

## ABSTRACT

FLETCHER, FREDERICK ALLEN. An Examination of Recreational Use and Comparison of Anglers' and Campers' Use Characteristics at the Upper Green River Special Recreation Area in Wyoming. (Under the direction of Dr. Roger L. Moore.)

The purpose of this study was to examine recreation river use and the characteristics of recreation users at the Upper Green River Special Recreation Management Area (SRMA). Under the management of the Bureau of Land Management field office in Pinedale, Wyoming, the SRMA covers 7,100 acres adjacent to the Green River and offers a variety of recreation opportunities. The study findings are intended to provide input to BLM management for a revision of the Recreation Area Management Plan for the SRMA.

On-site visitors were contacted while recreating in the Upper Green River SRMA and asked to complete a short questionnaire about their visit and give their consent to provide more comprehensive information via a mail survey. The on-site sampling was conducted during July 2006 through October 2006 and May 2007 through July 2007, resulting in 346 visitor contacts, 304 of whom agreed to receive a mail-back survey. Visitors returned 192 completed mail-back surveys, resulting in an effective response rate of 56%.

The study found a nearly even division of visitors between residents of Wyoming (51%) and of other states (49%). Visitors tended to be high- income, highly- educated, middle-aged males employed in professional occupations. Fly angling, camping, hunting, canoeing, and target shooting were among the recreational activities at the site. Users fell into three main groups in terms of primary

recreation activity: fly anglers that fish from the riverbank or wade in the river, fly anglers using float boats, and campers. These three user groups had distinct trip characteristics and motivations for visiting. Riverbank and float anglers emphasized the solitude motive, whereas campers highlighted being with family and enjoying the views. While visitors in all three groups were likely to have chosen the site as their primary destination, riverbank anglers traveled to the site with fewer people and were more likely to be first-time visitors. Float-boat anglers and campers visited in larger groups and stayed longer. Anglers were generally satisfied with their visits, but less so than campers.

These results have implications for management when developing future policies and possible infrastructure site upgrades. Although visitors were generally highly satisfied with their visits and experienced little perceived crowding or conflict, increased recreational use could degrade visitors' recreational experience.

An Examination of Recreational Use and Comparison of Anglers' and Campers' Use  
Characteristics at the Upper Green River Special Recreation Area in Wyoming.

by  
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A thesis submitted to the Graduate Faculty of  
North Carolina State University  
in partial fulfillment of the  
requirements for the Degree of  
Master of Science

Natural Resources

Raleigh, North Carolina  
2008

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## DEDICATION

This thesis is dedicated to my wife, Mimi, who willingly supported my dream to pursue my studies. You have my undying love and admiration.

## BIOGRAPHY

Fred Fletcher was born in Roanoke, Virginia and has always loved exploring the outdoors. After graduating from the University of Virginia with a Bachelor of Arts degree in Mathematics, Fred spent 31 years working for IBM and participated in the transition of computing from primarily large scale IBM mainframes to Personal Computers. Despite this long and satisfying career, he decided to pursue new adventures that would allow him to spend more time in the outdoors.

## ACKNOWLEDGEMENTS

I wish to thank Dr. Roger Moore for his kind guidance and willingness to engage in many “teaching moments.” Without his support I could never have made this career transition. I also wish to thank Dr. Carole Kline for her lively summer class, which served as my introduction to the field, and the confidence she displayed in my abilities.

A special thank you is extended to Martin Hudson, recreation planner for the Bureau of Land Management in Pinedale, Wyoming for allowing me the opportunity to survey users at the Upper Green River Special Recreation Management Area. The Upper Green River SRMA is truly a special place.

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## CHAPTER I

### INTRODUCTION

On an “average day” in 2006, 96% of all Americans age 15 or over engaged in some type of leisure activity (Bureau of Labor Statistics, 2007). Watching TV was the primary leisure activity, occupying about half of daily leisure time. However, the vast majority of Americans continue to seek the benefits of recreating outdoors. According to the 2000–2002 National Survey on Recreation and the Environment (NSRE), 97.6% of the U.S. population age 16 or older participated in some type of outdoor recreation activity annually (USDA NSRE, 2002). This was an increase from 94.5% cited in the 1994–1995 NSRE (Cordell, Lewis, & McDonald, 1995).

Americans also spent freely in support of their favorite outdoor recreational activities. In 2005, these expenditures generated an estimated \$289 billion in retail sales and services, resulting in an estimated \$88 billion in federal and state taxes (Leisure Trends Group, 2006). But Americans also demand quality outdoor recreational sites (Cordell, 2004).

Recreationists venture to a variety of outdoor settings. Often, water and recreational opportunities are inextricably linked. In describing the numbers of Americans participating in water-based activities, Cordell noted that “water has always been a major attractant for outdoor recreation” (Cordell, 2004, p. 108). The traditional water-based recreational activities of boating, swimming, and fishing continue to be enjoyed by millions of Americans annually. A river ecosystem provides essential support for many popular land-based activities, such as the

viewing and photographing of birds, fish, wildlife, natural vegetation, or natural scenery. Furthermore, recreationists' visits to outdoor sites often include related activities. For example, a water setting provides a pleasant backdrop for camping, where many other water-based recreational activities such as fishing, rafting, and swimming also occur (Kakoyannies & Stankey, 2002).

Resource managers should monitor national recreational participation to better understand trends in visitor usage. For example, the growing recreational use of off-highway vehicles (OHVs) may require managers to quickly develop or revise policies on their use. But nationwide participation rates for an activity may obscure differences between national and regional trends. Research shows that participation rates are often a function of supply and ease of access rather than of demand (Manning, 1999).

The popularity of water-based recreation in the United States differs by region. Residents of the Pacific and Rocky Mountain states are more likely than most Americans to visit watersides, view or photograph fish, or participate in coldwater angling (Cordell, 2004). A better understanding of such regional trends is necessary to help improve the quality of recreational settings that are important to regional economies dependent upon nature-based tourism. For example, Eubanks, Ditton, and Stoll (1998) documented the economic value of the annual Sandhill Crane gathering on the Platte River to Nebraska tourism. The study showed that in addition to an increase in visitation from non-Nebraska residents because of this event from both within and outside the U.S., these visitors to the Platte River

traveled in larger groups, stayed more nights, and spent more money per person than the average non-resident tourist visiting Nebraska (Eubanks et al., 1998). Furthermore, many of these visitors returned to Nebraska to visit the Platte River at other times of the year for other wildlife viewing opportunities.

Understanding other societal trends is also important for predicting future recreational trends and impacts. Many rural areas in the west are undergoing dramatic economic and demographic change. Between 1990 and 2000, the region's population grew 19.7 percent and added nearly 10 million people, in contrast to the national average of 13.2 percent (Kakoyannies et al., 2002). The natural, amenity-rich landscape of the west attracts new residents who were often first exposed to the region through tourism and recreation. But the desire to live near these locations and the resulting increase in population can also challenge managers of public lands to balance recreational needs and those of long-time residents. The community of Moab, Utah, for example, struggles with the transition from a resource-based community of ranchers and miners to one with increasing levels of in-migration and mountain-biking tourism (Brehm, 2007).

The Greater Yellowstone Ecosystem (GYE) provides another example. Sublette County, Wyoming at the base of the Wind River Range and Bridger Teton National Forest in the GYE serves as a gateway area for travelers in route to Yellowstone and Grand Teton National Parks and possesses many recreational amenities that also make it an attractive final destination. A Sublette County

brochure proclaims the county as “Better than Yellowstone! Breathtaking, Wild, Uncrowded” (Sublette County Joint Tourism Promotion Board, 2006).

The GYE’s Upper Green River Valley is a popular tourist destination for river floating, float-boat fishing, wade fishing, camping, OHV use, hiking, horseback riding, and more. These activities also attract locals to recreate and revel in the area’s signature scenery. The increasing regional population and changing demographics as a result of expanding natural gas development, the area’s attractiveness to retirees, and tourism have contributed to a growing demand for outdoor recreation opportunities on public lands (Wyoming Game and Fish Department, 2003). One such popular recreational site within this generally pristine area is the Upper Green River Special Recreation Management Area (SRMA), managed by the Pinedale Office of the Bureau of Land Management (BLM). The SRMA is located 22 miles north of Pinedale, Wyoming and 52 miles south of Jackson, Wyoming (Figure 1). It provides local residents and visitors with various recreational opportunities including float-boat fishing, bank fishing, and river floating with canoes, rubber tubes, or inflatable rafts.

Given its multitude of issues and user groups, a river recreational setting can often be complex to manage (Siderelis & Moore, 2006). The Upper Green River SRMA supports a variety of recreational activities having various biophysical and social impacts that must be accounted for and managed. Without an improved understanding of who visits, how many visit, and what benefits are sought by

visitors, management would be left to plan for the “average visitor” rather than specific user groups.

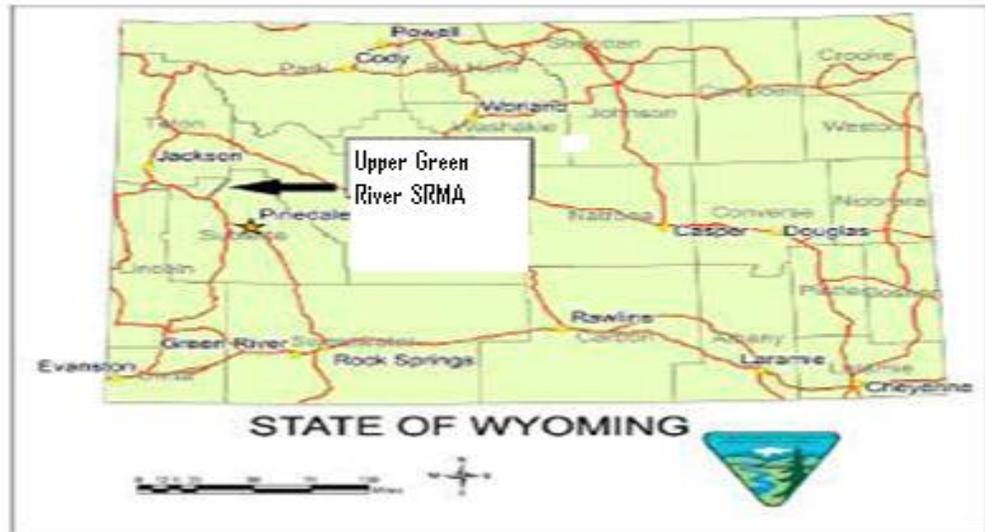


Figure 1. Location of Upper Green River SRMA

Different user groups have different reasons for visiting the Upper Green River SRMA, and their activities differ in how they impact the resource and other users. Since 2000, the Pinedale Office of the BLM has noted marked increases in dispersed recreation use such as camping and fishing on public lands they manage (USDI Bureau of Land Management, 2007). To better achieve the BLM’s mission to manage public lands for the use and enjoyment of present and future generations, its recreational management actions for the Upper Green River SRMA must accommodate projected changes in future recreational use. But just as important, any management plan must protect the natural resources and the quality of the users’ recreational experiences.

Therefore, the purpose of this study was to conduct a visitor survey as a first step towards creating a Recreation Area Management Plan (RAMP), by gathering information about current visitors and their experiences at the Upper Green River SRMA. Understanding users' characteristics, their motivations for visiting, and the nature of their recreational experiences is vital to the BLM in developing and implementing appropriate management strategies. Specifically, this research addressed the following research question and had four related objectives.

*Research Question*

Who are the users of the Upper Green River SRMA, what activities do they engage in, and what are the differences, if any, in user characteristics, motivations, and experiences across the participants in the major activity groups?

*Study Objectives*

1. To describe the characteristics and recreation river use of visitors to the Upper Green River SRMA.
2. To compare the recreation use of the main river user groups of the Upper Green River SRMA.
3. To compare the motivations of the main river user groups of the Upper Green River SRMA.
4. To compare the recreation experiences of the main river user groups of the Upper Green River SRMA.

## CHAPTER II

### REVIEW OF LITERATURE

In order to address this thesis's stated objectives, this chapter provides the historical context for the necessity of conducting river studies to better understand the complex issues in managing rivers for recreation activities. It also reviews literature pertinent to the following domains: (a) the usefulness in collecting and describing the characteristics and recreation activities of users and their comparison across user groups at various river venues, and (b) factors such as motivation, satisfaction, conflict, and crowding that influence a recreation experience. The review of recreation experience literature emphasizes the use of the Recreation Experience Preference (REP) scales for examining recreationists' motivations, and as a tool to develop a better understanding of the main user groups at the Upper Green River SRMA.

#### *River Settings, River Use, and Users*

The outdoor recreation literature is rich with studies of river recreation visitors' experiences and their interaction with river resources. During the 1960s and 1970s, river managers experienced a rapid increase in the number of river users and visits, which challenged their abilities to design and implement management plans that not only protected the biological resources of a river setting, but provided opportunities for satisfying recreational experiences and other benefits. The importance of rivers and streams to the American public was evident when citizen pressure resulted in

the passage of the Wild and Scenic Rivers Act in 1968.

An important part of the foundational research on river recreation can be traced to the first National Symposium on River Recreation Management, held in Minneapolis, Minnesota in 1977. It dealt exclusively with issues related to river recreation and sought to “encourage and stimulate the exchange of ideas, problems, solutions, and research needs within this rather broad field” (Lime & Fasick, 1977, p. i). The organizers sought to educate participants on the foundations of past research and accomplishments, which would facilitate and stimulate the identification of future research needs and priorities. Sixty-five formal papers were presented.

Most of the predictions and warnings expressed at the symposium about river recreation issues have come to pass. Nash (1977) wrote that the nation was only at the beginning of a rise in river recreation participation and predicted the continuing popularity of Americans seeking wild and natural river settings to experience an outdoor activity. He believed that the recreational growth would be fueled by improved technology, more instructive “how-to” guide books with detailed maps on the “best” rivers and streams, and promotion by the mass media, especially TV, of the thrills and glamour of whitewater activities. Nash feared the result being “amusement park” rivers and coined the term “rapidomaniac” to describe recreationists who ignored the total environmental setting while their sole worry about crowding concerned long lines. He felt that these rapidomaniacs would base their total experience solely upon feeling the surge of the whitewater and ignore the surroundings.

As a supplement to the symposium, Anderson, Leatherberry, and Lime (1978) created an annotated bibliography of 100 river recreation studies. They found that most of these papers, which were published after 1968, were one-time studies without subsequent follow-up, lacked comparability to other studies, tended to be descriptive in nature, unique to western whitewater rivers, or focused on a single activity at a specific time.

To address these limitations and to provide additional visitor information needed by both researchers and river managers, the National River Recreation Study was undertaken with the primary goal to “describe characteristics and preferences of recreation users for a variety of rivers using standardized measurement instruments” (Lime, Knopf, & Peterson, 1981, p. 1). This standardized instrument included survey questions collecting user information such as satisfaction, reason for visit, and perceptions of conflict and crowding. Additional information on user characteristics included age, occupation, and education, whereas additional information on trip characteristics included party size, type of group, and length of trip. Much of the information collected allowed researchers to compare user and trip characteristics between first-time and repeat visitors, private and commercial groups, and user groups based on activity (e.g., rafter vs. kayaker).

When Leatherberry, Lime, and Thompson (1980) described the upward trends in river recreation usage during this period, they found a tendency for researchers to constrain the term “river recreationists” to include only those using a canoe, raft, kayak, or small boat and not a large motorized watercraft or sailboat.

This definition also excluded anglers, shore users, river corridor campers, and riparian landowners. This visitor and activity focus may well explain the limited number of studies on river anglers, campers, or other participants in river activities during this period. Consequently, these user groups were often overlooked by river managers, who focused on recreation conflict and whitewater-boating issues. However, the information gathered by the National Survey would be applicable to other types of river users such as anglers.

Efforts to improve resource management were not limited to rivers. In the mid-1970s, Congress sought to improve management accountability and responsiveness to users of all public lands. Federal agencies were directed through the Federal Land Policy and Management Act (1976), the Forest and Rangeland Renewable Resources Planning Act (1974), and the National Forest Management Act (1976) to classify and inventory recreational use and to anticipate changes. Public pressure on agencies that resulted in this legislation, along with the need to better understand how to collect recreational user information through the National River Recreation Study, reflected society's recognition of the non-economic values of public land and river systems and would make their management a part of the political process.

Lime, Knopf, and Peterson (1981) charted the progress of the National River Recreation Study along with the status of an inventory tool piloted for use on 39 river segments, gathering data from over 50,000 river users. The information gathered included recreational use and activity; group size; and visitor age, education level,

income, and residence. These studies generated a growing centralized database for the study of other visitor issues including users' perceptions of conflict, satisfaction, and site problems, and whether they have previously visited the site. Ultimately, Lime et al. suggested that beyond these basic user characteristics, the study information would be helpful in providing management with a better understanding of visitor satisfaction by segmenting the user population on the basis of desired outcomes, perceptions of crowding and displacement, demand functions, and desired management actions.

### *User Characteristics*

The General Technical Report by Knopf and Lime (1984) reviewed the results of the 45 pilot studies conducted under the National River Recreation Survey and explained how user characteristics and other variables measured in these studies were of value to managers. For example, group composition and size were drawn from a study on Connecticut's Housatonic River, showing that 33% of visitors floating the river were with club members or an organization and 91% of these groups had a group size of greater than 10. In contrast, the Salt River in Arizona had only 5% of visitors floating with organized groups. This tells a manager at the Housatonic River that any restriction on group size could affect a high percentage of river users. Conversely, a manager at the Salt River could infer that any organized campaign against limiting group size does not reflect typical user sentiment.

The need for resource changes that will impact the resource users is a strong motivation for managers to better understand those users. Resource managers must

realize that public input to and acceptance of regulations are critical. For example, angler harvest regulations should be based partly upon an understanding of angler behavior, which requires knowledge of the angler groups using the resource.

In a case study for possible modifications to harvest regulations for spawning-size cutthroat trout on the Snake River near Jackson, Wyoming, Hubert and Gipson (1996) conducted a mail-in survey of the angling public to better understand its desires and reactions to new regulations. This input was important to the Wyoming Game and Fish Department because these modifications were being championed from interest groups that favored catch-and-release angling. From the two adjacent counties, Teton and Lincoln, using the database of Wyoming Game and Fish sport fishing licenses purchased, a sample of 300 residents and 300 non-residents was selected based upon the proportion of each type of license sold in each county. Significant differences were found between the anglers in the two counties. Anglers from Teton County preferred the Snake River (67.7%), to fish in a group with just one friend (37%), and to use flies (51.6%) rather than tackle (32.3%) or bait (4.3%), whereas anglers from Lincoln County did not generally prefer the Snake River (37.3%), preferred to fish with family (39.8%), and used tackle (59.7%) rather than flies (14.5%) or bait (12.9%). In addition, the authors found differences as to where anglers from each county chose to fish and significant differences between percentages of residents that keep fish (35.6% for Teton and 64.4% for Lincoln). By understanding these two angling segments based upon place of residence, the

Wyoming Game and Fish Department was able to adjust harvest regulations in a way that was acceptable to both angling segments.

Wright and Sanyal (1998) studied unguided and guided fly anglers on four rivers in southwest Montana and found significant differences between the groups in age, median income, gender, and residency. Unguided anglers, who were very likely to be male (93%) or from Montana (97%), had an average age of 38.4 and a median income from \$20,000 to \$40,000. On the other hand, guided anglers, who were more likely to be from out-of-state, were older (with an average age of 49.2) and with a median income from \$80,000 to \$120,000. This information may be valuable to river managers when considering potential conflicts between guided and unguided anglers because Montana anglers may resent wealthy non-residents coming to their state and negatively impacting their fisheries.

Hutt and Bettoli (2003) studied trout anglers on Tennessee tailwater fisheries and found that they averaged 44 years of age and 96% were male. Eighty-four percent of anglers had at least a high school education and 28% had at least a four-year college degree. Most (54%) anglers reported household income from \$20,000 to \$59,999. Eighty-six percent of survey respondents were Tennessee residents, with the nonresident anglers encompassing 20 states. Most (61%) respondents reported living in either a rural area or a small town and averaged 49 fishing trips in the past year. Interestingly, when recreation specialization level increased among angler groups, so did the use of fly fishing. These more specialized anglers were better educated, with 59% having at least a four-year degree, and 27% had

household incomes over \$100,000. The average age of this group was 46 years. This information may be useful to state fishery managers in understanding their angling population groups and the implications for future license revenues. For example, age or gender may be important variables when understanding the motivations for angling and desired experiences. If quality angling experiences are not continually provided or aging demographics reduces the number of anglers, license revenues may decrease.

