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Visitor Characteristics, Attitudes, and Management Preferences of the Bob Marshall Wilderness Complex

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VISITOR CHARACTERISTICS, ATTITUDES, AND
MANAGEMENT PREFERENCES OF THE BOB MARSHALL WILDERNESS
COMPLEX

By

Samuel Joseph Rhodes, B.S.F.

Presented to the Faculty of the Graduate School of

Stephen F. Austin State University

In Partial Fulfillment

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Masters of Science in Forestry

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MANAGEMENT PREFERENCES OF THE BOB MARSHALL WILDERNESS
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By

Samuel Joseph Rhodes, B.S.F.

Approved:

Dr. Pat Stephens Williams, Thesis Director

Dr. Ray Darville, Committee Member

Dr. Matthew McBroom, Committee Member

Pauline M. Sampson, Ph.D.
Dean of Research and Graduate Studies

ABSTRACT

The Bob Marshall Wilderness Complex (BMWC) encompasses 3 federal wilderness areas and spans over 1.5 million acres of iconic mountains and valleys in northwestern Montana. Here visitors can find a plethora of recreation opportunity that give access to some of the most rugged country that can be found in the lower 48 states. However, managing wilderness areas comes with the challenge of both preserving the natural resources found within their borders and enabling opportunities for recreational experiences. Wilderness social scientists always have striven to determine the type of visitors coming to wilderness, and see what sorts of experiences they pursue. Many attempts have been made to use the pristine conditions in the BMWC to collect data on visitor use.

Using two previous studies as a foundation, this research focused on developing an updated survey with the goal of discerning visitor use within the complex, experiences sought after, management conditions tolerated, and noteworthy management actions that potentially need to be undertaken going forward. These goals were addressed with the development of an onsite survey that was administered during the summer of 2018 at eight selected high use trailheads found throughout the complex. Of those responding to the onsite questionnaire (n=209), a majority of (81.1%) of visitors have had previous experience in the Bob Marshall and indicated that they were most influenced by

the prospect of immersing themselves in the various dimensions of wilderness character such as solitude, remoteness, and natural settings. The type of recreation use was primarily hikers (64.6%) that traveled in small groups of two to three individuals. A second follow up survey was solicited to visitors via email to collect more in depth data about perception toward management and conditions within the backcountry. Of those respondents (n=58), visitor attitude toward management conditions was overall reported to be positive with a vast majority (93.1%) of respondents claiming high satisfaction for their trip. Using these results, anecdotal experiences, and reviewed literature, additional commentary was generated addressing possible future pitfalls that could be experienced based upon various types of feedback provided by visitors. This study will be one of many that will continue to observe the ever changing dimensions of outdoor recreation visitor use and behavior.

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CHAPTER 1

INTRODUCTION

Wilderness areas in the United States are vast expanses of land safeguarded by the 1964 Wilderness Act, and contain millions of acres of untrammelled scenery that allow exceptional opportunities for primitive forms of recreation use (Public Law 1964). Effective management for recreation in these areas depends heavily upon the ability of managers to comprehend the complex dimensions of visitor use, as well as to understand the experiential desires that are expressed by wilderness users. No place is this more pertinent than in the Bob Marshall Wilderness Complex (BMWC), a 1.5 million acre contiguous land parcel that encompasses the Bob Marshall, Scapegoat, and Great Bear Wilderness Areas (Figure 1).

The BMWC or “The Bob” as it is locally known, is found between the Lewis and Swan Mountain Ranges in northwestern Montana, and sits to the south of the iconic Glacier National Park. The complex is penetrated by thousands of miles of trails that each year takes hundreds of hikers, backpackers, and horse packers deep into some of the nation’s most picturesque Rocky Mountain landscapes. With its vast array of recreation opportunity, The Bob has been identified for years as a flagship place to study various dimensions of wildland recreation and visitor use.

