,000 TO \$14,999
- C. \$15,000 TO \$24,999
- D. \$25,000 TO \$29,999
- E. \$30,000 TO \$34,999
- F. \$35,000 TO \$39,999
- G. \$40,000 TO \$49,999
- H. \$50,000 TO \$59,999
- I. \$60,000 TO \$74,999
- J. \$75,000 TO \$99,999
- K. \$100,000 TO \$149,999
- L. \$150,000 OR MORE

15