Cernicek (1998) compared commercial and noncommercial boaters on the Lower Taos and Racehorse sections of the Rio Grande River in New Mexico and noted that “the demographic characteristics of whitewater boaters have been relatively consistent throughout past research over many different types of river setting” (p. 32). For example, the majority of boaters were males, most boaters were age 30 to 41, and females were more likely to be on commercial trips.

The relationship between boater age and level of experience was explored by Schreyer (1981) in a study of boaters on two rivers in Utah. He found no relationship between boater age and level of experience because most boaters were first-time floaters.

User characteristics have also been used to predict users’ reactions to possible management actions. In a study of boaters on the Arkansas River, McMullen (1993) found that locals were more sensitive to environmental problems like litter and human waste than were non-locals and were more likely to attribute these problems to recreational use. In addition, locals and non-locals gave similar

estimates for the number of people they encountered at various sites, although locals were more bothered by those encounters. Although locals and non-locals were significantly different in their evaluations of impacts and conditions, they expressed similar opinions about potential management actions. When asked to indicate their level of support for or opposition to a variety of facilities (e.g., restrooms, parking areas, or picnic tables) and services (e.g., interpretive exhibits, river patrols, or workshops), locals and non-locals differed for only 2 of 16 items. Locals were more supportive of scheduling “no boat times” and were more opposed to providing additional shower facilities than were non-locals.

#### *Recreation activities and group differences*

Beyond exploring basic user characteristics, researchers and managers were concerned with understanding what activities river visitors engaged in and any differences between user groups. River studies vary in purpose: some studies document and describe all visitor recreation activities, whereas other studies select specific user groups.

Heywood (1987) noted the importance of understanding the diversity of social groups actively involved in river recreation on a given stretch of river. He suggested the important characteristics of river recreation groups were their membership or composition, size, and private or commercial group affiliation. Further, he found that “preferred recreation experiences are related to the size and composition of the social group of participation” (p. 11).

For example, Manning (1979), in his study of anglers and other recreationists on four multiple-use rivers in Vermont, stated that while documenting recreation use and examining user characteristics and preferences are necessary for the development of management policies, it is important to carry the analysis forward to compare the difference between user groups. In his study, recreationists were classified based on their primary activity, into three user groups: anglers, floaters (canoeists, kayakers, and rafters), and swimmers. Manning found that anglers were significantly older than members of the other groups and that angling was dominated more by males. Other significant differences were that anglers experienced more conflict with other users, expressed a lower level of satisfaction with their visit, and were more attuned to site problems with respect to water quality, bank erosion, and visitor river access.

Nielsen and Shelby (1977) examined the differences between commercial and private boaters on a river trip through the Grand Canyon on the Colorado River. While private boaters were more likely to be younger males traveling with fewer people than were typical in a commercial group, the key difference was that private boaters were more likely to have experience running other rivers. This tells site managers that the user satisfaction reported by private boaters is more likely influenced by their previous boating experiences than the satisfaction reported by commercial boaters.

Shelby (1980) used an experimental design to better understand differences between motorized and non-motorized river runners on the Colorado River in the

Grand Canyon. One group traveled the river in oar-powered boats, and the others used motorized boats. People preferring the oar-boat experience cited pace of travel, smaller and more comfortable social groupings, enhanced sensitivity to the natural environment, style of travel, and characteristics of the boat itself (e.g., size and maximum speed). The findings indicated that management actions need to be driven by management goals such as creating opportunities for desired visitor experiences.

Townsend and Tarbet (1982) studied differences between private and commercial boaters on the Chattooga River. They found that private boaters were more aware of environmental degradation and more sensitive to the decline of the overall resource. Private boaters were also more likely to see crowding as a problem and to perceive user conflict than were commercial boaters.

Backlund (2005) examined the relationship between resource substitutability and place attachment for both trout anglers and whitewater boaters using the Chattooga National Wild & Scenic River in 2000. The study found that whitewater boaters considered the Chattooga a unique resource within the general area, whereas trout anglers consider the Chattooga to be one of many angling options, some of which may provide a better angling experience. This difference between boaters and anglers could possibly be used by management to justify policies that are more sensitive to boaters.

River managers must also consider the likelihood that a visitor is engaged in many activities during a visit. Overnight camping is often an integral part of a multi-

day float or angling trip. Although Brunson and Shelby (1990) found that boaters on the Deschutes River in Oregon selected camping locations based upon a hierarchy of campsite attributes, with the highest priority being for “necessity attributes” (e.g., flat ground), they found that boaters also sought “experience attributes,” which helped them achieve a high-quality recreational experience. For example, a campsite may promote solitude, add to scenic beauty, or provide firewood. Stewart, Larkin, Orland, and Anderson (2003) found that “spike flow” (controlled flooding) decisions by river managers may well have recreational value when they effect improvements in both primary and secondary camping attributes. Private trip leaders, commercial boaters, and river guides all expressed a preference for larger beaches for camping. While this result may seem intuitive, the study was also able to quantify the general dimensions of the preferred camping beaches, enabling managers to better target future release flows.

In the 2001 Niobrara National Scenic River Visitor Study, Davenport, Flitsch, Thompson, and Anderson (2002) profiled canoeists, tubers, kayakers, and rafters on the Niobrara River in Nebraska. The purpose of this study was to replicate an earlier study conducted by Lime, Thompson, Lewis, and Freimund (1994) and to address current management concerns. (Replicating previous studies helps determine whether current management objectives remain relevant to current usage and visitor desires.) The data showed that canoes were the most common watercraft used to float the river and that those visitors were predominantly well-educated, in their early forties, and Nebraska residents. A small majority (55%) of the users overall were

women. The most common group size was four to six people (34%), and most users were with family members (73%). The most common visitor trip was a day trip. Respondents with previous experience on the Niobrara NSR were more likely than those visiting the river for the first time, to perceive certain problems such as litter on the shore and in the river, rowdy and noisy people, and alcohol consumption. However, they were also more likely to perceive there being too many rules on the river as a management problem.

In a study on the West Branch of the Farmington River in west central Connecticut, Moore and Siderelis (2001) documented the recreational use and characteristics of users and noted that only 16% of river users were women. They found that most visitors were well educated and middle-aged, with a mean age of 48. The results showed that the primary activity on the river was fly fishing (49.9%), which the authors suggested may help explain the predominance of men at the site. Forty-percent of users were by themselves, whereas being with a group of friends (25%) or in a family group (25%) were the dominant group types.

In a study of the Chattooga River, Moore and Siderelis (2003) sought to document recreational usage and the visitor characteristics along with the economic benefits provided to the surrounding area. They found that visitors were primarily middle-aged men with relatively high levels of income and education. Visitors were very satisfied with their trip experience and rated their satisfaction at 8.3 on a 10-point scale (where 10 indicates the best possible trip). The researchers compared the Chattooga results with those of the Farmington River study and found that the

most common user activities differed; Chattooga users favored rafting and kayaking, whereas the Farmington River attracted fly angling and tubing. The results showed more first-time and overnight visitors to the Chattooga, along with a greater tendency to use commercial outfitters. The results also showed that both rivers received high levels of use and were highly valued by their visitors.

### *Summary*

In their study of three rivers in Michigan, Driver and Bassett (1977) wrote of the great diversity of river recreation use and users. They discussed problems posed by this diversity to river recreation researchers and noted frequent difficulty in “identifying appropriate variables to measure” (p. 267). In addition, they noted that “the users themselves differ with respect to age, sex, income...” In other words, Driver and Bassett believed that these differences in users influenced their preferences and must not be ignored. Tourists and local residents or first-time and regular users cannot be considered as homogeneous groups with respect to their preferences. Consistent with that assessment, the preceding selection of river studies demonstrates the wide breadth of river recreation research that described recreation user characteristics, their group differences, and their activities.

### *River Recreation Experiences*

Knopf and Lime (1984) pointed out that a guiding principle for river managers should be to avoid the temptation of “managing for recreation activities, rather than managing for recreation experience” (p. 15). They cautioned against concluding that

two recreationists engaged in the same activity at the same site necessarily seek the same recreation experience. The researchers contended that river managers must understand the desired experiences of visitors in order to provide for their attainment.

A recreational *experience* is defined as a psychological outcome associated with participation in a given activity in a particular setting (Manfredo, Driver, & Brown, 1983). In other words, recreationists process information about their needs, wants, and desired outcomes and make choices for a particular recreational setting and activity. A river setting, such as the Upper Green River SRMA, offers users a variety of recreation activities. Therefore, in striving to provide users with opportunities for a quality experience, managers must consider how visitors' expectations determine what activities they choose. How well management achieves or fails to achieve this goal is an important measurement for management and is most often reflected in visitor satisfaction (Williams, 1989). Recreation research has recognized that understanding visitor satisfaction requires a multiple-satisfactions approach, which considers a variety of elements found in the user recreational experience (Whisman & Hollenhorst, 1998).

Consequently, overall satisfaction has been found to be influenced by several situational or subjective factors. This concept has been used to examine elements of conflict and crowding that would lead to user dissatisfaction and detract from visitors attaining a quality experience and satisfying visits (Ditton, Graefe, & Fedler, 1981).

## *Satisfaction*

Given the BLM's stated mission that public lands under its management must provide "for the use and enjoyment of present and future generations," any management plan must include some guidance on understanding what satisfaction is and how it is measured (Herrick & McDonald, 1992). However, constructing a reliable measure of satisfaction has proved difficult (Kuss, Graefe, & Vaske, 1990). One approach is to explore the relationship between the motivations of users and their satisfaction. For example, an angler visiting the Upper Green River SRMA may have a set of unique expectations based upon the activity-specific consumptive aspects of angling (e.g., catching fish), while carrying another set of general expectations based upon the non-consumptive benefits that may be in common with other recreation activities (e.g., relaxation).

Vaske, Donnelly, Heberlein, and Shelby (1982) explained that visitor satisfaction is often a function of an interaction between the individual and the elements of the activity that are activity-specific. They noted that whereas many studies had looked at only the visitors' satisfaction of their general psychological motivations from an activity, various recreation activities produce different types of satisfaction. Activities like hunting and fishing, which are considered consumptive activities where the goal is to acquire game, differ from non-consumptive activities like wildlife viewing. Consumptive recreationists, they believed, had more specific goals that were central to their activity and faced more elements beyond their control. They hypothesized that satisfaction ratings would be lower for consumptive

recreationists than for non-consumptive recreationists, and the results supported this. The authors suggested that this was because non-consumptive recreationists with multiple objectives for their experience have a more flexible standard for measurement of satisfaction.

In a recent study of German anglers, Arlinghaus (2006) sought to improve the understanding of the linkage between angler motivations and their satisfaction. He hypothesized that the expected elements of an angling experience (i.e., the motivations) should correlate with the elements that most strongly determine angler satisfaction or dissatisfaction. Specifically, Arlinghaus suggested that an angler who is weakly motivated by the consumptive activity-specific elements of angling would report high levels of satisfaction by fulfilling the non-consumptive activity-general aspects of angling. This would imply that user satisfaction would increase as an angler's orientation toward the consumptive activity-specific elements decreases. He found that while most German anglers were classified as having low or minimal consumptive motives toward catching fish, they still placed a high importance on the consumptive aspects of angling when measuring their satisfaction with their angling season. This finding supported results from other studies that catching fish or having the possibility to catch fish is a component of every angling experience and that visitor satisfaction is a multi-faceted concept. Therefore, providing for a high-quality and satisfying visitor experience requires an understanding of more than just visitor motivations.

Subjective and situational variables have also been used to measure the multiple-satisfaction concept for non-consumptive activities. In a study of rafters and kayakers on the Ocoee River in Tennessee, Herrick and McDonald (1992) sought to better understand the effects of setting variables on satisfaction. Factor analysis was used to identify 5 independent variables (encounters, time waiting, parking, setting attributes, and group behavior) from 18 items related to river conditions and the trip itself. Three additional variables (perceived crowding, use levels, and previous experience) were added to the analysis. Overall visitor satisfaction was the dependent variable. The results indicated that six of the variables (group behavior, setting attributes, perceived crowding, parking, encounters, and past experience) were significant in explaining differences in visitor satisfaction, but accounted for only 31% of the variance in the model for visitor satisfaction. Setting attributes (6%) such as difficulty and length of rapids, along with group behavior (15%), were the most important variables explaining visitor satisfaction. This result implies that a manager must be aware that both physical and social conditions are important to managing visitor satisfaction and that other variables are important also.

Whisman and Hollenhorst (1998) proposed a model using both situational and subjective variables related to whitewater boating on the Cheat River in West Virginia, in an attempt to improve upon previous models that showed these variables influenced visitor satisfaction. They proposed a three-tier model. First, they hypothesized that private or commercial boater evaluations of subjective variables were directly related to their reported satisfaction. Second, situational variables were

predicted to have an indirect effect on visitor satisfaction by their direct effect on the subjective evaluation by visitors. Third, there would most likely be some direct effect of situational variables on satisfaction. The dependent variable, overall satisfaction, was measured by averaging scores on six questions related to five dimensions of satisfaction.

For example, the situational variable measuring water-flow level was expected to indirectly influence the subjective variables of challenge, excitement, and skill testing, while directly influencing overall satisfaction. The subjective independent variables were measured by single-item questions concerning the visitor's opportunity to experience challenge, excitement, testing their skills, and escaping usual demands of life. In addition, boaters were asked how pleased they were with the scenery and whether their trip was more enjoyable because of the condition of the land and forest along the river. Crowding was also measured, using a nine-point scale with 1 being "not all crowded" and 9 being "extremely crowded." The three situational variables were use level, water-flow level, and past experience.

The results supported the concept of the multi-dimensional construct of recreation satisfaction along with an improved model for explaining boater satisfaction. The direct influence of the subjective variables and indirect influence of situational variables explained more than 50% of the variation in boater satisfaction. Consistent with previous studies, experiencing challenge, excitement, and skill testing were the variables having the greatest effect on boater satisfaction.

Managers should be aware that regional differences in site-situational conditions may affect satisfaction. Smith, Wellman, Roggenbuck, and Killeen (1982) studied canoeists on eight rivers in Virginia. They found similarities as well as differences between responses for these rivers and those from the nationwide survey conducted by Knopf (1982) on 38 rivers. Similar to other river recreationists, Virginia canoeists assigned the highest management priority to reducing litter and the lowest priority to use levels. However, Virginia canoeists assigned a higher management priority to improved river access, pollution control, and development control than in the nationwide survey, which ranked pollution control 13th among visitor concerns.

### *Conflict*

As the demand for opportunities to participate in river recreation increases, so does the potential for conflict among users. Interactions involving river users and groups can be positive or negative. Conflict reflects a negative outcome for at least some of the participants. For example, an angler wading in the river and actively casting may experience conflict when interrupted by a group of passing float-boat anglers.

Recreation conflict was defined by Jacob and Schreyer (1980) as "goal interference attributed to another's behavior" (p. 369). They proposed four major factors affecting levels of recreation conflict: activity style, resource specification, mode of experience, and lifestyle tolerance. Conflict is not necessarily a function of congestion and may occur between participants in the same activity. But much

recreation research has focused on conflict between different groups in a variety of recreation activities including hiking, boating, and skiing.

Research has consistently found conflict to be asymmetrical (Watson, Niccolucci, & Williams, 1994), where one group perceives one-sided goal interference from another group (i.e., one group consistently reports experiencing conflict with a competing group, whereas the other group reports little or no conflict).

Manning (1979) segmented recreationists on four different Vermont rivers by activity type and found that anglers experienced significant conflict with swimmers and floaters, whereas the reverse was not true. Adelman, Heberlein, and Bonnicksen (1982) studied boaters on the Boundary Waters Canoe Area of Minnesota and found that 71% of paddling canoeists disliked meeting or seeing motor-craft users, but only 8% of motor-craft users disliked meeting or seeing paddling canoeists. Watson, Niccolucci, and Williams (1994) found evidence of asymmetrical conflict between hikers and recreation stock users, in which more hikers disliked encounters with stock users than stock users with hikers. They also found that neither hikers nor stock users minded meeting others of the same group (Watson et al., 1994).

### *Crowding*

When striving to provide high-quality recreation experiences, resource managers face a complex challenge in balancing the protection of the natural resource with increases in visitor usage. As the previous literature has shown, satisfaction can be influenced by situational variables such as litter and by subjective

variables such as crowding. For example, if an angler seeking solitude arrives at an isolated stretch of river to fish, the presence of other recreationists floating the river will most likely result in a subjective judgment by the angler that his or her expected experience and satisfaction would be negatively impacted. Therefore, crowding can be conceptualized as a visitor's perception that the recreational experience will be negatively impacted by a high number or the density of other people present (Kuss, Graefe, & Vaske, 1990). This issue has often been addressed within management plans by considering not only a resource carrying capacity, but also a social carrying capacity designed to protect the recreation experience. Manning (2001) reflected on these dual goals when he described carrying capacity as the "amount and type of use that can be accommodated in parks and related areas without unacceptable impacts to park resources and/or the quality of the visitor experience" (p. 93).

The concept of carrying capacity has provided foundational support for crowding research (Manning, 2000). A "satisfaction" model (Heberlein & Shelby, 1977) is based upon the concept that a decrease in satisfaction due to increased use does not fully explain crowding. Therefore, an expanded model incorporated normative definitions of crowding and coping behaviors (Manning, 2000). The normative approach classifies crowding as a problem only when visitors perceive interference to their objectives or values. Coping strategies have been used to help explain displacement, rationalization, and product shift.

Early research on river crowding was in response to a dramatic rise in river usage and managers' desires to determine resource carrying capacity and strategies

to control visitor density and implement use limits. It was therefore thought relevant for researchers to explore a linkage between visitor satisfaction and crowding. In a study of river users on the Yampa and Green River in the Dinosaur National Monument, Roggenbuck and Schreyer (1977) suggested that defining managerial objectives in terms of visitors' desired recreation experiences would provide a sound framework for developing better use-limitation guidelines. They theorized that river users had varying motives for taking a river trip and that these users would differ in their preference for the number of people they wish to see and the maximum group size. They found at the 0.05 level a statistically significant relationship (although the strength of the correlations were weak) between motivations of stress release / solitude and self-awareness, and user preferences for river use density and for limiting group size. The authors cautioned that the weak correlations and the high levels of trip satisfaction implied that this research approach may not be optimal for an assessment of socio-psychological aspects of carrying capacity.

Much the same result was noted by Heberlein and Vaske (1977) when studying crowding and visitor conflict on the Bois Brule River in Wisconsin among canoeists, tubers, and anglers. They found that use level was related to perceived crowding, but found little relationship between use level and overall visitor satisfaction.

Perceived crowding is more often used as a substitute term for crowding, to highlight that crowding is an individual's subjective evaluation of the impact to the recreation experience. Researchers measuring this perception have widely used a

9-point scale where a response of 1 or 2 indicates *not all crowded*, 3 or 4 indicates *slightly crowded*, 5 to 7 indicates *moderately crowded*, and 8 or 9 indicates *extremely crowded*. Shelby and Vaske (2007), in a comparative analysis and meta-analysis of crowding perceptions of hunters and anglers, noted that this scale has been consistently used for over 30 years in studies that have combined for over 85,000 individual responses. For their analysis, the scale was collapsed to a dichotomous variable reflecting *not at all crowded* versus any degree of crowding. The comparative analysis revealed that for anglers, crowding ranged from 18% to 100%, whereas for hunting, crowding ranged from 0% to 91%. The analysis showed that the most crowding was detected early in angling or hunting seasons. Management actions were found to reduce crowding perception of hunters in Wisconsin from 79% to 17%, following a mandatory increase in spacing of hunting blinds. Visitors at different locations at the same site were found to perceive varying levels of crowding. At the mouth of the Rakaia River in New Zealand, anglers reported higher perceived levels of crowding (74%) than did those fishing upstream (45%). In the meta-analysis, 57% of anglers and 51% of hunters felt some degree of crowding.

The authors suggested that this scale works well in field situations where a limited number of questions can be asked and in mail-back surveys. They encouraged the continued use of the scale. They found that while this scale was not a comprehensive substitute for measures of crowding usually found in a more

comprehensive carrying-capacity study, it provides managers a useful glimpse of crowding issues.