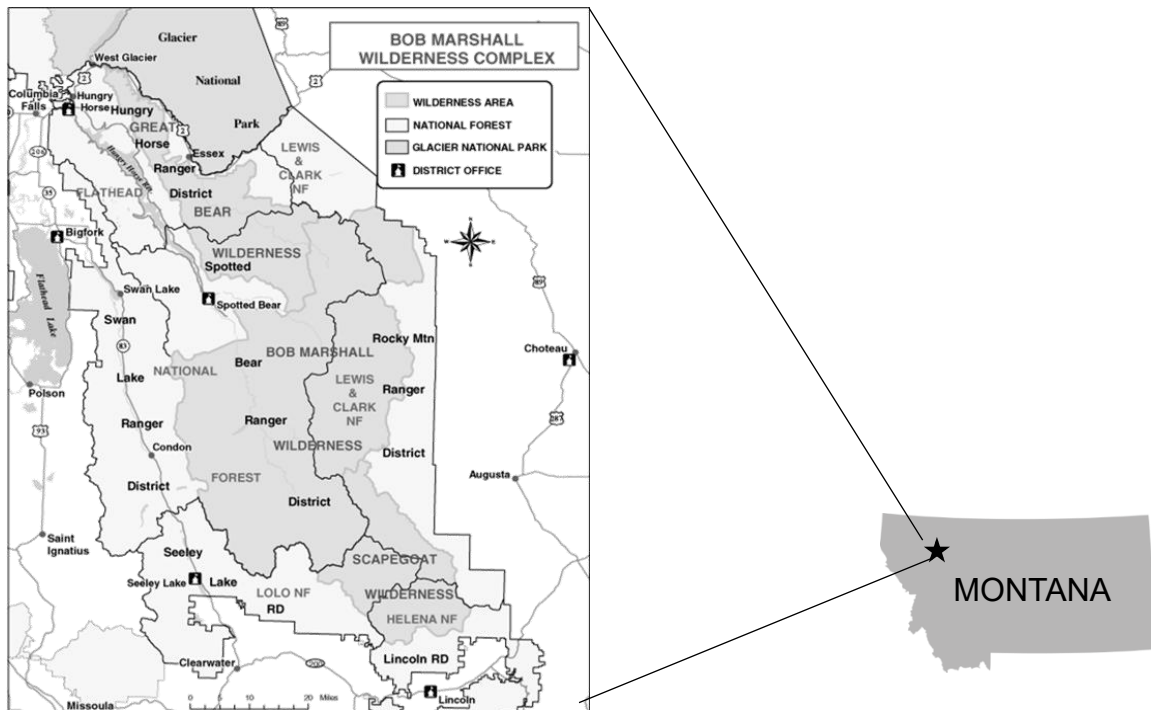


Figure 1. Map of the BMWC in northwestern Montana.

In 1970 and 1982, the first comparative study of the complex was launched, analyzing 10-year variations in visitor use and behavior throughout the complex. These studies were replicated in 2003 and 2004, but until now no new measurements have been conducted to observe existing conditions with regard to visitor use. As recreation use trends and types have changed throughout the early parts of the twenty-first century, current managers have desired to gain a better understanding of how visitors are using the complex, as well as understand what conditions recreationists are most in favor of. This study sought to answer these questions, building upon the work that was conducted in previous years while assisting wilderness managers as they continue to develop strategic planning frameworks to maintain integrity of The Bob.

Goals and Objectives

The goals of this project were to replicate and expand the 2003 and 2004 general visitor use studies conducted in the BMWC, and give an updated view of recreation visitor use and preference. The survey used during the 2004 study was revised and implemented to collect specific information from visitors at high use trailheads throughout the complex, and response data about various wilderness users were captured.

The objectives of this study were to:

- Evaluate the forms of recreation use participated in by visitors within the BMWC.
- Analyze wilderness management activities that are preferred or tolerated by visitors.
- Determine resource conditions that wilderness visitors desire.
- Ascertain possible management actions needed to be carried out by BMWC managers.

CHAPTER 2

REVIEW OF LITERATURE

Present literature suggests that experiences in wilderness areas are influenced by visitor attitudes, behaviors, motives and preferences while recreating (Cole & Williams 2012). This literature review will consider this notion as it focuses on some of the pioneering pieces of social science conducted in various wildlands of North America. In addition, it will recognize preexisting methodologies that have been successful at capturing information pertaining to visitor use, investigate the effects that wilderness management has on visitors, and ascertain what types of experiences wildland recreationists have sought out over the previous years.

Wilderness Recreation Management

An exhaustive collection of literature exists that details various definitions of wilderness and components that are necessary for management. One must look to the Wilderness Act, however, to determine original management intentions that were laid out for protected wilderness areas. The Act states that these areas are set aside to be refuges “untrammelled by man” where this same man is “a visitor who does not remain”. The Act also builds on the foundation for recreational wilderness experience, defining wilderness as

places that will “provide outstanding opportunities for solitude or primitive and unconfined types of recreation” (Public Law 1964). Even with these pieces defined, best management is oftentimes difficult to determine and complex challenges never cease to arise as wilderness managers strive to maintain these desired goals set forth by the Wilderness Act.