### *Motivations*

Although national surveys are often used in recreation studies to describe participation in recreation activities, their usefulness for resource managers is debatable because these surveys generally do not consider the underlying meanings that these activities have for participants (Manning, 1999). Past recreation research has shown that visitors are often better characterized by their motivations or experience preferences than by their recreation activity (Manfredo, Driver, & Brown, 1983). An overemphasis on activities ignores the potential for one activity to be substituted for another activity in fulfilling the same motivations (Manning, 1999). A given recreation river setting may have simultaneous activities, including fishing (wade angling, boat angling, and bank fishing), rafting (whitewater and social floating), social camping activities, kayaking, swimming, or inner-tubing. Research has shown how desired user experiences have been found to vary among users engaged in the same or a different river recreation activity, at the same or a different river, and how their desired experiences are often influenced by the effect of non-motivational characteristics.

The recreation experience preferences (REP) approach of Driver (1977) was designed to measure the motivations (benefits sought) of participants in recreational activities. The REP scales consist of individual statements related to desired outcomes of recreation. The scales are organized into “domains” (escape/relaxation,

learning, and testing skills) that represent larger motivational categories that often differ in importance across subsets of recreational participants. Individual studies have typically used smaller lists of REP items that are focused on domains hypothesized to be important for the activity and/or setting in question. The more common motivational elements include escape, solitude, being close to nature, and social interaction.

River studies have consistently used items patterned after Driver's REP scales to understand visitors' experiences (motivations). Schreyer and Roggenbuck (1978) used a 38-item scale and included the elements of action/excitement and stress release in their study of the differences between commercial and noncommercial whitewater boaters in Dinosaur National Monument. They hypothesized that nine classes of experience were important, and the survey contained at least three questions to quantify the importance of the experience to the visitor. They found that on average, boaters rated *action/excitement* and *learning about nature* as the experiences they most sought. This was also true of overnight or day users as separate groups. However, the REP categories for private, commercial, and "education" boaters (those participating in an organized group trip) differed significantly in their recreation-experience expectations.

Recreation research on participants' motivations has shown that motivational dimensions can vary for participants even in the same activity at the same or similar sites. For example, Knopf and Lime (1984), in their review of river studies, described procedures for assessing user characteristics and experience preferences of river

recreationists, using a variety of rivers throughout the United States. They found that although both first-time and repeat visitors to the Rio Grande River in New Mexico considered *desire to view scenery* and *learn in a peaceful environment* as very important motivations for their visit, repeat visitors were much more likely to *seek solitude* than were first-time visitors.

Motivational differences can also vary among participants in the same activity but at different sites. Knopf and Lime (1984) found that float-boat visitors on Alaska's Delta River and Arizona's Salt River shared a strong desire *to view scenery* and *experience tranquility*. But Delta River users showed a stronger interest in *learning*, *skill development*, and *exercise* than did Salt River visitors.

Davenport et al. (2002) found differences between river floaters recreating on the Niobrara National Scenic River (NSR) in Nebraska, based upon whether they visited on a weekend or weekday. Weekday visitors felt that *learning more about the natural history of the area* was more important than did weekend visitors.

Differences were also found between first-time visitors and those with previous experience at the site. First-time visitors valued *experiencing new and different things*, whereas experienced users valued social elements such as *bringing family closer together*. Overall, Davenport et al. found that visitors floating the river rated *enjoying scenery*, *getting away from life's demands*, *doing something with family*, and *being with members of their own group* as the most important motivations, whereas the least important experiences were *being more productive at work/school*, *developing skills and abilities*, and *doing something creative*.

Over time, visitor motivations can change even though the activities they participate in remain the same. Davenport et al. (2002) reported significant differences between their findings and those of Thompson et al. (1993) in all but three motivational items among study respondents. For example, *learning about nature, getting away from crowds, and experiencing solitude* were important to 1993 respondents, but generally not to 2001 respondents. The researchers suggested that this may reflect a shift in visitors seeking more generalized benefits rather than specific ones such as *experiencing solitude*.

Thapa, Confer, and Mendelsohn (2004) examined the motivations of river users on the Gallatin River in Montana. Rather than compile and determine a mean value for the motivations of all users on the river, they grouped users by activity type and compared motivations among anglers, kayakers, and rafters. They found that anglers were more likely to participate *for solitude*; kayakers were more likely to participate because it *offers a challenge, keeps them in shape, and enables to do things with other people*; and rafters were more likely to participate to *see wildlife and to tell others about it at home*.

Thapa, Confer and Mendelsohn (2004) used four non-motivational variables for comparison of the following motivational items: first-time visitor, gender, frequency of participation, and residency status. They found that repeat visitors were more likely than first-time visitors to rate *solitude* and *relaxation* as their most important motives, whereas first-time visitors were more likely to favor *watching wildlife* and *to tell others about it at home*. Visitors that participated for more than 8

days in the past 12 months were more likely to be motivated by *keep them in shape* and *opportunity for challenge*. Males were more likely than females to participate for *solitude*, whereas females favored *could tell others about it at home*. Tourists were more likely than local residents to be motivated to *get away from everyday routine of life*, *to see wildlife*, and *to tell others about it at home*. Local residents were more likely to participate because it helps them to *keep in shape*.

Additional river studies have compared the motivations of users in different primary activities. Moore and Siderelis (2001, 2003) compared the motivations of visitors on the Chattooga River in Georgia, a premier whitewater boating site, and the West Branch of the Farmington, a popular trout-angling destination. Results showed that the top three visitors' motives at each site were to *enjoy the view*, to *experience the river*, and *to be close to nature*.

Other river studies have been devoted solely to anglers rather than boaters. Providing quality opportunities for recreational anglers is a major consideration for many river managers, and identifying angler motivations helps managers determine why people fish and why they choose a particular recreational site.

Wright and Sanyal (1998) conducted a study of fly anglers on four rivers in southwest Montana. They sought to differentiate motivations between fly anglers using a guide service and those who were unguided. Discriminant analysis revealed five discriminating variables between the groups. Guided anglers were more likely to be motivated to *learn new skills from others*, whereas unguided anglers emphasized *testing flies that I tied*, *releasing built-up tensions*, *catching trophy fish*, and *catching*

*different kinds of fish*. Similarities between the two groups were also found.

Consistent with other angler studies, *being close to nature* was the top motivation for both groups. Additionally, both angler groups rated *learning about the river* and *learning about the fish* as important motivations, whereas *thinking about personal values* and *developing spiritual values* were less important.

Anglers were also the subject of another river study that included catch motivations unique to angling. Hutt and Bettoli (2003) used the recreational specialization concept proposed by Bryan (1977), to segment Tennessee tailwater trout anglers into five subgroups using cluster analysis. Consistent with other angler studies, motives unrelated to catching fish were generally ranked as important or very important reasons to fish. The non-catch motives of *getting outdoors*, *relaxing*, *getting away from it all*, *spending time with family or friends*, and *experiencing new things* were rated as being important or very important reasons to fish by more than 60% of all anglers. The only non-catch motive deemed unimportant among many anglers (43%) was *getting physical exercise*.

Hutt and Bettoli (2003) used Bryan's recreational specialization construct to place at opposite ends of the spectrum, novice anglers who only fish occasionally and highly specialized anglers who fished frequently and had strong preferences as to where and how angling occurred. The five subgroups were (1) *Non-consumptive Specialists*, who rated trout fishing as their primary recreational activity and rarely harvested trout, (2) *Occasional Trout Anglers*, who rated angling as an important recreational activity but did not normally target trout, (3) *Casual Trout Anglers*, who

placed low importance on angling but did favor trout as their primary catch, (4) *Consumptive Specialists*, who rated angling as important, targeted trout, and were likely to harvest their catch, and (5) *Fishing Generalists*, who sometimes fished for trout and were likely to harvest their catch.

In Hutt and Bettoli (2003), the primary motivations of anglers differed significantly among the groups. Anglers in the more specialized groups (consumptive and non-consumptive anglers) and the fishing generalists tended to rate higher the catch-related motives for angling. These groups were more interested in *pursuing trophy trout* and *being challenged by the sport*. Specialized anglers in particular were more interested in *testing their angling skills* and *sharing their knowledge of the sport* with other anglers. All anglers tended to rank the non-catch-related motives fairly equally. However, the occasional and casual trout anglers tended to consider non-catch-related motives as somewhat more important than catch-related motives.

Gender differences in motivations of anglers were explored by Schroeder, Fulton, Currie, and Goeman (2006). In that study of Minnesota anglers, factor analysis identified six motivational factors: (1) *appreciation of nature and relaxation*, (2) *use of angling skills and equipment*, (3) *catching fish for food*, (4) *catching fish more generally*, (5) *catching trophy fish*, and (6) *affiliation / social motives*. Men rated the factors related to *using skills and knowledge* and *catching trophy fish* higher than women did. Women rated the factor related to *catching fish for food* higher than men did. Women and men did not differ on the factors related to *appreciation of nature*

*and relaxation, affiliation / social motives, or catching fish in general.* The authors found that men were more specialized anglers and fished more frequently than women. They suggested that women viewed angling less as leisure and more as a consumptive activity. Therefore, participation in a catch-and-release mode of angling, like fly angling, would seem less desirable to women.

### *Summary*

During the 1960s and 1970s, as the American public increasingly valued rivers as a recreation resource, their increased use challenged management to provide access and opportunities for high-quality recreation experiences. Much of the literature produced over the past four decades has demonstrated that if natural resource agencies are to accomplish their organizational mandates, they must understand river users' differing characteristics, the activities they engage in, and their desired experiences and benefits. Not having accurate visitor-use data can reduce the effectiveness of management initiatives designed to address not only natural-resource protection, but social conditions such as crowding and recreation conflict.

Furthermore, as Manning (1999) explained, the applications of visitor-use studies can "range from monitoring the popularity of recreation activities so as to more efficiently plan budgetary, personnel, and other resource needs to determining the residence and education of users in order to more effectively conduct public information and education programs" (p. 16). In today's often highly politicized

environment with various active interest groups, public participation and input is critical to successfully implementing long-range management plans that may be perceived to alter traditional use or setting attributes. The inability of the National Park Service to gain sole authority over setting limits for commercial outfitter user days in the Grand Canyon during the 1970s was an example of an agency failure to adequately engage the public with comprehensive and credible visitor and usage data (Shelby, 1981).

The Upper Green River SRMA is a unique natural setting providing a high quality recreation site for anglers and campers in the Greater Yellowstone Ecosystem, a region where recreation use of public land is under increasing pressure from tourism, population growth, and natural-resource extraction. The application of the principles of visitor-use studies described in the above literature and embodied in this study's research objectives provided a solid empirical foundation for the collection of visitor data.

Even though thousands of visitors are drawn to recreate at the SRMA every year, little is known about them, the different recreation activities they engage in at the SRMA, the reasons why they select this location over others in the region, and most important, their desired experiences. The literature reviewed above encompasses a number of different rivers in various regions of the country, covering a variety of activities. Few or no studies focused on areas similar to the Upper Green River SRMA, where a mix of commercial and private fly anglers recreate using both

float boats and angling from the riverbank. In fact, little is known about the experiences or motivations of fly anglers using float boats.

Therefore, it was the intention of this study that the findings add to the body of research on river users by comparing the experiences and motivations of visitors to the SRMA. Additionally, the application of the findings will assist BLM management in the development and public acceptance of a revised RAMP, enabling the BLM to better provide opportunities for high-quality recreation experiences for future visitors and achieve the agency's mission to "sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations."

## Chapter III

### METHODOLOGY

This chapter describes the methodology and research procedures employed in this study, including the study area, sample, data collection methods, instrumentation, and analyses.

#### *Study Area*

In the late 1800s, the expansion of the Union Pacific Railroad relied on local forests as a source of timber for railroad ties. “Tie-hacks” would harvest timbers from Wyoming forests when the spring runoff allowed the logs to be carried downriver for railroad use. Due to these harvests, the watershed suffered a loss of vegetation and increased peak water flows in the Upper Green River valley. The river channel was permanently altered as the river was lowered and widened.

The upper Green River is the major recreation attraction in the SRMA. Trophy brown, cutthroat, and rainbow trout are found in the upper Green River as it flows through some of Wyoming's most scenic landscapes. From its source just north of Pinedale along the Continental Divide in Wyoming's Wind River Range, the Green River flows 30 miles through National Forest and BLM lands where public access for recreation is ample. The segment of the upper Green River flowing within the BLM Special Recreation Management Area (SRMA) was recently determined suitable for consideration as a “scenic” river under the Wild and Scenic River Act as part of the National Wild and Scenic River System (USDI Bureau of Land Management, 2003).

This study took place within the Upper Green River SRMA, a popular recreation destination for both area residents and tourists as they seek to escape the seasonal crowds within the Greater Yellowstone Ecosystem and pursue their favorite recreation activities such as fly angling and camping. The southern terminus of this area is adjacent to the Warren Bridge on Highway 191. Consequently, the Upper Green River SRMA is also known by locals and identified in the two survey instruments as the Warren Bridge Green River Access Area.

This area consists of 7,100 acres, at an elevation range of 7,400 to nearly 7,800 feet, jointly managed by the BLM and the Wyoming Game and Fish Department. A single road entrance to the SRMA is located off Highway 191. The nearly nine-mile hard-packed and unpaved road traverses a rolling sagebrush bluff and provides access to nearly eight linear miles of the Green River. There are 10 spur roads from the main road, leading to 12 river access sites (Figure 2) that serve as designated overnight campsites, visitor day-use parking for fly anglers, and river launches for private and commercial float-boating. But camping or parking to access the river is not limited to these areas. For example, the spur road leading to Access Site 6 (Figure 3) contains several areas adjacent to the river that are suitable for tents or even recreational vehicles (RVs). There is little on-site management and no designated self-registration process, and the only regulatory signage restricts visitor stays to 14 consecutive days.

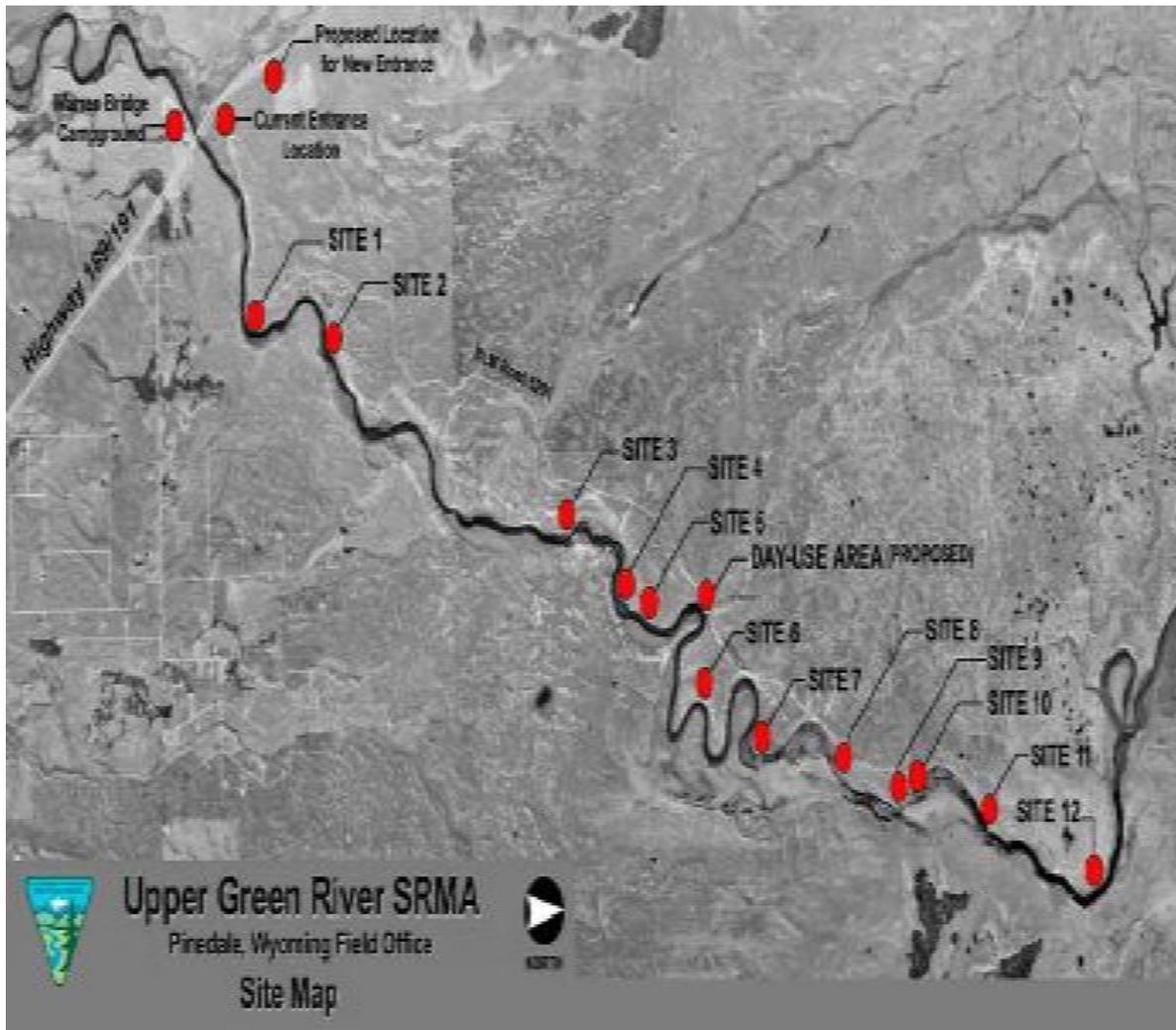


Figure 2. Map of Upper Green River SRMA

There is no visitor fee for recreational use, including overnight camping, within the undeveloped portion of the SRMA, nor is there a limit on group size. Across from the main entrance on Highway 191 is a BLM-administered developed campground, with a \$10.00 per day camping fee. The locations selected by day-use bank anglers

or camping parties are largely determined by the visitors' own preferences and the physical attributes of each site.

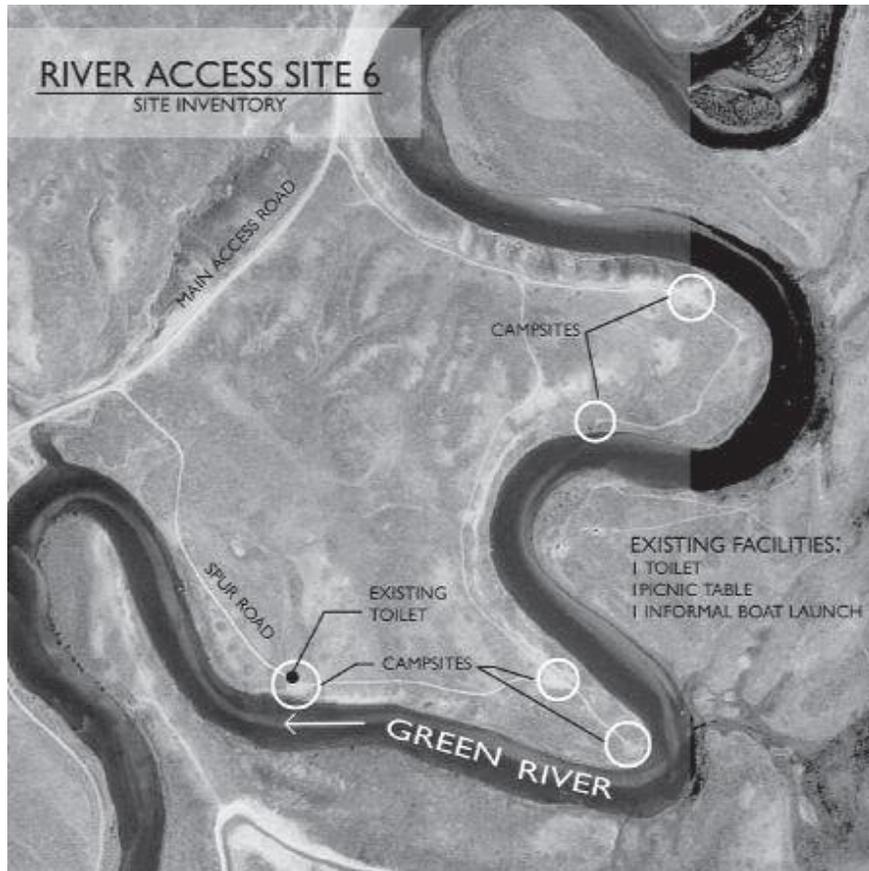


Figure 3. SRMA River Access Site 6

The 12 access areas differ in size, steepness of the access road, distance from the main road, and suitability to put in or pull out a float boat. Based on observational information, BLM managers have inferred certain visitor criteria for site selection. Overnight users may tend to seek solitude by selecting unoccupied sites close to the river, and generally only one affiliated group will occupy a given site,

resulting in dispersed camping along the river. In general, the informal preferences followed by visitors discourage two large groups sharing the same site without spatial separation. Large, flat, open areas seem to attract RV campers and are favored by large camping groups (Figure 4). Easy access to the river encourages large camping parties that engage in many water-based activities. Commercial outfitters and private float-boat anglers seek sites offering easy float-boat launching. Day users appear to select sites based upon where they wish to fish and their desire to avoid other users. Based upon primarily observational information and knowledge of weather patterns and apparent tourist travel habits, BLM recreation management



Figure 4. Large Open River Access Site for Camp Groups

has developed a seasonal outline of the majority of recreational activity in the Upper Green River SRMA.

Recreational usage occurs primarily in late spring, early summer, and fall (BLM, 2003). Recreational use generally peaks after Memorial Day, with mid-to-late June seeing the most usage. The level of activity during this period is influenced by limited access to other nearby recreation camping or angling opportunities at higher elevations, due to weather and water quality/quantity being dependent upon

snowpack melt. High snowmelt volume in late spring affects water clarity in the surrounding region and on rivers such as the Snake River, which is then not conducive to fly fishing. This condition drives users to the SRMA. User groups in the peak season typically include a mix of commercial outfitters and clients, day-users, and extended-stay users. As the summer progresses, fly and float-boat fishing remain popular, but small and large private-group camping, often using larger RVs, increases. Other popular water-based activities include swimming, rafting, and canoeing.

After Labor Day, the extended-stay camping and day use along the river declines. Hunting season begins in September and lasts through October, bringing another small usage spike to the area. Hunters are attracted to the area for the waterfowl and big game, and the majority of the fall hunting season use is day use. Winter usage is limited to minimal snowmobiling and cross-country skiing because the SRMA access road is not plowed or maintained for recreation use. Therefore, while it is known that the river and wildlife for hunting influence recreation use, there is little, if any, existing information about SRMA users that is valuable for developing management plans.

Livestock operations have a long history in this area of the Green River Valley as well. Livestock graze within allotted areas of the SRMA from May until July, with the majority of the cattle being moved out of the area by mid-June. Livestock is not constrained or fenced to specific areas, and often livestock is found within many of

the river access sites as they seek food and water. It is not known whether this livestock presence presents a major issue with recreationists.

### *Sample and Data Collection*

This study was sponsored by Bureau of Land Management to support the development of a Recreation Area Management Plan (RAMP) for the Upper Green River SRMA. The purpose of the RAMP is to prepare a “management strategy that protects and preserves the Upper Green River SRMA and accommodates projected increases in recreational use over the next twenty years while maintaining the quality of the existing recreational experience” (Bureau of Land Management, 2003, p. 2). Because there is no on-site visitor registration process, the BLM previously has only estimated visitor use based on data gathered through a traffic counter at the single entrance provided by the access road.

On-site data collection occurred over a two-year period and was conducted by the principal investigator and supplemental personnel. The supplemental personnel were interns employed by the local Pinedale BLM field office and assigned by the BLM recreation planning staff. These interns were trained by the principal investigator and used only when the principal investigator was not available.

On-site data collection during 2006 occurred between July 22 and October 30. During 2007, it occurred between May 27 and July 29. These survey intervals were selected to represent a single recreation season that includes spring/summer

peak usage and the fall hunting season. Data were collected during 176 unique site visits taking place on 51 days in 2006 and 58 days in 2007, with a maximum of two visits per day. Some days in each interval had no visits. Survey times and days were varied to cover all days of the week and timed to best capture the variety of use and users at the river. For example, many anglers believe that the best fishing opportunities occur at various times throughout the day. Therefore, survey start times ranged from 7:00 a.m. to 7:00 p.m. Commercial fishing guides traveling from Jackson would often arrive early in the morning, enabling either a half-day or full-day guided trip.

The visitor contact and survey methodology was modeled after the Farmington River Study (Moore & Siderelis, 2001). During an on-site sample visit, a study investigator drove the length of the access road, from the entrance at Highway 191 to the last river access site. Along the route, the investigator visited each of the river access points and contacted each user encountered at or near those sites. Only users 18 years old and older were surveyed. Area users found anywhere along the riverbank or spur access roads in the access area were also surveyed when accessible during each visit. A few users hiking or operating off-trail vehicles (OTVs) were found away from the river access sites. Some anglers parked along the road and accessed the river using informal trails. During each of these survey visits, as many accessible users as possible were approached; then briefed on the purpose of the study, and asked to participate. Those users agreeing to participate either were handed a clipboard with a one-page self-administered questionnaire or were read

the questions if that was more convenient for them. The on-site questionnaire asked for the user's name, address, and permission for the investigators to send the user a more detailed mail questionnaire. The on-site contact took approximately three minutes. Those agreeing to receive a follow-up were sent a mail questionnaire as soon as possible after the initial contact. Up to three mailings were employed with each sampled user, as necessary, to maximize response rates.

Visitor contact totals by year are summarized in Table 1. A total of 346 on-site interviews were conducted. Some users declined to disclose name and address, but provided information about their stay. Users who preferred to complete the detailed survey on-site were provided with a copy of the survey and mail-back envelope during the initial contact. Four users that completed the survey in 2006 were not included again when they were encountered once again at the SRMA in 2007 reducing the number of unique on-site contacts to 342.

Not all users encountered agreed to participate. Some users in large groups listened to the study objectives, but did not agree to complete a questionnaire. For example, an RV camp group may contain a visitor that listened to the study introduction from within the camper, but made no effort to acknowledge the interviewer or respond to the general question asked of others to participate. So as to avoid anyone feeling pressured, a general question would be asked of any others in the party to discern interest in participating. If there was no response or acknowledgement of the interviewer, the individuals were not counted as refusing to participate in the study. Only those individuals that were directly asked to participate

in the study and declined were counted as refusals. At a minimum, any user refusing to participate was asked for zip code information to enable a better understanding of visitor demographics. But no records were kept of the number of visitors that were not directly asked to complete the initial survey, but their number was small and certainly less than 50.

Of the 342 subjects approached at the SRMA during 2006 and 2007, only 33 refused to further participate in the survey by declining to receive the more detailed questionnaire. Thirty-one visitors immediately requested the detailed questionnaire while on-site rather than having it mailed to them. A total of 277 surveys were mailed and only 4 were returned by the Postal Service as undeliverable. Of the 341 asked to participate in the survey by completing a detailed survey, 192 returned completed ones, representing an overall survey study response rate of 56%.

Table 1. Sample Sizes and Response Rates

Type of Group	2006	2007	Total
On-site visitor interviews	202	140	342
Refused to supply name or address	9	25	33
Visitors agreeing to receive survey	193	115	308
On-site surveys distributed	17	14	31
Surveys mailed	176	101	277
Returned undeliverable	4	0	4
Effective sample size	202	140	342
Returned usable	115	77	192
Response rate	57% (115/202)	55% (77/140)	56% (192/342)

### *Survey Instruments*

The two survey instruments (on-site and mail-back questionnaires) were developed in collaboration with the BLM field office in Pinedale, Wyoming. The on-site questionnaire focused on users' characteristics and trip information concerning their visit to the SRMA that day. The on-site survey consisted of 10 questions and focused on users' characteristics and their trip. The questions consisted of the following:

- (1) An estimate of one-way miles from the visitor's home to the SRMA.
- (2) Whether the trip was part of an overnight trip away from home.
- (3) An estimate of the visitor's travel time to the site on the day of the interview, unless the visitor camped overnight.
- (4) An estimated arrival time the day of the survey, unless the visitor camped at the site the previous night.
- (5) Group size.
- (6) Whether the SRMA was the visitor's primary destination for that trip.
- (7) The visitor's primary activity during the visit (open-ended).
- (8) Whether the visitor was using a paid guide service or outfitter, and the company name.
- (9) The visitor's name and address (for a follow-up mail survey).
- (10) The area that the visitor used most the day of the contact (based on a map of the SRMA provided by the investigator).

The mail-back questionnaire consisted of 12 pages containing 5 sections of open and closed questions. Not all questions asked are evaluated in this study. The five sections consisted of the following:

- (1) Seven questions describing the respondent's visit to the SRMA that day.
- (2) Seven questions describing the respondent's experience at the SRMA the day of the survey.
- (3) Six questions exploring user demand for the SRMA.
- (4) Five questions describing the user's attitudes regarding the SRMA resources and management.
- (5) Four questions related to the user's demographics.

#### *User Characteristics*

One of the key objectives of the study was to describe the characteristics of visitors to the SRMA. In the on-site questionnaire and Part V of the mail-back survey, visitors were asked a series of questions designed to provide socio-demographic information regarding gender, education, employment, income, and age. Gender was reported as nominal data. The education variable asked respondents to indicate which of eight responses was most accurate: eighth grade or less, some high school, high school graduate or GED, some college, college graduate, some graduate school, Master's degree, or a Doctoral or professional degree. For the age variable, respondents were asked their age in years. The employment variable had 11 possible responses: managerial or professional

specialty; technical, sales, or administrative support; service occupation; farming, forestry, or fishing; precision production, craft, or repair occupation; operator, fabricator, or laborer; homemaker; retired; student; unemployed; or other (supplied through an open-ended question). The last demographic variable, income, had 11 possible responses, ranging from under \$20,000 to \$200,000 or more, in \$20,000 increments.

### *Recreation Use*

A second aspect of the same objective was to obtain information about visitor recreation activities at the SRMA. Responses to Part I of the mail-back survey provided this information. A list of 19 recreation activities was provided along with an open-ended question allowing for a respondent to enter an activity not listed. The visitor was asked to select all recreation activities engaged in during that visit. A follow-up question asked the visitor to identify the primary activity engaged in on the day the person was contacted.

### *User Trip Characteristics*

The final aspect of the same objective was to obtain information about visitor trip characteristics. Part I of the mail-back survey provided this information.

Respondents to the mail-back survey were asked for the following information:

- (1) How long the person stayed at the SRMA on the day of the contact.

(2) Whether this trip was the person's first visit to the SRMA. If not, the respondent was then asked to supply the month and year of the first visit; whether the overall quality of the site had improved, declined, or remained the same; and the main reason the quality had changed (open-ended).

(3) The composition of the travel group, with the following possible answers: alone, family, friends, family and friends, organized groups, or other (supplied through an open-ended question).

(4) Whether the visitor was a guide or outfitter with a paying customer the day of the contact.

(5) Whether the visit was part of an overnight trip that involved air travel.

### *User Experiences*

Another objective of the study was to describe the visitors' experiences at the SRMA. Part II of the mail-back survey asked 24 questions about potential motives for visiting the SRMA, based upon the Recreation Experience Preference (REP) scales and drawn from previous outdoor recreation research (Moore & Siderelis, 2003, 2001). Visitors were asked to rate the importance of each motive on a five-point scale from 1 ("not at all important") to 5 ("extremely important"). Six additional questions concerning visitors' experiences were then asked:

(1) The respondent's most important reason for the visit.

(2) A rating on a scale of 1 to 10 (where 10 indicated the best possible visit) of visitors' overall satisfaction with their visit to the SRMA.

(3) The degree of crowding at the SRMA, on a nine-point scale (where 1 meant “not at all crowded” and 9 meant “extremely crowded”).

(4) The effect of other users on the visitor’s experience, using a seven-point scale (where -3 meant “other users greatly reduced my enjoyment” and +3 meant “other users greatly increased my enjoyment”).

(5) Which label best fit the SRMA. The choices were *primitive*, *back country*, or *front country*.

(6) What activity the respondent would have engaged in had the SRMA been unavailable that day. An accompanying open-ended question asked where that activity would take place.

#### *Data Analyses*

The data obtained from the surveys were entered, checked for errors, and analyzed using the STATA statistical package. Descriptive statistics were used to summarize the findings regarding survey respondents’ characteristics, river use, motivations, and experiences. Comparisons across the three major river user groups were made using Kruskal-Wallis and Somers D tests.

#### *Limitations of Study*

There were several limitations of this study. First, river users, and anglers in particular, are often not easily accessible for in-person interviews because they are either fully engaged in their activity on the riverbank or wading upriver or downriver away from the riverbank. Float-boat anglers are also difficult to interview, because

they are accessible only when launching their boat or coming ashore at the end of their trip. While there were a limited number of places where boats were launched or pulled from the river, their dispersal along the 8-mile riverbank made it difficult for the survey investigator to locate and contact them.

Second, difficulties in contacting commercial boaters may have caused under-representation of commercial groups. Only 8% of respondents indicated they used the services of a commercial guide. Many guided parties traveled more than an hour to reach the site and were engaged for hire in either a half-day or a full-day float trip, hence they were focused on organizing supplies and promptly launching the float craft. Usually, a float party required the use of a shuttle, and time spent by the group on-shore was very limited and busy. While investigators may have observed commercial parties entering the site while surveying, it was not uncommon for the group to be launched and angling on the river before any investigator could reach its launch site. Additionally, when approached, some guides may have been apprehensive about identifying their parties as commercial, because the enforcement of required permits and payment of fees to the BLM is largely self-regulated by the commercial sector on an honor system, as enforcement of permits is often sporadic. The Wyoming Game and Fish officer enforces Wyoming fishing regulations and not Federal permitting policies.

Third, the fall hunting season began after the principal investigator was no longer on-site and surveys were then conducted by BLM interns along with their other assigned duties. The number of trips and the length of time they could spend

at the SRMA during hunting season were limited by their availability. This may have caused under-representation of hunters.

## CHAPTER IV

### RESULTS

This chapter describes the results of the study. It is organized into five sections, starting with descriptive information about all visitors, and ending with statistical comparisons among the three main user groups. The first section summarizes the characteristics of users of the Upper Green River SRMA. The second section characterizes users' most recent trip to that SRMA. The third section describes the user's experience including the motivations for visiting the Access Area. The fourth section segments the visitors into three categories—bank anglers, float-boat anglers, and campers—and compares them with regard to visitor characteristics, trip characteristics, and user experiences. The final section describes the motivations of bank anglers, float-boat anglers, and campers.

#### *User Characteristics of All Visitors*

The majority (76%) of all visitors surveyed at the Upper Green River SRMA were males (Figure 5). Visitors tended to be over the age of 40, college-educated, and relatively affluent. The overall mean age was 49 (Table 2). Of the 68% who earned a college degree, 45% either obtained an advanced degree or had some post-baccalaureate education (Table 3). More than half of all respondents reported household incomes over \$80,000 per year (Table 4). The most common occupation type was managerial or professional, at 39% (Table 5). The second most common occupation was retired, at 22%.

A slight majority (51%) of Access Area visitors were from Wyoming. The next most common state of origin was California (9%). Residents of the nearby states of Colorado and Utah combined for another 16%. More than a quarter of all visitors were from states other than those previously listed (Figure 6). Interestingly, 25% of the Wyoming visitors were from nearby Jackson. No international visitors were encountered at the site.

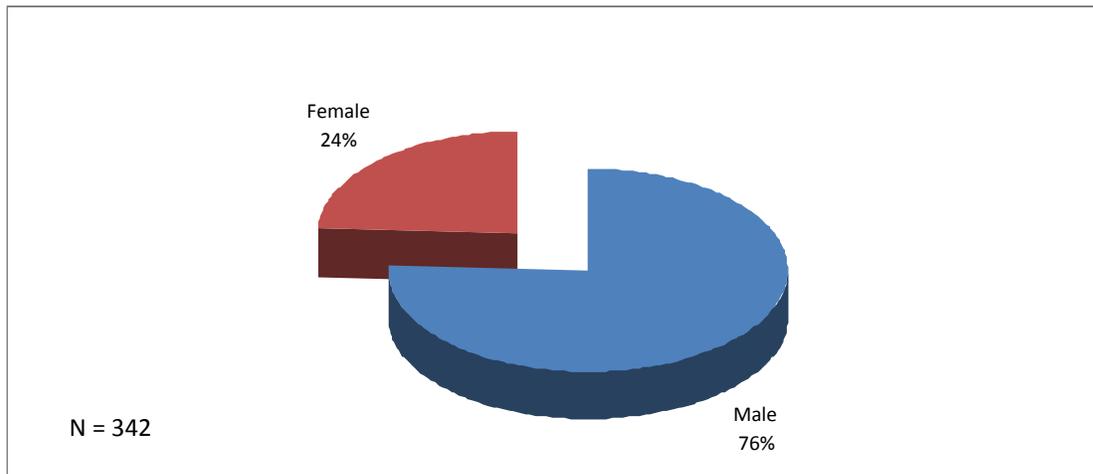


Figure 5. Gender of Upper Green River SRMA Visitors

Table 2. Age of Upper Green River SRMA Visitors

<b>Age</b>	<b>Frequency</b>	<b>Percentage</b>
Under 20	1	0.5
20-29	17	9.0
30-39	25	13.3
40-49	47	25.0
50-59	51	27.1
60-69	38	20.2
70 and over	9	4.8
<b>Total</b>	<b>188</b>	<b>100.0</b>

Mean = 49.1, Median = 50.0, Standard Deviation = 13.2

Table 3. Respondent's Education Level

<b>Education Level</b>	<b>Frequency</b>	<b>Percentage</b>
Eighth grade or less	1	0.5
Some high school	1	0.5
High school diploma or GED	10	5.2
Business school or trade school	8	4.2
Some college	41	21.4
College graduate	72	37.5
Some graduate school	15	7.8
Masters degree	22	11.5
Doctoral or professional degree	22	11.5
<b>Total</b>	<b>192</b>	<b>100.0</b>

Table 4. Respondent's Household Income

<b>Income</b>	<b>Frequency</b>	<b>Percentage</b>
Under \$20,000	7	3.8
\$20,000 to \$39,999	21	11.4
\$40,000 to \$59,999	23	12.5
\$60,000 to \$79,999	25	13.6
\$80,000 to \$99,999	31	16.8
\$100,000 to \$119,999	25	13.6
\$120,000 to \$139,999	14	7.6
\$140,000 to \$159,999	8	4.3
\$160,000 to \$179,999	7	3.8
\$180,000 to \$199,999	2	1.0
\$200,000 or more	21	11.4
<b>Total</b>	<b>184</b>	<b>100.0</b>

Table 5. Respondent's Occupation

Occupation	Frequency	Percentage
Managerial or professional specialty	74	38.9
Retired	42	22.1
Service occupation	20	10.5
Technical, sales, or administrative support	10	5.3
Operator, fabricator, or laborer	9	4.7
Farming, forestry, or fishing	8	4.2
Student	8	4.2
Precision production, craft, or repair	7	3.7
Homemaker	5	2.6
Unemployed	1	.5
Other	6	3.2
<b>Total</b>	<b>190</b>	<b>100.0</b>

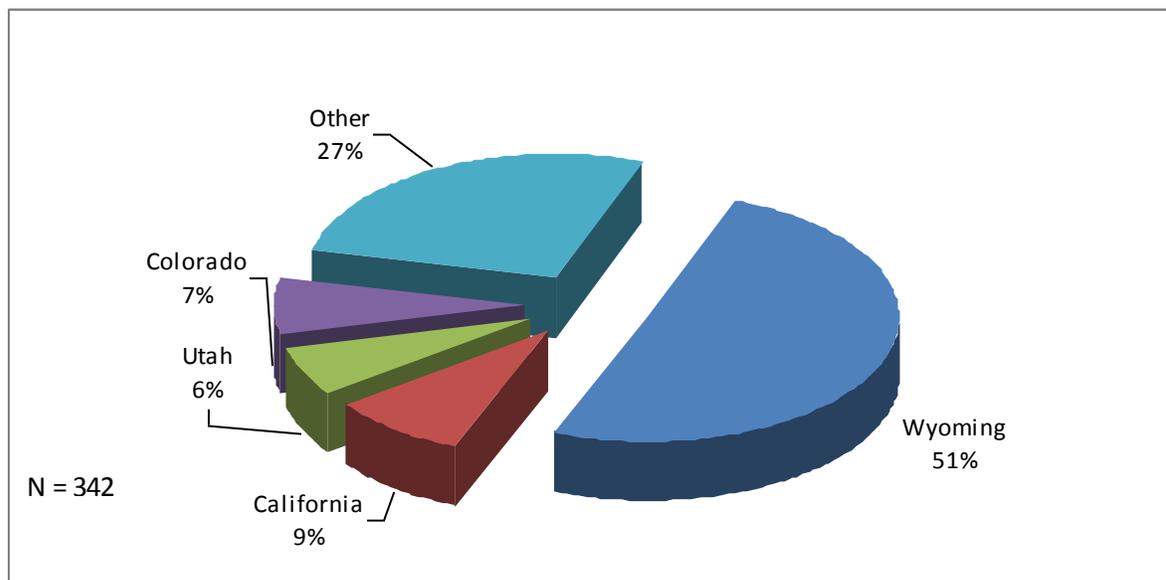


Figure 6. Visitor to Upper Green River SRMA State of Origin

### *Trip Characteristics of All Visitors*

This section describes the river visits the respondents were engaged in on the day each was contacted to participate in the study.