Because the Act lays a clear expectation for management conditions, many managers acknowledge that studying the human dimensional aspects of wilderness is the most important when planning for resource development. A recent survey of the four federal agencies managing and administering wilderness (National Park Service (NPS), U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), and Bureau of Land Management (BLM)) found that visitor management and monitoring protocols were among the top 10 needs for better research. Visitor use constantly fluctuates, and managers struggle to keep pace with the ever changing needs that are presented by wilderness users. In addition, managers are beginning to question the effectiveness of existing monitoring protocols, and are becoming open to the development new methodologies of studying visitors and their relationship with wilderness areas (Dawson et al 2016).

Wilderness Management Frameworks

Wilderness recreation management frameworks find their roots within three commonly used models: carrying capacity, levels of acceptable change

(LAC), and the recreation opportunity spectrum (ROS). The former two models allow managers to gain a better understanding of impact toward both natural and recreational resources which in turn could have influence on the experience of visitors. Once desired conditions are met, ROS enables the identification of whether or not appropriate recreational opportunities actually exist at a specific site. The use of these three frameworks has helped managers gauge how well wilderness character is being preserved, and permits a better approach of how to manage wilderness recreational experiences (Manning & Lime 2000).

While the use of management frameworks has been instrumental for resource planning, understanding how visitors are actually using the resource is something that also must be investigated. Visitor use has not been found to be uniform among wilderness areas, and many studies have yielded results that highlight varying visitor attitudes and preferences that seem to be dictated by the location and use intensity of a site (Roggenbuck & Watson 1993). While analogous trends can be identified among various units of preserved federal wilderness, it is more important for current managers to investigate the current visitor use preferences at their specific site, and observe the level of use the wilderness under their jurisdiction is receiving (Dawson & Hendee 2008). This can both help maintain principles of wilderness character, and maximize experiential opportunities that can be sought out within a specific Wilderness Area (Hammit et al. 2015).

Influence of Wilderness Management on Experience

While appropriate frameworks and management techniques can be devised with the visitor's best intentions at heart, managers oftentimes concern themselves with how to effectively implement these practices and remain cautious of how they may influence the attitudes and experience of wilderness users (Dawson & Hendee 2008). Management actions regarding wilderness are categorized as either direct or indirect. Direct management refers to forcefully manipulating the behavior visitors by imposing regulations like stay and party size limits. Conversely, indirect focuses more on affecting the decision making factor of visitors, and influences the psychology and behavior of wilderness users. Indirect management strategies are characterized most times by techniques such as informative signage or brief educational talks given by rangers or agency personnel (Manning & Lime 2000). A sort of continuum is created from the establishment of these two forms of action, with both leading to a possible unobtrusive or obtrusive experience. The action that is actually being undertaken by managers is oftentimes the determiner of the effect on visitors (McCool & Christensen 1996).

Despite there being a postulated gradient to which management actions influence experience, there are key management activities that commonly have had effect on visitor behavior. These effects, however, have not been uniform among all wilderness areas, but some common trends still can be identified.

Regulations on recreation use always gather attention when studying wilderness areas. These regulations vary within different agencies and individual sites, and the acceptance or tolerance of these regulations is what concerns most wilderness social scientists (Hammit et al. 2015). Regulations are useful when resource degradation becomes problematic, such as trail and campsite damage. Experiential preferences are also considered for visitors when regulations are being devised and managers impose restrictions such as group size and stay limits with the intention of preserving the elements of solitude and primitive recreation defined in the Wilderness Act (Lucas 1983).

In a visitor survey analysis of various wilderness areas in the state of Oregon, researchers found that most visitors supported or were at least tolerant of regulations set in place by managers. Support was most oftentimes conceived when the regulations were benefiting elements of wilderness experience, or was in the interest of a special user group (Schindler & Schelby 1993). Similar results were found in the BMWC surveys of 1972 and 1980, with visitors more cognizant of regulatory site improvements that influenced perceived changes in the areas quality. This same study saw support for regulatory controls that were set in place for group sizes restrictions and stay limits, although neither of these two pieces seemed to have a significant negative effect on experiential quality. Presence of agency personnel, whether they were conducting maintenance or patrolling and enforcing policy, were also seen as desirable in the BMWC in both the 1970 and 1982 (Lucas 1985). These factors did not change significantly