Demonstrating the Access Area's desirability as a final destination and remoteness, 73% of all visitors indicated that the Access Area was their primary trip destination (Figure 7) and 69% reported that the visit was part of an overnight trip (Figure 8). Eighty-four percent of users traveled more than 50 miles one-way to reach the Access Area (Table 6), and a number of visitors (27%) had traveled over 750 miles, with the median distance being 145 miles. While some large groups frequented the Access Area, 61% of the visitors came to the area in a group of 3 or fewer (Table 7).

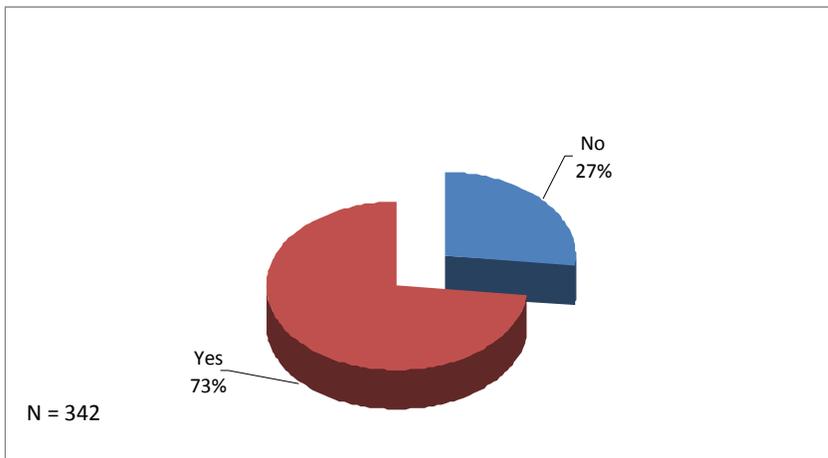


Figure 7. Whether Upper Green River SRMA was Visitors' Primary Destination

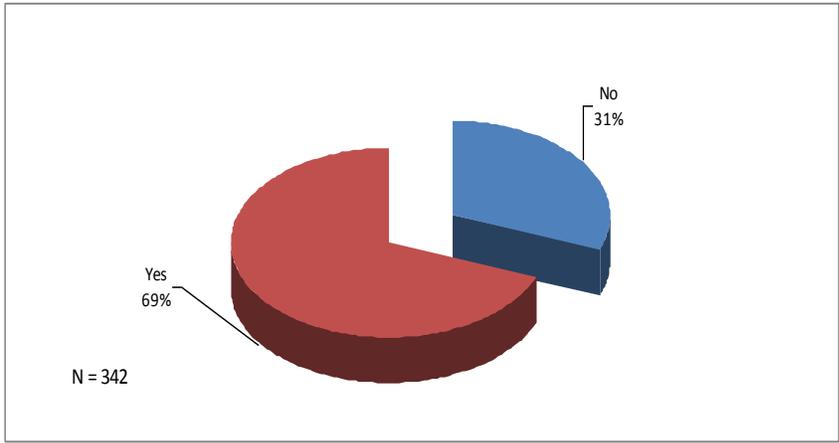


Figure 8. Whether Visit was Part of an Overnight Trip

Table 6. One-Way Miles Traveled to Upper Green River SRMA

Miles	Frequency	Percentage
0-10	19	5.6
11-50	34	10.0
51-75	92	27.0
76-125	23	6.7
126-175	7	2.1
176-225	10	2.9
226-350	31	9.1
351-500	22	6.5
501-750	11	3.2
751-999	32	9.4
> 999	60	17.6
<b>Total</b>	<b>341</b>	<b>100.0</b>

Mean = 478.59, Median = 145.0, Standard Deviation = 616.95

Table 7. Group Size

<b>Group Size</b>	<b>Frequency</b>	<b>Percentage</b>
1	41	12.0
2	118	34.7
3	52	15.3
4	50	14.7
5	6	1.8
6-20	51	15.0
21 and over	22	6.5
<b>Total</b>	<b>340</b>	<b>100.0</b>

Mean = 4.86, Median = 3.0, Standard Deviation = 6.36

Many participants had only recently begun visiting the Access Area. In fact, 31% were on their first visit to the Access Area, and another 21% had visited for the first time within the last 5 years (Table 8). However, 19% of respondents made their first visit more than 20 years ago.

Table 8. Number of Years Since Visitor's First Visit to Upper Green River SRMA

<b>Number of Years</b>	<b>Frequency</b>	<b>Percentage</b>
First Visit	59	30.7
<=5 yrs	41	21.3
6-10 yrs	21	10.9
11-15 yrs	22	11.4
16-20 yrs	12	6.2
21-24 yrs	7	3.6
25-29 yrs	9	4.6
30-34 yrs	8	4.1
35-39 yrs	9	4.6
>=40 yrs	4	2.0
<b>Total</b>	<b>192</b>	<b>100.0</b>

Mean = 14.12, Median = 11.0, Standard Deviation = 12.05

On average, respondents made 5 trips to the river in the past 12 months (Table 9) and anticipated taking 5 additional trips in the next year (Table 10).

Table 9. Number of Trips to Upper Green River SRMA by Respondent in Past 12 Months

Number of Trips	Frequency	Percentage
0	6	3.2
1	90	48.1
2-5	53	30.3
6-10	24	12.7
>10	13	7.3
<b>Total</b>	<b>187</b>	<b>100.0</b>

Mean=5.0, Median=1, Standard Deviation=12.3

Table 10. Number of Expected Trips to SRMA by Respondent in the Next 12 Months

Number of Trips	Frequency	Percentage
0	34	18.5
1-2	81	44.0
3-5	28	15.3
6-10	26	14.1
11-20	9	4.9
>20	6	3.1
<b>Total</b>	<b>184</b>	<b>100.0</b>

Mean=5.0, Median=1.0, Standard Deviation=12.6

Almost 14% were by themselves, with family (39%), and groups of friends (28%) comprising the most common group types (Table 11). Most visitors (54%) stayed at the river for longer than 8 hours, which isn't surprising given that many were making an overnight trip (Table 12). The most common "day" trip lasted between 5 and 6 hours, with an average trip being 5 hours.

Table 11. Type of Travel Group to Upper Green River SRMA

<b>Group Type</b>	<b>Frequency</b>	<b>Percentage</b>
Alone	26	13.5
Family	75	39.1
Friends	54	28.1
Family and Friends	29	15.1
Organized Group	5	2.6
Other	3	1.6
<b>Total</b>	<b>192</b>	<b>100.0</b>

Table 12. Length of Respondent's Stay at Upper Green River SRMA that Day

<b>Time</b>	<b>Frequency</b>	<b>Percentage</b>
1 hour or less	4	2.1
> 1 hour through 2 hours	5	2.6
> 2 hours through 3 hours	15	7.8
> 3 hours through 4 hours	18	9.4
> 4 hours through 5 hours	11	5.8
> 5 hours through 6 hours	22	11.5
> 6 hours through 7 hours	3	1.6
> 7 hours through 8 hours	11	5.7
Longer than 8 hours <sup>1</sup>	103	53.7
<b>Total</b>	<b>192</b>	<b>100.0</b>

Mean=13.9, Median=12.0, Standard Deviation=9.3

<sup>1</sup> 85 respondents reported 24-hour stay, indicating overnight visit.

Angling was by far the most common recreational activity. Of the 192 respondents, 136 engaged in bank or wade angling (riverbank angler) sometime during their visit (Table 13). Another 62 respondents used a float boat for angling. When asked to identify their one *primary* activity, nearly 72% reported fishing from either the riverbank or a float boat (Table 14).

Table 13. Type of Activities Respondents Engaged in During their Visit to Upper Green River SRMA

<b>Activity Type</b>	<b>Frequency<sup>1</sup></b>	<b>Percentage</b>
Bank/Wade Angling	136	26.2
Camping	97	18.7
Float-Boat Fishing	62	11.9
Wildlife Observation	47	9.0
Hiking	32	6.1
Swimming	22	4.2
Rafting	18	3.4
Scenic Floating	17	3.2
Target Shooting	16	3.0
ATV Riding	15	2.8
Tubing	13	2.5
Hunting	11	2.1
Other	32	6.1
<b>Total</b>	<b>518</b>	<b>100.0</b>

<sup>1</sup> A respondent could report more than one activity for the visit.

Table 14. Primary Activity During Respondent's Visit to Upper Green River SRMA

<b>Activity Type</b>	<b>Frequency</b>	<b>Percentage</b>
Bank/Wade Fishing	95	49.5
Float-Boat Fishing	43	22.4
Camping	31	16.1
Upland Bird Hunting	4	2.1
Big Game Hunting	3	1.6
Other	16	8.3
<b>Total</b>	<b>192</b>	<b>100.0</b>

Camping was the third most common primary activity, at 16.1%. The overwhelming majority of users (92%) were visiting the river without the services of a commercial outfitter (Figure 9).

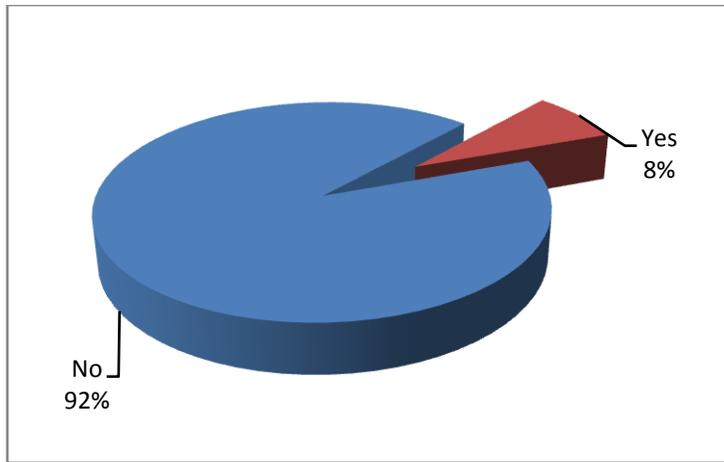


Figure 9. Whether a Commercial Guide Service was Used During Visit

To better understand user trips to the Upper Green River SRMA, respondents were asked what they would have done instead that day if the Access Area had not been available. Table 15 summarizes their responses. Nearly half would have gone fishing at substitute sites, and almost 20% would have camped elsewhere. Ten percent would have gone elsewhere with no specific activity given, which was the next most common response.

For 70% of respondents, this was not their first visit to the river. They were asked how the overall quality of visiting had changed since their first visit. Nearly as many said there had been no change in the site quality (41%) as said the Access Area had improved (42%) (Figure 10). Only 17% felt conditions had worsened. The improvement most often cited was the recently upgraded restroom facilities. The most negative comments were about crowding at the site and that a decline in the fish habitat was affecting the fishing quality.

Table 15. Substitute Activity if Upper Green River SRMA had not been Available that Day

Response	Frequency	Percentage
Fished	91	48.7
Camped	36	19.3
Gone Elsewhere	18	9.6
Stayed Home	14	7.5
Not Sure	8	4.3
Another Place	4	2.1
Hiking	4	2.1
Hunting	3	1.6
Same Activity	3	1.6
Sightseeing	3	1.6
Nothing	1	0.5
Boat/Kayak	1	0.5
Worked	1	0.5
<b>Total</b>	<b>187</b>	<b>100.0</b>

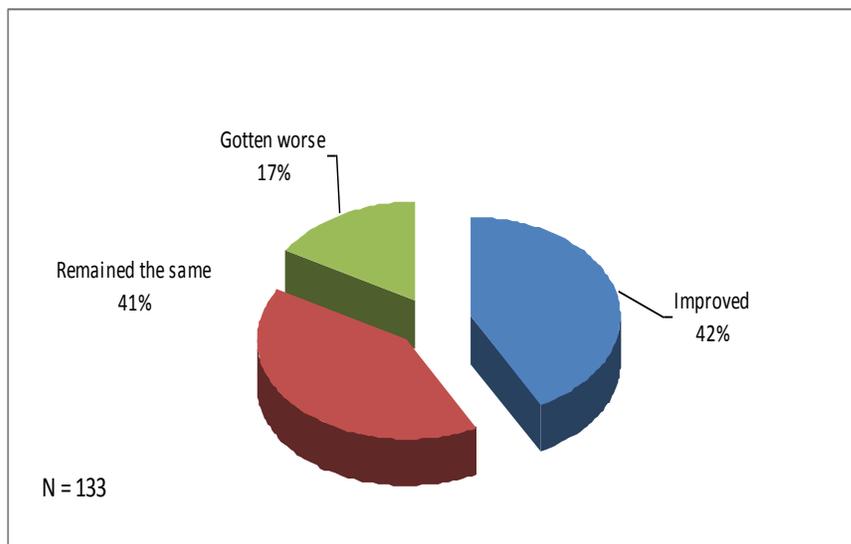


Figure 10. Respondent's Perception of Change in Upper Green River SRMA Site Quality since First Visit

Survey respondents who planned to visit the Access Area in the next 12 months were asked three additional questions to determine how that decision might be affected by possible improvements or an increase in recreational use at the site. When asked how an improved access road and the upgrading of the river access sites with new picnic tables and fire rings would affect the number of planned trips without an increase in recreational use, only 3% of users indicated they would not plan a return visit (Table 16).

Table 16. Expected Number of Trips to SRMA in Next 12 Months if Area Improvements Made

<b>Number of Trips</b>	<b>Frequency</b>	<b>Percentage</b>
0	5	3.3
1-2	70	46.3
3-5	36	23.8
6-10	23	15.2
>10	17	11.3
<b>Total</b>	151	100.0

Mean=6.3, Median=3.0, Standard Deviation=13.7

When asked if those improvements were not made and recreation use doubled, 16.6% of respondents indicated they would not return (Table 17). But when asked if those improvements were made and recreational use doubled, 23.7% of respondents indicated they would not return (Table 18).

Table 17. Expected Number of Trips to SRMA in Next 12 Months without Area Improvements and with Recreation Usage Doubling

<b>Number of Trips</b>	<b>Frequency</b>	<b>Percentage</b>
0	25	16.6
1	59	39.1
2-5	39	25.8
6-10	16	10.5
>10	12	7.9
<b>Total</b>	<b>151</b>	<b>100.0</b>

Mean=3.9, Median=1.0, Standard Deviation=7.7

Table 18. Expected Number of Trips to SRMA in Next 12 Months with Area Improvements and Recreation Usage Doubling

<b>Number of Trips</b>	<b>Frequency</b>	<b>Percentage</b>
0	36	23.7
1	51	33.6
2-5	35	23.0
6-10	16	10.5
11-20	9	5.9
>20	5	3.5
<b>Total</b>	<b>152</b>	<b>100.0</b>

Mean=4.3, Median=1.0, Standard Deviation=9.43

The mail-back survey listed potential problems and asked the respondent to rate each on a 7-point scale where 1 indicated “not a problem” and 7 indicated “major problem.” Responses are summarized in Table 19. No problem was rated at or above the midpoint of the scale. The problem rated most serious was the presence of livestock and manure, followed by crowding and the rugged condition of the access road.

Table 19. Respondent's Perception of Possible Problems at Upper Green River SRMA

<b>Problem<sup>1</sup></b>	1	2	3	4	5	6	7	Mean	Std. Dev.	n
	(%)	(%)	(%)	(%)	(%)	(%)	(%)			
Livestock manure	45.7	14.7	12.0	10.9	5.4	6.0	5.4	2.5	1.8	184
Livestock and grazing in the Access Area	53.2	11.8	9.1	8.6	7.0	4.8	5.4	2.4	1.8	186
Too crowded	46.8	17.7	12.9	10.2	6.5	2.7	3.2	2.3	1.6	186
Rugged condition of the access roads	51.6	12.4	11.3	10.8	4.3	5.9	3.8	2.3	1.7	186
Reckless behavior of other users	53.8	17.2	11.8	7.0	2.2	5.4	2.7	2.1	1.6	186
Trampled vegetation along the river banks	47.0	26.5	9.2	8.6	4.9	3.2	0.5	2.1	1.4	185
Conflicts between different types of visitors	54.3	21.0	9.1	4.3	4.3	4.3	2.7	2.0	1.6	186
Litter	52.4	22.7	10.8	8.1	3.2	1.1	1.6	1.9	1.3	185
Erosion of river banks	51.4	27.0	8.6	7.0	3.8	1.6	0.5	1.9	1.2	185
Too few rangers or mgmt. staff in the Area	65.6	15.6	8.1	4.3	1.6	2.2	2.7	1.8	1.5	186
Erosion at river launch sites	55.9	55.2	23.8	6.6	8.3	4.4	1.7	1.8	1.2	181
Insects	59.7	18.3	8.6	10.2	1.6	1.1	0.5	1.8	1.2	186
Noisy/rowdy people	66.7	17.7	5.4	3.2	1.6	1.6	3.8	1.7	1.4	186
Lack of drinking water	67.0	16.2	5.4	5.9	2.2	2.2	1.1	1.7	1.3	185
Facilities visible from the river	67.4	18.5	6.0	4.3	1.1	2.2	0.5	1.6	1.1	184
Not enough access sites	71.4	13.5	4.9	3.8	2.7	1.1	2.7	1.6	1.3	185
Lack of info on cultural and natural resources	68.1	14.6	7.6	5.9	2.2	0.5	1.1	1.6	1.1	185
Traffic noise from nearby roads	71.0	18.8	3.2	4.8	0.5	0.5	1.1	1.5	1.0	186
Erosion on the trails	65.2	21.7	5.4	4.9	2.2	0.5	0.0	1.5	1.0	184
Lack of helpful user info (e.g., maps, rules)	70.1	14.7	6.0	6.5	1.1	1.1	0.5	1.5	1.1	184
Not enough restrooms	74.2	19.9	1.1	2.7	1.1	0.5	0.5	1.4	0.9	186
Muddy water in the river	72.8	17.9	4.3	3.3	1.1	0.5	0.0	1.4	0.8	184
Not enough trails	75.8	12.4	5.4	3.8	2.2	0.5	0.0	1.4	0.9	186
Too many rules and regs.	78.3	15.8	3.3	1.1	.5	0.0	0.5	1.3	0.8	184
Not enough parking at access sites	77.0	14.8	4.4	2.7	0.0	1.1	0.0	1.3	0.8	183
Feeling unsafe/insecure	83.2	13.5	2.2	0.0	0.0	0.0	1.1	1.2	0.7	185
Lack of services (food, drink, rentals, etc.)	85.4	10.3	2.7	0.5	0.0	0.0	1.1	1.2	0.7	185

<sup>1</sup> Scale of 1 to 7 where 1 = not a problem and 7 = major problem

### *Users' Experiences*

To determine what motivated respondents to visit the Upper Green River SRMA, they were asked to indicate the importance of each motive from a list of 27 possible ones. Their responses were measured on a 5-point scale ranging from 1 for “not at all important” to 5 for “extremely important.” The results are summarized in Table 20. Overall, five of the motivations were rated as very important (means: 3.5 or above), eight as moderately important (means: 2.5–3.4), five as of little importance (means: 1.5–2.4), and six as not important at all (means: 1.4 or lower). The top two motives for visitors were *to enjoy the view* and *to be close to nature*. The least important motives for visitors were *to help earn a living*, *to show others I can do it*, and *to meet new people*.

Another method to understand users' motive was also used (Figure 11). Here users were asked to indicate which of three general reasons was the most important for their visit: the place itself, the activity that they participated in, or their companions. Sixty-nine percent said they came because the Access Area was a good place for their activity, 18% because they enjoyed the place itself, and 13% to spend time with their companions.

Table 20. Motivations to Visit the Upper Green River SRMA

<b>Reason<sup>1</sup></b>	<b>1</b> <b>(%)</b>	<b>2</b> <b>(%)</b>	<b>3</b> <b>(%)</b>	<b>4</b> <b>(%)</b>	<b>5</b> <b>(%)</b>	<b>Mean</b>	<b>Std.</b> <b>Dev.</b>	<b>n</b>
To enjoy the view	2.7	1.6	13.4	38.7	43.5	4.1	0.9	186
To be close to nature	5.3	4.3	23.5	25.7	41.2	3.9	1.1	187
To be with members of my group	24.3	2.8	13.3	18.8	40.9	3.5	1.6	182
To relax physically	10.4	6.6	22.4	35.5	25.1	3.5	1.2	183
To experience the Access Area	12.3	8.0	16.6	34.8	28.3	3.5	1.3	185
To do something with my family	28.5	1.6	9.7	14.5	45.7	3.4	1.7	186
To experience solitude	19.5	7.6	15.1	24.9	33.0	3.4	1.4	184
To help reduce built-up tension	25.3	10.4	19.2	28.6	16.5	3.0	1.4	184
To be on my own	30.1	11.5	13.1	24.0	21.3	2.9	1.5	183
To use my equipment	25.0	11.7	23.9	23.9	15.6	2.9	1.4	180
To get exercise	22.1	16.6	27.1	23.8	10.5	2.8	1.3	181
To learn about the countryside	38.8	9.8	18.0	15.8	17.5	2.6	1.5	183
To bring back pleasant memories of a prior visit	37.7	9.8	23.0	16.4	13.1	2.5	1.4	183
To think about my personal values	43.1	11.6	23.2	14.4	7.7	2.3	1.3	181
To avoid paying entrance fees	57.5	9.4	11.6	6.6	14.9	2.1	1.5	182
To reach a specific destination	54.6	9.8	17.5	9.8	8.2	2.0	1.3	183
To share my skills and knowledge with others	55.2	11.0	27.1	12.2	4.4	1.9	1.2	181
To be creative by doing something such as sketching, painting, taking pictures	59.9	11.0	17.6	7.7	3.8	1.8	1.1	182
To take risks	79.3	12.8	5.0	2.2	0.6	1.3	0.7	179
To be away from the family for a while	80.0	8.3	6.1	4.4	1.1	1.3	0.7	179
To test my endurance	79.4	12.2	5.6	1.7	1.1	1.3	0.8	181
To meet new people	83.2	7.3	7.3	1.7	0.6	1.2	0.7	179
To show others I can do it	86.2	9.4	3.3	0.6	0.6	1.2	0.5	181
To help earn a living (e.g., professional guiding)	95.5	2.2	1.1	0.0	1.1	1.0	0.4	180

<sup>1</sup> Scale of 1 to 5 where 1 = Not at all Important and 5 = Extremely Important

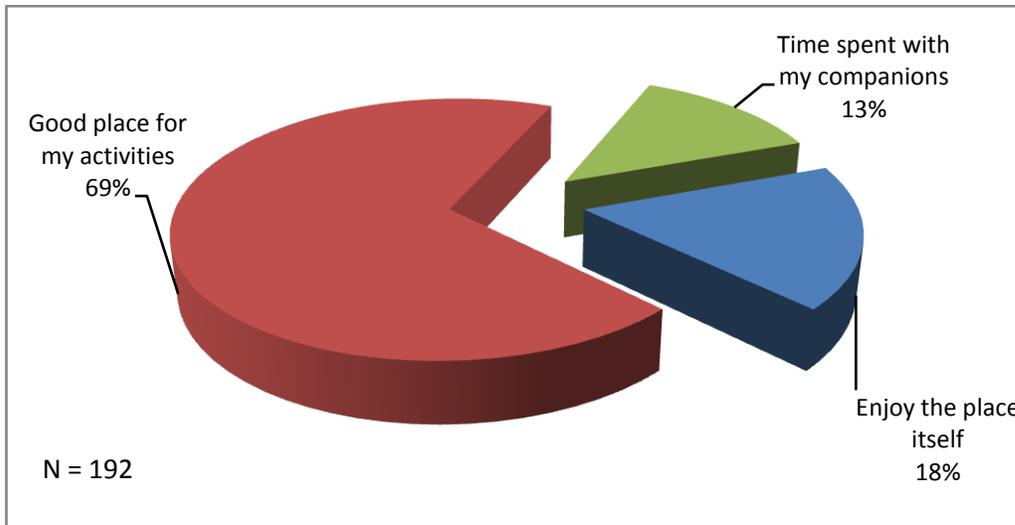


Figure 11. Respondent's Reason for Visit to Upper Green River SRMA

Forty-seven percent of users felt that the section of the Access Area they visited that day was best described as “front country,” i.e., “the kind of place where a natural setting is provided, but seeing other persons is part of the experience” (Figure 12). Only 14% felt the river was “primitive” (“a place generally unaffected by the presence of people, providing outstanding opportunities for solitude and self-reliance”), despite its remoteness and distance from large population centers. The remaining 37% described the area as “back country” (“the kind of place where complete solitude is not expected, but the environment appears mostly unaffected by people”).

Access Area users rated the quality of their trips very highly. On average, nearly 32% of respondents rated their trips as a 9 or 10 (where 10 was “the best possible trip”). The average rating was 7.7 (Table 21).

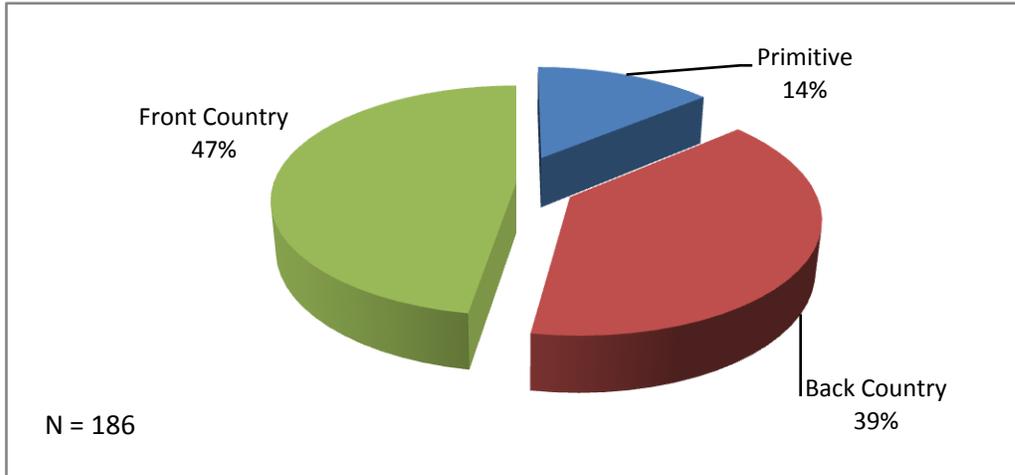


Figure 12. Respondent's Perception of Setting of Upper Green River SRMA

Table 21. Respondent's Satisfaction with this Visit to Upper Green River SRMA

1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)	10 (%)	Mean	Std Dev	n
1.6	0.0	1.0	1.0	7.8	9.4	18.2	29.2	13.0	18.8	7.70	1.80	192

Scale of 1 to 10 where 10 = Best Possible Trip

Because crowding is sometimes cited as a problem in prior river studies, more specific questions concerning crowding were asked. Users were asked to indicate their opinion of social conditions on the day they were contacted by rating crowding conditions on a scale from 1 to 9. A response of 1 or 2 indicated not at all crowded, 3 or 4 slightly crowded, 5 to 7 moderately crowded, and 8 or 9 extremely crowded. Over 70% found the river “not at all crowded” that day, whereas only 2.1% found it “extremely crowded” (Table 22).

Table 22. Level of Crowding Experienced at the Upper Green River SRMA for that Visit

Not at all Crowded		Somewhat Crowded		Moderately Crowded			Extremely Crowded		Mean	Std. Dev.	n
1	2	3	4	5	6	7	8	9			
(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)			
44.8	26.0	7.8	5.7	3.6	5.2	4.7	1.6	0.5	2.42	2.0	192

When compressed to a bivariate scale, where a response of 1 or 2 indicates no perceived crowding and a response of 3 to 9 indicates perceived crowding, 71% of visitors perceived the site as not at all crowded (Figure 13).

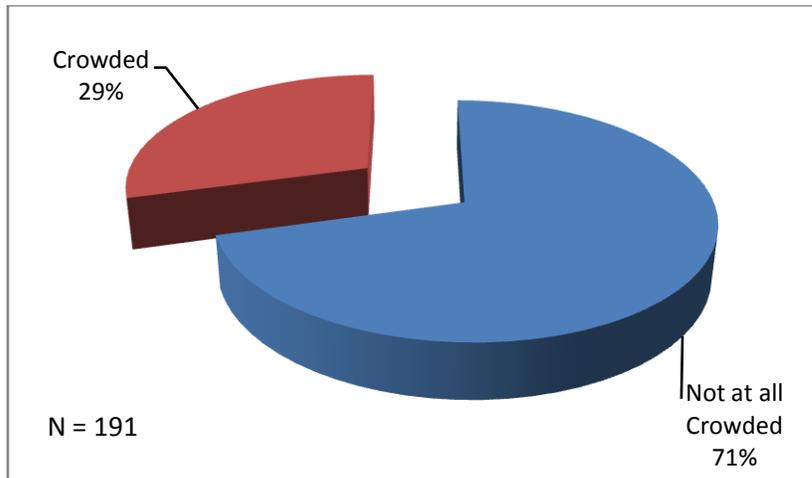


Figure 13. Level of Crowding Experienced at the SRMA During Current Visit

Another question used to assess the effects of crowding on visitors' experiences revealed that the majority of visitors (69%) perceived that other visitors had no effect on their enjoyment (Table 23). But nearly 22% of visitors noted at least some negative impact on their enjoyment from other people. Only a small percentage (9%) felt their visit was enhanced by meeting others.

Table 23. How Respondent’s Encounters with Other Users Affected their Enjoyment during that Visit

Other users greatly reduced my enjoyment			Other users had no effect on my enjoyment	Other users greatly increased my enjoyment			n
-3 (%)	-2 (%)	-1 (%)	0 (%)	1 (%)	2 (%)	3 (%)	
4.2	4.7	13.0	69.3	6.3	2.1	0.5	192

Two open-ended questions asked what were liked best and least about the Upper Green River SRMA (Table 24). Fishing was the most frequently mentioned positive attribute of the SRMA. Users had affinity for the natural unspoiled beauty of the site and described the area as providing excellent accessibility to the Green River without feeling overly crowded. By far, the most common complaint concerned the unpaved and rough portions of the access main road and spur access roads leading to the river (Table 25). But often, this complaint was qualified with accompanying speculation that the rough roads probably prevented the area from being too overcrowded or allowing larger RVs enter the site. Ironically, the next two most common complaints concern fishing and crowding, whose related features were also among the three most liked.

Table 24. Things Best Liked about the Upper Green River SRMA

Response	Frequency	Percentage
Fishing	80	21.3
Access to Site and River	45	12.0
Not Crowded	37	9.8
Camping	36	9.6
Natural Scenery	34	9.0
Tranquility	23	6.1
Views	22	5.9
Facilities Provided and Condition	20	5.3
Green River	18	4.8
Wildlife	17	4.5
Proximity to Home	17	4.5
Variety of Recreational Opportunities	14	3.7
Cost	8	2.1
Relaxation	4	1.1
Nothing	1	0.3
<b>Total</b>	<b>376</b>	<b>100.0</b>

Table 25. Things Least Liked about the Upper Green River SRMA

Response	Frequency	Percentage
Road Condition	38	31.1
Quality of Fishing	16	13.1
Site Crowding	14	11.5
Cattle	12	9.8
Boat Launch Condition/Location	11	9.0
Lack of Amenities	8	6.6
Insects	5	4.1
Rule Enforcement Needed	5	4.1
Conflicts between Users	5	4.1
Condition of Facilities	4	3.3
Use of Motorcycles/ATVs	3	2.5
Possible Planned Improvements	1	0.8
<b>Total</b>	<b>122</b>	<b>100.0</b>

### *User and Visit Characteristics of Bank Anglers, Float-Boat Anglers, and Campers*

This section covers user and trip characteristics of the study respondents by primary activity. As part of the mail-back survey, visitors provided a list of all activities they engaged in during their visit and indicated their *primary* recreational activity the day they were contacted. Of the 192 respondents, 95 (49.4%) cited bank or wade fishing (riverbank angling), 43 (22.3%) were anglers using a float boat and 31 (16.1%) were camping. The remaining 23 (11.9%), who engaged in another activity such as canoeing, hunting, or rafting, were removed from the sample for the remainder of this analysis.

Thirteen variables were compared among these three groups. They are related to the users themselves and their most recent trip to the Access Area. Table 26 provides the mean and median values for the 10 numerical variables, by user group. These same 10 variables are later analyzed using Somers D statistical test. The remaining three variables were nominally scaled and are analyzed using a chi-square statistical test.

When determining statistically significant differences among variables for more than two groups, the analysis of variance statistical test (ANOVA) is commonly used to compare the group mean values. ANOVA assumes that data is normally distributed. However, an analysis of the distribution of the data for the 13 variables compared in this section revealed that the data were not normally distributed.

Table 26. Summary of Mean and Median Values by User Group

Variable	Bank Anglers		Float Anglers		Campers		n
	Mean	Median	Mean	Median	Mean	Median	
One-Way Miles Traveled	677.0	350.0	375.0	115.0	379.0	70.0	168
Group Size	3.0	2.0	3.0	3.0	10.0	4.0	169
Age	48.6	51.5	49.9	54.0	47.3	44.0	166
Length of Stay in Hours	10.7	6.0	14.6	11.0	24.0	24.0	169
Overall Satisfaction with Trip <sup>1</sup>	7.5	8.0	7.7	8.0	8.3	8.0	169
Perception of Crowding <sup>2</sup>	2.6	2.0	2.0	2.0	2.4	2.0	169
Effects of Other Users on Visit <sup>3</sup>	-0.33	0.0	-0.21	0.0	-0.06	0.0	169
Number of Trips to Access Area during Last 12 Months	4.5	1.5	7.1	2.0	2.4	1.0	165
Satisfaction with Current Conditions at Access Area <sup>4</sup>	5.1	6.0	5.3	6.0	5.1	6.0	166
Years Since First Visit	11.3	8.5	17.7	2.1	16.0	11.0	118

Notes: Scales defined below:

<sup>1</sup> 1 to 10 where 10 is best possible trip

<sup>2</sup> 1 to 9 where 9 is extremely crowded and 1 is not at all crowded

<sup>3</sup> -3 to +3 where 3 is other users greatly increased enjoyment and -3 is other users greatly reduced enjoyment

<sup>4</sup> 1 to 7 where 7 is very satisfied with current conditions

Therefore, the Kruskal-Wallis test, which does not make assumptions about normality, was used. Rather than comparing group means, the Kruskal-Wallis test uses a ranking of means and the underlying null hypothesis that the mean ranks of samples from the populations are the same.

Overall, the results indicate statistically significant differences in 6 of the 13 variables. Three of the variables had significant differences between campers and all anglers, whereas one variable had a significant difference between bank anglers and the other two groups.

Six statistically significant group differences were related to trip characteristics

given in Tables 27 through 40. Camping groups were on average more than twice as large as groups of bank anglers or float-boat anglers (Table 27); they consisted of 10 people, 3 people, and 4 people on average, respectively.

Table 27. Group Size For Three Primary User Groups

<b>Group</b>	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>n</b>
Bank Angler	2	3.26	3.93	95
Float Angler	3	3.62	2.59	43
Camper	4	10.38	12.03	31
<b>Total</b>	2	4.66	6.60	169

Chi-square with ties=19.1, df=2, p=0.00

Campers stayed longer (Table 28) at the site the day they were contacted (24 hours) than either bank (10.7 hours) or float-boat anglers (14.6 hours). A majority of each user group chose the Access Area as their primary destination (Table 29), but campers were even more likely than anglers to have done so. Eighty-seven percent of the campers traveled to the Access Area because it was their primary destination, as compared with 62.1% of bank anglers and 79.1% of float-boat anglers. All campers (100%) came to camp overnight, in contrast to 71% of bank anglers and 57.1% of float-boat anglers (Table 30). Another statistically significant difference among the groups was the average number of miles traveled to the site (Table 31). Overall, bank anglers traveled the greatest distances to the site, averaging 677 miles, compared to 375 miles for float boat anglers and 380 miles for campers.

Table 28. Hours Stayed at SRMA for Three Primary User Groups

<b>Group</b>	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>n</b>
Bank Angler	6	10.70	8.79	95
Float Angler	11	14.61	8.88	43
Camper	24	23.61	2.15	31
<b>Total</b>	<b>12</b>	<b>14.06</b>	<b>9.33</b>	<b>169</b>

Chi-square with ties=43.35, df=2, p=0.00

<sup>1</sup> 76 respondents reported 24-hour stay, indicating overnight visit.

Table 29. Primary Destination of Three Primary User Groups

<b>Primary Destination</b>	<b>Bank Anglers n (%)</b>	<b>Float Anglers n (%)</b>	<b>Campers n (%)</b>	<b>Total (%)</b>
No	36 (37.9)	9 (20.9)	4 (12.9)	49 (28.9)
Yes	59 (62.1)	34 (79.1)	27 (87.1)	120 (71.1)
<b>Total %</b>	<b>95 (100%)</b>	<b>43 (100%)</b>	<b>31 (100%)</b>	<b>169 (100%)</b>

Pearson Chi<sup>2</sup>= 8.91, p = 0.01

Table 30. Comparison of Overnight Visits of Three Primary User Groups

<b>Overnight Visitor</b>	<b>Bank Anglers n (%)</b>	<b>Float Anglers n (%)</b>	<b>Campers n (%)</b>	<b>Total (%)</b>
No	29 (30.5)	18 (42.8)	0 (0.0)	47 (27.1)
Yes	66 (69.5)	25 (57.2)	31 (100)	121 (72.9)
<b>Total</b>	<b>95 (100.0%)</b>	<b>43 (100.0%)</b>	<b>31 (100.0%)</b>	<b>169 (100.0%)</b>

Pearson Chi<sup>2</sup>= 16.96, df = 2, p = 0.00

Table 31. Comparison of One-way Miles Traveled of Three Primary User Groups

<b>Group</b>	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>n</b>
Bank Angler	350	676.97	729.98	95
Float Angler	115	375.06	512.91	43
Camper	75	441.70	612.85	31
<b>Total</b>	<b>200</b>	<b>557.00</b>	<b>670.86</b>	<b>169</b>

Chi-square with ties= 6.80, df=2, p=0.03

One variable related to users' experience with the site showed statistical significance. While there was no significant difference between groups of campers and anglers as to whether this was their first visit (Table 32), bank anglers were more likely to be more recent visitors (Table 33).

More than 60% of bank anglers were making their first visit to the Access area or their initial visit was less than 5 years ago, compared to 42.9% for float anglers and 40.6% for campers.

Table 32. Whether this Visit by Three Primary User Groups were their First

<b>First Visit</b>	<b>Bank Anglers n (%)</b>	<b>Float Anglers n (%)</b>	<b>Campers n (%)</b>	<b>Total (%)</b>
No	62 (65.3)	32 (74.4)	26 (83.8)	120 (71.0)
Yes	33 (34.7)	11(25.6)	5 (16.2)	49 (29.0)
<b>Total %</b>	95 (100.0%)	43 (100.0%)	31 (100.0%)	169 (100.0%)

Pearson Chi<sup>2</sup> = 4.2, df = 2, p = 0.12

Table 33. Years since First Visit to Access Area by Three Primary User Groups

<b>Group</b>	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>n</b>
Bank Angler	8.5	11.31	11.63	60
Float Angler	15	17.74	12.12	31
Camper	11	16.03	12.78	27
<b>Total</b>	11	14.08	12.27	118

Chi-square with ties= 8.74, df=2, p=.01

No significant differences existed among these three user groups in terms of either gender or age. Seventy-eight percent of bank anglers were male, whereas 60% of float anglers and 71% of campers were male (Table 34). The mean age

range was consistent among each user group, although the median age for campers was lower than for anglers (Table 35).

Table 34. Gender of Three Primary User Groups

<b>Gender</b>	<b>Bank Anglers n (%)</b>	<b>Float Anglers n (%)</b>	<b>Campers n (%)</b>	<b>Total (%)</b>
Male	74 (78.0)	26 (60.0)	22 (71.0)	122 (72.0)
Female	21 (22.0)	17 (40.0)	9 (29.0)	47 (28.0)
<b>Total %</b>	95 (100.0%)	43 (100.0%)	31 (100.0%)	169 (100.0%)

Pearson Chi<sup>2</sup>= 1.8, df= 2, p = 0.40

Table 35. Age of Three Primary User Groups

<b>Group</b>	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>n</b>
Bank Angler	51.5	48.60	14.44	94
Float Angler	54	49.95	12.94	42
Camper	44	47.3	11.21	30
<b>Total</b>	50	48.70	13.50	166

Chi-square with ties= .90, df=2, p=0.64

No significant differences were found among the groups in terms of satisfaction and the conditions found at the site. All three groups were generally satisfied with the quality of their visit and the conditions they found at the Access Area. Bank Anglers rated their trip quality satisfaction at a mean score of 7.5, float anglers averaged 7.7, and campers averaged 8.3 (Table 36). Regarding the current conditions of the resources at the Access Area (Table 37), more than half of all bank anglers (53.2%), float-boat anglers (55.8%), and campers (58.7%) were highly satisfied.

Table 36. Visitor Satisfaction with the SRMA of the Three Primary User Groups

<b>Group</b>	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>n</b>
Bank Angler	8	7.5	1.90	95
Float Angler	8	7.7	1.81	43
Camper	8	8.2	1.63	31
<b>Total</b>	<b>8</b>	<b>7.70</b>	<b>1.85</b>	<b>169</b>

Scale rating of 1 to 10, where 10 = Best Possible Trip

Chi-square with ties= 3.73, df=2, p=0.15

Table 37. Satisfaction with Current Conditions of SRMA by Three Primary User Groups

<b>Group</b>	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>n</b>
Bank Angler	6	5.15	1.83	92
Float Angler	6	5.32	1.64	43
Camper	6	5.12	1.82	31
<b>Total</b>	<b>6</b>	<b>5.19</b>	<b>1.77</b>	<b>166</b>

Scale rating of 1 to 10, where 10 = Very Satisfied with Conditions

Chi-square with ties= .133, df=2, p=0.94

Most of these visitors had visited the site before and perceived it to be not crowded (Table 38). Nonetheless, the enjoyment by all three groups was diminished little by other users (Table 39). Although float-boat anglers visited more often in the last 12 months (7.1 trips) than bank anglers (4.5 trips) or campers (2.4 trips), this difference between groups was not significant (Table 40).

Table 38. Perception of Crowding at SRMA by Three Primary User Groups

<b>Group</b>	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>n</b>
Bank Angler	2	2.61	2.03	95
Float Angler	1	2.02	1.56	42
Camper	2	2.43	2.01	31
<b>Total</b>	<b>2</b>	<b>2.43</b>	<b>1.93</b>	<b>168</b>

Scale rating of 1 to 9, where 1= Not at all crowded and 9 = Extremely crowded  
 Chi-square with ties= 2.27, df=2, p=0.28

Table 39. Perception of Conflict at SRMA by Three Primary User Groups

<b>Group</b>	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>n</b>
Bank Angler	0	-.331	1.09	95
Float Angler	0	-.214	.781	42
Camper	0	-.064	.629	31
<b>Total</b>	<b>0</b>	<b>-.252</b>	<b>.952</b>	<b>168</b>

Scale rating of -3 to 3, where -3= Enjoyment greatly reduced by other users  
 and 3= Enjoyment greatly increased by other users  
 Chi-square with ties= 2.18, df=2, p=0.33

Table 40. Number of Trips to SRMA by the Three Primary User Groups in the Past 12 Months

<b>Group</b>	<b>Median</b>	<b>Mean</b>	<b>Std Dev</b>	<b>n</b>
Bank Angler	1.5	4.5	10.29	92
Float Angler	2	7.0	18.54	42
Camper	1	2.4	2.11	31
<b>Total</b>	<b>1</b>	<b>4.77</b>	<b>12.16</b>	<b>165</b>

Chi-square with ties= 1.96, df=2, p=0.37

### *Motivations of Bank Anglers, Float-Boat Anglers, and Campers*

Survey questions measuring the users' motivations used an ordinal scale of 1 to 5 where 1 signifies "Not at all Important" and 5 signifies "Extremely Important." Table 41 contains the mean values for the bank anglers, float-boat anglers, and campers.

The Somers' D ordinal measure of association is used here because the distributions of the motivation data were not normal. The Somers' D coefficient expresses the associations with a particular group type dummy variable (dependent variable = 1, 0) and its motivations (independent variables) for visiting the Access Area. This non-parametric statistical method allows for the estimation of these probabilities as population parameters and computes a confidence interval around the parameter estimate as well as  $p$ -values.

The table for each group (Tables 42, 43 and 44) contain the probability coefficient (Somers' D) that the particular motivation (dependent variable) is important to that user group (independent variable) when compared across all user responses. Also reported is the 95% confidence interval around the probability for each motivation.

Table 41. Mean Scores for Motivations of Bank Anglers, Float-Boat Anglers, and Campers

User Group	Mean			n
	Bank Angler	Float Boat Angler	Camper	
To be on my own	3.3	2.5	2.7	161
To take risks	1.3	1.1	1.3	158
To use my equipment	3.1	2.6	3.2	159
To do something with my family	3.3	3.0	4.6	165
To be with members of my group	3.0	3.8	4.3	162
To meet new people	1.2	1.2	1.5	158
To learn about the countryside	2.7	2.2	2.5	161
To enjoy the views	4.2	4.0	4.4	164
To think about my personal values	2.5	1.8	1.9	160
To be close to nature	4.0	4.0	3.6	165
To be creative by doing something such as sketching, painting, taking pictures	2.1	1.5	1.6	161
To bring back pleasant memories of a prior visit	2.5	2.5	2.9	161
To get exercise	2.7	2.6	2.8	160
To relax physically	3.4	3.7	3.8	162
To help reduce built-up tension	3.1	2.7	2.5	162
To experience solitude	3.7	3.6	2.7	162
To be away from the family for a while	1.4	1.3	1.1	158
To share my skills and knowledge with others	1.8	2.1	2.1	160
To reach a specific destination	2.0	1.9	2.2	161
To show others I can do it	1.1	1.2	1.1	159
To test my endurance	1.4	1.2	1.2	160
To experience the Access Area	3.7	3.3	3.6	162
To avoid paying entrance fees	2.2	1.5	3.1	161
To help earn a living (e.g., professional guiding)	1.1	1.1	1.0	158

For example, Table 42 describes the motivations of bank anglers. For the motivation *to be on my own*, there is between a 10% and 42% probability at the 95% confidence level that this was the motivation for the bank angler to visit the area that day. The probabilities of 10% and 42% are the low-end and high-end column (95% confidence interval) entries in Table 42 after being converted to percentages. Newson (2001) argued that confidence limits for these parameters are more informative than the traditional practice of reporting only *p*-values.

Table 42 for bank anglers, Table 43 for float-boat anglers, and Table 44 for campers characterize the respective user group's motivations for visiting the Access Area on the day of the interview. The Somers' D association is a directional statistic; a negative coefficient indicates that the motivation is not important to that user group overall.

The analysis indicates that bank anglers considered six motivations to be important (i.e., significant at the .05 level): *to be on their own*, *to use their equipment*, *to think about their personal values*, *to seek solitude*, *to experience the Access area*, and *to be creative*. None of the motivations was significant at the .05 level for float-boat anglers, although *to be with members of my group* and *to seek solitude* were somewhat important. In contrast, campers noted four significantly important motivations: *to do something with the family*, *to be with members of their group*, *to enjoy the view*, and *to avoid paying entrance fees*.

Table 42. Somers' D Summary of Bank Anglers' Motivations

Motivation	Coefficient	95% Confidence Interval	
		Low end	High end
To be on my own	0.26**	0.10	0.42
To experience solitude	0.22**	0.03	0.35
To be creative by doing something such as sketching, painting, taking pictures	0.18**	0.04	0.33
To use my equipment	0.18*	0.01	0.34
To experience the River Access Area	0.17*	0.00	0.33
To think about my personal values	0.16*	0.03	0.35
To be with members of my group	-0.30**	-0.46	-0.14
To share my skills and knowledge with others	-0.16*	-0.32	-0.10
To help reduce built-up tension	0.10	-0.70	0.27
To be close to nature	0.06	-0.10	0.22
To avoid paying entrance fees	0.04	-0.12	0.19
To be away from the family for a while	0.02	-0.10	0.14
To learn about the countryside	0.02	-0.15	0.19
To take risks	-0.00	-0.12	0.13
To test my endurance	-0.00	-0.12	0.12
To help earn a living (e.g., professional guiding)	-0.02	-0.80	0.40
To enjoy the view	-0.02	-0.19	0.14
To bring back pleasant memories of a prior visit	-0.02	-0.19	0.14
To meet new people	-0.03	-0.15	0.80
To reach a specific destination	-0.04	-0.19	0.12
To do something with my family	-0.05	-0.21	0.12
To get exercise	-0.07	-0.24	0.10
To relax physically	-0.08	-0.25	0.80
To show others I can do it	-0.09	-0.19	0.10

Note. Asterisks depict probability of a greater z value. Z values imply the use of large sample statistics. \*\* 99% confidence. \* 95% to 98% confidence.

Table 43. Somers' D Summary of Float-Boat Anglers' Motivations

Motivation	Coefficient	95% Confidence Interval	
		Low end	High end
To avoid paying entrance fees	-0.25**	-0.41	-0.10
To think about my personal values	-0.24**	-0.43	-0.06
To be on my own	-0.23**	-0.42	-0.05
To use my equipment	-0.19*	-0.38	0.00
To enjoy the view	-0.18*	-0.37	0.00
To be creative by doing something such as sketching, painting, taking pictures	-0.17*	-0.33	-0.02
To take risks	-0.12*	-0.24	0.00
To experience the River Access Area	-0.16	-0.35	0.34
To do something with my family	-0.16	-0.35	0.03
To learn about the countryside	-0.14	-0.33	0.04
To test my endurance	-0.10	-0.22	0.02
To help reduce built-up tension	-0.13	-0.33	0.06
To get exercise	-0.07	-0.28	0.13
To meet new people	-0.05	-0.18	0.07
To reach a specific destination	-0.04	-0.23	0.15
To help earn a living (e.g., professional guiding)	-0.03	-0.09	0.04
To show others I can do it	-0.02	-0.14	0.10
To be with members of my group	0.14	-0.04	0.33
To experience solitude	0.07	-0.12	0.27
To relax physically	0.03	-0.16	0.23
To share my skills and knowledge with others	0.02	-0.17	0.22
To be close to nature	0.01	-0.17	0.21
To bring back pleasant memories of a prior visit	0.01	-0.18	0.21
To be away from the family for a while	0.00	-0.14	0.14

Note. Asterisks depict probability of a greater z value. Z values imply the use of large sample statistics. \*\* 99% confidence. \* 95% to 98% confidence.

Table 44. Somers' D Summary of Campers' Motivations

Motivation	Coefficient	95% Confidence Interval	
		Low end	High end
To avoid paying entrance fees	0.42**	0.21	0.63
To do something with my family	0.41**	0.25	0.57
To be with members of my group	0.34**	0.15	0.52
To enjoy the view	0.24*	0.02	0.45
To experience solitude	-0.31**	-0.52	-0.10
To be close to nature	-0.25*	-0.48	-0.03
To bring back pleasant memories of a prior visit	0.17	-0.05	0.40
To use my equipment	0.15	-0.08	0.37
To share my skills and knowledge with others	0.12	-0.09	0.33
To reach a specific destination	0.10	-0.12	0.32
To meet new people	0.08	-0.10	0.26
To relax physically	0.08	-0.14	0.29
To take risks	0.07	-0.11	0.26
To show others I can do it	0.05	-0.10	0.21
To experience the River Access Area	0.05	-0.19	0.29
To test my endurance	0.02	-0.15	0.18
To get exercise	0.00	-0.21	0.21
To help earn a living (e.g., professional guiding)	-0.01	-0.09	0.07
To learn about the countryside	-0.04	-0.27	0.18
To be creative by doing something such as sketching, painting, taking pictures	-0.06	-0.24	0.12
To be on my own	-0.07	-0.28	0.14
To be away from the family for a while	-0.11	-0.24	0.02
To think about my personal values	-0.15	-0.37	0.08
To help reduce built-up tension	-0.16	-0.42	-0.10

Note. Asterisks depict probability of a greater z value. Z values imply the use of large sample statistics. \*\* 99% confidence. \* 95% to 98% confidence.

Interestingly, float-boat anglers exhibited more motivations that were particularly unimportant (i.e., had significant negative Somers' D coefficients) than did any other group. Those seven unimportant motives were *be on their own*, *take risks*, *use their equipment*, *enjoy the view*, *think about personal values*, *be creative*, and *avoid paying entrance fees*. Bank anglers had two significantly unimportant motives: *to be with their group* and *to share their skills and knowledge*.

Campers' significant unimportant motivations were *to be close to nature* and *seeking solitude*.

## CHAPTER V

### DISCUSSION AND CONCLUSIONS

This study examined outdoor recreation use and users at the Upper Green River SRMA. This chapter presents, through a discussion of the survey data presented in Chapter 4, an examination of the results in terms of the four objectives of the study and the research question: Who are the users of the Upper Green River SRMA, what activities do they engage in, and what are the differences, if any, in user characteristics, motivations, and experiences across the participants in the major activity groups? Further, the second section of this chapter presents the implications of this study and possible future research for managers of the Upper Green River SRMA.

In this study, the recreation activities engaged in were determined from the responses to two survey questions. Visitors were asked to select from a list of possible activities all those they engaged in during their visit. A second question asked which activity was their primary activity. It was determined that fly angling from the riverbank or wading in the river (riverbank or bank angling) was the most popular primary activity, cited by nearly half the respondents. Fly angling from a float boat was the next most popular activity, cited by 22% of respondents. Overall, nearly 72% of all respondents reported some form of angling as their primary activity.

The SRMA provides quality trout angling. Unlike the surrounding states of Montana and Idaho, where public access runs to the mean high water line, Wyoming landowners control the river bottom. To protect their private property

rights, many local landowners erect warning signs along the river and often monitor their lands to prevent float anglers from stopping to fish from the bank or wade in the river. The impact of this property law is that access to public lands becomes very important for local bank and wade anglers, who need access to the river bottom and the adjacent riverbank. For similar reasons, the site is favored by permitted commercial outfitters because they can provide a client with a guided experience that differs from float trips that would solely cross private lands. Many out-of-state visitors also seek such access to the riverbank and river bottom and favor using public lands because they are unfamiliar with private land boundaries.

Camping was the next most common primary activity (16.1%) and was often engaged in by visitors who were primarily angling. Thirty-six percent of respondents who reported riverbank angling as their primary activity also camped overnight. Interestingly, 56% of respondents who reported float-boat angling as their primary activity camped overnight as well. This is most likely due to visitors bringing their personal float craft to the site for a multi-day stay, which implies that float angling is not limited to commercial groups. Interestingly, float-boat anglers often cross over to riverbank angling during their visit, as nearly 40% of these float anglers also reported fishing from the bank. The reverse is not true, as only 4% of riverbank anglers also used a float boat during their visit.

Visitors to the site were almost an even mix of local residents and non-residents. Just over half (51%) of the visitors were residents of Wyoming, and nearly one quarter came from nearby Jackson, a driving distance of 52 miles. Nearly 67%

of respondents held at least a college degree, and the overall mean age of visitors was 49 years. The most common occupation type was managerial or professional, with more than half reporting annual incomes over \$80,000. This may be explained largely by Jackson being part of Teton County, where according to the 2004 Census, the median household income was \$59,568, much higher than for Wyoming as a whole.

The predominance of middle-aged male visitors (76%) is likely influenced by fly angling being the most popular recreational activity at the site. The mean age of 48 is higher than that of 37 found for fly anglers in the 2005 survey by the Outdoor Industry Foundation, in which 30% of fly anglers were males over the age of 45. The higher mean age found in this study was also likely influenced by the second most reported occupation being retired (22%). Similar characteristics have been associated with users of the West Branch of the Farmington River (Moore & Siderelis, 2001), where nearly 84% of all visitors were middle-aged males, with a mean age of 48, and fly angling was the most popular recreational activity. Education and income levels of the two sites were also similar, with one quarter of the visitors to the West Branch of the Farmington River reporting household incomes over \$100,000. Findings by Hutt and Bettoli (2003) showed that fly anglers were more specialized, viewing fishing as more than a consumptive activity, and tended to be middle-aged males, with a mean age of 44 and with higher education and income levels.

This mix of local residents and tourists may help explain several of the visitor trip characteristics. For example, the average mileage of a one-way trip from home to the site was 478 miles, with the median being 145 miles. The considerable distance traveled is consistent with the finding that the majority of recreationists selected the site as their primary trip destination (73%) and did so because it was a good place for their recreational activities (69%). The majority of visitors stayed overnight at one of the 12 river access sites (69%) and were either alone or in a group of fewer than 5 family members or friends. If the trip did not involve overnight camping at the site, the typical day-use length of stay was between 5 and 6 hours, which is somewhat higher than the 4.4 hours found by Manning (1979) for Vermont river anglers and the 4.7 hours Moore and Siderelis (2001) found at the Farmington River, but it may indicate that users viewed the excursion as a “day trip.” Use of the site by organized groups (2.6%) was minimal and comprised only a small number of visitors, who were most likely to be participants from a nearby Boy Scout camp on a guided canoe trip.

Many respondents had been visiting the site for some time, with nearly 70% being repeat visitors. Forty-eight percent of visitors reported that their first visit occurred more than 5 years ago, and just over 15% of visitors had an association with this river site for 25 years or more. Visitors averaged 5 trips in the last 12 months, with a median of 1 trip. Although 30% of respondents were here on their first visit to the site, fifteen respondents (8%) indicated they would return to the site more than 10 times in the next 12 months. A large majority (81.5%) indicated they

would return to the site at least once in that time. The 18.5% of visitors that did not plan a return trip in the next year traveled an average of 986 miles from home. Interestingly, 98% of respondents from the Jackson zip codes 83001 or 83002 indicated they planned to visit the site an average of 7 times within the next 12 months.

By examining the SRMA visitor and trip characteristics, a better understanding of who and what recreation activities were popular at the site emerged. That this mix of local residents and tourists engaged predominantly in fly angling and camping is not surprising. The entrance to the SRMA is located off Wyoming Highway 191 and is marked only by a weathered wooden sign that does not provide information about available recreational opportunities. Only a small sign (Figure 14) posted a short distance along the entrance road mentions fishing or hunting. No informational kiosk or visitor services bulletin board is present to inform the user of any amenities, and there is no regular on-site BLM presence. Based on these facts, the SRMA seems best known as a place for locals to recreate.

When examining the social conditions of crowding, conflict, and satisfaction at the site, considering visitors' past experience with this setting is important (Schreyer, Lime, & Williams, 1984). Just over 6% of respondents who reported camping as their primary activity and 32% of respondents who reported angling as their primary activity were making their first visit to the site. It is likely that regular users at the SRMA would have prior knowledge of the site amenities and had gained experience

as to where to park and camp, what other recreation activities others engaged in, and what recreation experiences to expect. How crowded a person feels depends



Figure 14. SRMA Sign along Entrance Road

partly on his or her expectations. Those expectations can be formed by experience (Jacob & Schreyer, 1980), as in resource specificity, where a person attaches significance to a specific resource for the given activity. It is often measured by their frequency of visitation. With each visit, a visitor gains experience on which to base evaluations of others' behaviors and develops more refined criteria for that judgment (Watson, et al., 1994).

Crowding was found to be of minor concern, as 29% of respondents perceived some crowding. This finding was consistent with the low end of the crowding range indicator of 18% reported for angler studies by Shelby and Vaske (2007). Also supporting this assessment of crowding was the finding that when visitors were asked to rate items they felt were problems at the site on a scale of

1 to 7, crowding was the third highest-rated problem, but its mean was only 2.3. Most visitors to the SRMA expected to recreate in an area where seeing people is expected. When asked to describe the area, 60% of respondents indicated the SRMA was “the kind of place where a natural setting is provided, but seeing another person is part of the experience.”

Conflict among users was also low, reported by only 21% of respondents. Within the SRMA, the Green River covers 13 miles and the river access sites are spaced such that few campers are near each other. One source of reported conflict was brief encounters between users. This conflict was often one-sided, as when a riverbank angler believed that a float angler had ignored his or her casting pool or a float angler judged that another user, like a canoeist, unnecessarily caused his or her course to be altered. But as Jacob and Schreyer (1980) suggested, conflict is not solely a function of congestion. Resource impacts such as eroded riverbanks, littered fire rings, or dirty restrooms can lead to a visitor feeling conflict. The two highest-rated problems at the site were related to livestock whereas the reckless behavior of other users which was rated fifth highest with a mean value of only 2.1 on a scale of 1 to 5.

An understanding of satisfaction is important because it helps establish a measurement of the quality of the service or experience provided. The mean rating of visitor satisfaction was 7.7 out of a possible 10 and was consistent with other research that has found that recreationists are generally satisfied with their recreational experiences (Kuss, Graefe, & Vaske, 1990). Past experience is also

related to satisfaction and may have affected the SRMA especially during 2006 and 2007. Herrick and McDonald (1992) examined satisfaction using a model that included past experience. Although past experience was not the highest-rated indicator, it was found to be a significant indicator of satisfaction. One factor during 2006 and 2007 that may have influenced visitation was travel costs. The reported median trip cost was \$150.00 and only 8.4% of visitors spent under \$20.00, whereas just over 16% spent more than \$1000.00. In most cases (71%), the trip cost covered just one or two visitors. During the spring and summer of 2006 and 2007, gasoline prices in the region surpassed \$3.00 per gallon. Given the relatively small number of first time visitors to the site (30%), it was less likely that a repeat visitor would pay to travel to a site without a previously formed expectation of a satisfying trip. In fact, repeat visitors had a favorable evaluation of the overall quality of the site. Only 17% of respondents reported that the site quality had declined since their first visit, whereas 42% felt it had improved and 41% perceived no change. Respondents were generally satisfied with current conditions at the site, with over 51% being highly satisfied and only 10% being unsatisfied.

*Recreation River Use, Experiences, and Motivations of Fly Anglers, Float-Boat Anglers, and Campers*

The results examined in the previous section suggest that while no single activity dominated recreation in the Upper Green River SRMA, the site is well known by locals and tourists for being an excellent river on which to fly-fish, and indeed, fly-angling from either the riverbank or a float boat was the primary activity for a majority

of users. A riverbank angler is one who fishes from either the riverbank or wades into the river. The next most common primary activity was camping (16%). This section discusses comparisons of the characteristics, experiences, and motivations of visitors across primary activities.

Many similarities and differences were found among the three primary user groups. The mean ages for riverbank fly anglers (48.6 years), float-boat anglers (49.9), and campers (47.3) were near the overall visitor age of 49.1 years. But a better understanding of the different user groups was found when examining their recreation activities, trip characteristics, and experiences. Significant differences were found among the use characteristics and variables related to whether the site was a visitors' primary destination, group size, length of stay, miles traveled to the site, and years since first visit.

Camping visitors more often selected the Upper Green River SRMA as their primary destination (87%), traveled to the site in larger numbers (10 people), and stayed longer (24 hours) than did bank anglers (62.1%, 3 people, 6 hours, respectively) or float-boat anglers (79.1%, 3 people, 11 hours, respectively). By definition, all camping parties stayed at the site overnight. Riverbank anglers traveled a median distance of 350 miles, float anglers 115 miles, and campers 70 miles. First-time visitors, on average, traveled 1060 miles if riverbank anglers, 672 miles if float-boat anglers, but only 362 miles if campers.

These characteristics of SRMA campers are not surprising. Camping is a popular family vacation activity, especially in the west (Outdoor Industry Foundation,

2005). At the Upper Green River SRMA, nearly 60% of respondents reporting camping as their primary activity were in a family group. Some river access sites at the Upper Green River SRMA can support several relatively large recreational vehicles (RVs) within close proximity to the river. In fact, many camping sites sit only a few steps away from the river and there is no site-regulated maximum number of campers. The largest reported camping group size during the survey was over 40 campers, with nearly a dozen RVs.

In contrast with many nearby private, U.S. Forest Service, and other BLM campgrounds, the SRMA is a no-fee camping area with visitor stays restricted to 14 consecutive days. This relatively unregulated camping opportunity might well have attracted some campers who participated in many other recreational activities. Interestingly, 65% of campers engaged in fly angling from the riverbank and 35% used a float boat for angling. This finding supports the notion that angling is an important activity at the site, but angling may also serve as a complementary activity for campers. On the other hand, 36% of riverbank fly anglers also camped, as did 56% of float-boat anglers. Therefore, camping is also a complementary activity for some anglers. As evidenced by the miles traveled, the SRMA appeared to be a regional attraction for visitors who like to camp and fish. Perhaps given that campers were more likely to be in family groups, the SRMA serves as a site for family reunions, gatherings of friends, and nearby residents who are attracted to the site because of the pleasant setting and angling. Anglers, on the other hand, are often

drawn to the site from greater distances and were more likely to use camping as a means to support their desire to experience fly fishing in the west.

The difference between reported satisfaction for anglers and campers is interesting for management. Riverbank fly anglers had a mean visit satisfaction of 7.5 out of a possible 10, float anglers 7.7, and campers 8.3. Although the differences were not significant, campers rated their trip as slightly more satisfying, on average, than did anglers. Interestingly, all three groups expressed similar but only moderate satisfaction with the current site conditions, with ratings of 5.1 from riverbank fly anglers, 5.3 from float anglers, and 5.1 from campers. Nearly 84% of campers had previously visited the site and were aware of existing camping conditions and regulations. A majority of fly anglers (65%) and float anglers (74%) were also previous visitors. Jackson residents accounted for 25% of campers, 29% of float-boat anglers, and 43% of riverbank anglers. Although there was not a significant difference among the three groups, campers (2.4) visited the site less frequently in the past 12 months than did fly anglers (4.5) or float-boat anglers (7.1).

Perhaps all three groups have become conditioned to the primitive conditions such as the rough road surface, or they consist largely of nearby residents quite familiar with the SRMA. Although frequent or long-time users may desire changes at the site, they nonetheless indicated high overall satisfaction. The research reviewed in Chapter 2 suggests two other possible reasons. First, anglers, as consumptive recreationists, often have more complex reasons for angling that can affect their satisfaction than do non-consumptive recreationists such as campers. It may be that

the differences in visitor satisfaction ratings were a result of consumptive aspects of the angling experience. While, overall, their satisfaction ratings were relatively high, anglers may have simply expressed lower satisfaction with the entire fishing experience; whether in a lack of trophy fish, the number of fish caught, or some perceived decline in fishery habitat. On the other hand, the slightly greater overall satisfaction of campers may be because their camping experience, while enhanced by being able to fish, was more enjoyable because their satisfaction was not dependent on angling success. Second, as found by Vaske, Donnelly, Heberlein, and Shelby (1982) and Thapa, Confer, and Mendelsohn (2004), non-consumptive recreationists reported higher levels of satisfaction than consumptive recreationists.

When asked about conflict and crowding at the SRMA, 16.3% of bank anglers, 16.1% of campers, and 11.7% of float anglers reported that other groups affected their enjoyment. The differences among these groups were not significant; however, campers expressed a greater perception that crowding was moderate to extreme (16.1%) than did bank anglers (13.8%) or float anglers (4.8%). Given the nature of the activities at the SRMA, even just a few visitors might cause a brief, but memorable, conflict. Manning (1979) reported that in a survey of Vermont river users, anglers as a group reported the highest rates of one-sided conflict with other river users. Manning's finding may be applicable at the SRMA. For example, a fly angler can be interrupted by a single float-boat party or find that a camping group occupies the access site that the person would like to use. However, because many access sites cannot be viewed from the main access road, a camping group can be

interrupted by other visitors driving through its campsite. A camping group that experiences several interruptions or sees many anglers may perceive the site as crowded. Float-boat anglers reported the least conflict and crowding, which makes sense considering that their use of the river involves not just a single place, but most or all of the length of the river segment. Their judgment may be based upon viewing a larger section of the SRMA, rather than just a campsite or a single river access site. Float angling often involves being with a group of friends or family. This contrasts with the fly angler that traveled to the site to be alone.

#### *Comparison of Motivations of Riverbank Anglers, Float-Boat Anglers, and Campers*

Understanding what experiences and benefits people seek through their chosen recreation activities can provide useful guidance to management in understanding visitor preferences and behavior. Although this study demonstrated that visitors to the Upper Green River SRMA often engaged in multiple activities, it found that bank anglers, float-boat anglers, and campers represent three distinct visitor groups, based on differences in each group's key motivations. The purpose of this section is to describe and compare the important motivational differences among these groups at the SRMA.

Overall, the reasons people visited the SRMA were consistent with past research of river users. However, interesting differences did emerge when the three primary user groups were compared. Riverbank anglers ranked six motivations as most important for visiting: *to be on their own, to think about their personal values, to*

*seek solitude, to experience the Access Area, to use their equipment, and to be creative.* Motives that were rated as unimportant to bank anglers were *to be with members of their group* and *to share skills and knowledge.* The two motivations of *being on their own* and *seeking solitude* were consistent with the finding that more than half of all riverbank anglers traveled to the SRMA either alone or with just one other visitor. Overall, a large majority of riverbank anglers (90%) were in parties of 4 or fewer. This finding may help explain why the SRMA would be quite popular with fly anglers, as the river access sites provide easy access to many secluded locations to fish. Very closely aligned with the two previous important motivations were *to think about personal values* and *to experience the Access Area.* Introspection most often would be facilitated by being alone, in a tranquil or peaceful setting. These two motivations indicated that visitors found the SRMA a setting where they enjoyed and valued privacy and independence, which allowed them to be introspective. When contrasted with the two motives that were rated as significantly unimportant for riverbank anglers, *to be with members of my group* and *to share my skills and knowledge with others,* the riverbank anglers' desire for independence, privacy, and tranquility becomes clearer still.

The two motives significantly important to riverbank anglers of *to use their equipment* and *to be creative* perhaps reflected that fly anglers perceive the art of fly angling as selecting the proper fly that will draw trout and that many fly anglers enjoy tying and testing their own flies.

The findings are somewhat consistent with past research. As Wright and Sanyal (1998) noted, there is scant published information on fly anglers and their motivations in settings such as the SRMA, but their study of guided and unguided fly anglers in southwest Montana found that being *close to nature* was the main motivation for both groups. A motivation such as *close to nature* possibly implies experiencing peace and tranquility, and SRMA riverbank anglers ranked it an important but not statistically significant motivation. One explanation is that 44% of all anglers rated the SRMA as being “front country,” where the setting is considered natural but seeing other people is part of the experience. Riverbank anglers probably believed that based on their past experience, finding a secluded angling spot within the SRMA was highly likely. Finding a setting where it is unlikely to encounter others is possible in the region surrounding the SRMA, but not as convenient. Perhaps locals have become accustomed to the setting and scenery in the area and make a sharper distinction among places that are all close to nature.

But the most important motivations are consistent with the dimensions identified by many previous general angling studies. For example, based on their review of angling studies, Sanyal and McLaughlin (1993) described multiple dimensions of angling motivations. These dimensions consisted of the following: escape; to get away from other people and to experience solitude for the opportunity of introspection; to test equipment; and sense of achievement. Fedler and Ditton (1994) provided a similar grouping of motivations, categorized into five general areas: psychological and physiological, natural environment, social, fishery resource,

and skills and equipment. In their study of Tennessee tailwater sites, Hutt and Bettoli (2003) labeled one of their groups of anglers as non-consumptive specialists that rated angling as their primary recreation activity, invested heavily in equipment, and rarely harvested their catch. It is likely that the bank anglers at the SRMA are more specialized and their motivations would be less focused on consumptive angling than on fulfilling their desired intrinsic benefits from their recreation experience.

Quite surprisingly, float-boat anglers demonstrated no statistically-significant important motivations, but they rated *to be with members of their group* and *to experience solitude* as somewhat important. One possible reason is that many float-boat anglers were also riverbank anglers during their visit; hence their responses may be based on a mixture of the two experiences. Another possible explanation considers the variety of float boats used at the Upper Green River SRMA. One craft type is the single-angler boat, allowing the angler to self-propel the craft. This allows the angler to float with the current, stop at the riverbank, and fish either from the bank or while wading in the river—away from others and much like a bank angler. Or the angler may “anchor” in the river and remain in the boat to fish. Therefore, a group of float-boat anglers using this type of boat can visit the site and possibly experience much the same opportunity for solitude as the bank angler.

Another type of craft is the multi-person float boat; where a guide or partner propels the craft while others fish. This type of boat is commonly used by commercial guides, local residents, and family or group campers. But the common denominator is that this craft hosts a fishing group, which deemphasizes solitude.

This finding was consistent with Wright and Sanyal (1998), who found that guided anglers in Montana were motivated by *angling with family* and *sharing knowledge about angling with others*. Therefore, there may well be distinct groups of float-boat anglers: crossover riverbank anglers, users of single-angler boats, and users of float boats.

An alternative way to look at float-boat anglers is to consider the seven motivations they felt were unimportant: *thinking about personal values*, *to be creative*, *to take risks*, *avoid paying entrance fees*, *using their equipment*, *enjoying the views*, and *to be on their own*. These rankings contrast sharply with those of riverbank anglers.

Possibly the motivational questions asked did not adequately address the desired experiences for float anglers. For example, Wright et al. (1998) identified specific catch-related motivations that were important to guided anglers, such as catching trophy fish and catching different kinds of fish. Hutt and Bettoli (2003) identified significant differences in the importance of harvesting trout and catching trophy fish among the varying subgroups of anglers. Many unguided local residents use float boats at the SRMA. In fact, nearly 29% of the float-boat users were Jackson residents. Therefore, the sample consisted of a mixture of group types, including local residents, tourists, and visitors using commercial guides,.

Campers considered four motivations to be of significant importance to their visit, and these are consistent with their trip characteristics. Traveling in significantly larger groups than anglers, campers rated *to do something with my family* and *to be*

*with members of my group* as significantly important motivations. *To avoid paying entrance fees* and *to enjoy the views* were the other two motivations of most significance to campers. The former probably reflects that no user fees are assessed and alternative camping sites are fee-based private or public campgrounds. The latter is consistent with Stewart et al. (2003), where desirable camping spots along the river were important to river users. After all, camping is how many people interact with nature. For these visitors, camping may be one of the best ways that they experience an extended stay in the outdoors. Campers also rated two motivations as significantly unimportant. Both motivations, *to experience solitude* and *to be close to nature*, are understandably incompatible with being in a group of campers with RVs.

#### *Implications for Management*

Due to the rapid growth of participation in river recreation in the 1960s and 1970s, the organizers of the 1977 River Recreation Symposium foresaw a need to establish a research agenda for future river studies to provide river managers with relevant and empirical information to guide the formulation of management plans. The four objectives of this study were consistent with this goal and provide BLM managers with additional data on how and by what means people derive benefits from their activities at the SRMA.

The study revealed that the Upper Green River SRMA supports a diversity of users engaged in a variety of activities that can fulfill their various needs and

desires. Managing for multiple groups does not imply that the experiences sought by particular groups should be minimized or ignored, but that those desired experiences should help guide the development of the plan. The study findings will aid BLM managers to gain a better understanding of the SRMA visitors in order to enable each visitor to attain the benefits he or she seeks. Three specific implications for management are discussed below.

First, given the reputation of the Green River as a quality trout river, it is not surprising that fly angling is widely popular at the SRMA among both locals and tourists. Given the variety of benefits sought by SRMA visitors, it would be misguided to manage this site emphasizing the benefits for a single user group. However, although it would be also be difficult to implement a management strategy that would fully satisfy all users, providing angling opportunities so that all anglers can enjoy the outdoors and relax would well serve the goals of a majority of visitors. Both riverbank and float boat anglers considered finding solitude an important reason for their visit. Any upgrades to the site infrastructure that would facilitate an increase in visitor use levels such that attaining solitude was unlikely would negatively impact the recreation experience and satisfaction of most existing users. Camping parties enjoy occupying a river access by themselves. When considering improved road surfaces or reducing steep grades to river access sites, which could increase the usage of access sites by RV campers, care should be given to develop sites that can accommodate multiple unaffiliated parties while maintaining privacy for each party. The sites that are the greatest distance from the road could be reserved

for tent or car campers, to allow a more “primitive” experience and promote solitude for anglers.

Second, 53% of riverbank anglers traveled an average of 1211 miles to experience fly angling at the SRMA. These visitors are important to Wyoming tourism and the local economy, and their trip satisfaction is important in “spreading the word” that fly fishing the SRMA is a satisfying tourist experience. However, the survey indicated that a number of SRMA river users are locals, many of whom were from nearby Jackson (19%) and may already feel somewhat displaced by tourist crowding on the Snake River. The SRMA is likely to be regarded as a special place or refuge for locals to escape tourists, but conflict or displacement may occur if they perceive higher levels of crowding or site degradation. Management should understand the mix of locals and tourists seeking opportunities for enjoyment and consider providing information to all visitors relating site regulations, the characteristics of each river access site, and etiquette on angling and other activities that could be helpful in reducing potential conflict among visitors. This information would be also helpful not only for the first-time visitor but for large camping parties, whose members often swim or float the river using inner tubes or rafts without any consideration of anglers. Management should consider a reminder to river floaters that other visitors may experience some level of interference with their activity when river floaters pass by, and this information may encourage behavior changes by river floaters to reduce conflict.

Finally, given that any site infrastructure or policy changes would contrast with the customary lack of on-site management, it is important to consider how management should inform visitors of any pending changes. Without immediate and consistent enforcement of using designated camping areas, direct management strategies are likely to fail or be misunderstood. A promising strategy would use indirect methods such as informational signs to inform visitors of the need for changes (e.g., preventing further erosion of riverbanks) and encourage cooperation. In the past, BLM management presence on the site had been sporadic. BLM management should strive to be more visible during high-use periods to explain what management strategies will be implemented and why.

#### *Recommendations for Future Research*

Research on angler satisfaction has long understood that catching fish is not the only appeal for anglers. This study found that anglers sought a number of diverse benefits and reported somewhat lower satisfaction than did other recreationists. As Arlinghaus (2006) pointed out, catching fish does affect the satisfaction of some groups of anglers. Further, the activity-specific aspects of fishing at the SRMA are less well understood because in this study anglers were not directly asked questions about catch-related motivations, such as number of fish caught, number of bites, or whether catching trophy fish. BLM management should be aware that catching fish is an important aspect of the recreation experience for many, if not most, anglers. Therefore, BLM management should consider integrating

the study of angling experiences at the SRMA with periodic Wyoming Game and Fish creel studies.

Little is known about commercial float-boat anglers, and their inclusion in this study was limited because they were not easily accessible. No statistically significant motivations were found for float-boat anglers, yet Wright et al. (1998) found differences in motivations between guided float-boat anglers and unguided riverbank anglers. Additionally, visitor conflict is often an important management concern, and as suggested by Wright et al. (1998), local bank anglers are concerned about the effects of commercial use by non-resident guided anglers on the health of the trout fisheries. Therefore, a more in-depth study of motivations and carrying capacity would provide management with a better understanding of angler behavior and would be useful for management planning when considering implementing future use limits on commercial trips. Future research exploring these and other social and setting conditions could facilitate a better understanding of visitors to the SRMA.

Segmenting recreation users by activity for comparison is a common methodology in river studies. Another approach for understanding motivations would be to use discriminant analysis, which allows the understanding of differences between groups using a number of variables. Given that many of the users at the SRMA engage in multiple activities during their stay, it would be useful to determine how well various motivations influence the differences between the groups.

In summary, this thesis has examined who uses the SRMA, what activities they engage in during their visit, and the reasons for their trip. In doing so, it is hoped that the results will provide the BLM recreation management important user information about the SRMA that will assist in the development of an effective RAMP and implementation of policies that will enable the BLM to continue offering visitors high quality outdoor recreational opportunities at the SRMA.

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