when the study was revisited in 2003 and 2004 (Whitmore et al. 2005). In a study encompassing the BMWC in comparison with other wilderness areas within the United States, group size and stay limit regulations were of no concern for most visitors, however, dissatisfactions commonly were found in neglected trail conditions or lack of appropriate backcountry developmental features such as signs and waypoints (Lucas 1980). Ultimately, regulations tend to typically be tolerated by most visitors, and never seem to be a significant influencer on the overall quality of wilderness recreation experience (Monz et al. 2000). However, it is important to note that while many studies may not reveal results displaying influence on satisfaction, one should not ignore that tolerance does not equal preference. Just because regulations exist, and visitors comply, does not always mean that this is a preferred means of management (Hammit et al. 2015).

Regulations influence management frameworks such as carrying capacity and LAC, and are therefore established to create some sort of desired condition. This may be lowering probability of group encounter or reduced crowding in popular areas that could be suffering environmental degradation due to overuse. Therefore, when looking at past wilderness studies it is important to note visitor attitudes not just to the regulatory mandates set forth by agencies, but to the actual experience they are having. For example, if a group size limit regulation is put in place this may not mean that wilderness visitors will not see large groups of individuals in areas in which they are traveling in. This is when indirect methodologies can be more important, as managers advocate lesser known

areas in order to relieve stress on higher use areas where carrying capacity is being exceeded and too much resource change is occurring. The direct management solutions, such as closing a site or issuing limited permits to certain areas, become unpopular and are only useful when giving reasoning that is understandable to some recreationists (Manning and Lime 2000).

Visitors within high use wilderness areas in Oregon and Washington oddly enough advocated less restriction and regulations to ameliorate these issues, claiming that free choice is of greater importance to wilderness users than not seeing other people. This trend was reversed, however, when visitors were asked about these variables affecting resource and ecological conditions at the site. Visitors were much more supportive of regulations when they safeguarded the natural environment of a site, valuing this component more than recreation experience (Cole & Hall 2008). Recreation regulations may be one of the most significant management implementations carried out by wilderness managers, as well as one of the easiest to quantify through various methodologies. Other high profile management activities exist however, evoking strong public attention, especially among recreationists.

Outside recreation regulations, management of fire in protected wildlands has always gathered attention on the national level. Few studies exist that gauge recreationist's perception toward fire in wilderness, but conditions during the 2003 and 2004 surveys of the BMWWC allowed for some noteworthy observations.

Following the 2003 fires in northwestern Montana, researchers found that recreationists still held a positive view of prescribed natural fires in wilderness, regardless of the large acreages burned during the previous year. Overall support for natural fires was further found to be much higher than it was during the 1972 and 1980 study (Borrie et al. 2006). When similar studies were conducted in various other wilderness areas throughout Idaho, Washington, and Oregon, similar trends were found with visitors generating larger support for the use of fire as a management tool in wilderness (Knotek 2006). While some of these studies still find these positive attitude trends toward fire, it is important to note that human prescribed fires are still seen at times undesirable for overall character of a Wilderness Area. Such actions have risk of disturbing the untrammelled elements set forth by the Wilderness Act, and are therefore not oftentimes as supported (Knotek et al. 2008).

Another popular issue that has arisen among visitors in their attitudes towards management is non-native fish stocking programs that historically have been conducted in some wilderness areas. Some wilderness areas received fish stocks in lakes where fish previously did not exist. This was done with good intentions to restore desired species, or attract visitors (Landres et al. 2001). To restore sites to their historical fidelity and naturalness, widespread programs have been launched by wilderness managers in order to terminate non-native fish stocks. For example, non-native trout were stocked historically in Sunburst Lake, a popular backcountry water body that sits below the iconic Swan Peak. A

recent operation saw that this lake was treated with a piscicide, and restocked with native trout species. This operation was due to trepidations of the non-native trout escaping through the log jam at outlet of the lake, passing through Gorge Creek, and finally entering the South Fork of the Flathead River. Overall these actions are seen with support by the public, with fishermen mustering some of the loudest members speaking against non-native fish stocking and restoration of backcountry water bodies. As mentioned in the example of Sunburst Lake, this is driven by fear of inbreeding within species, and corruption of native fish populations (Knapp et al. 2001).

Wilderness Experience & Preference

While it is important to consider the effects of management actions on experience, wilderness social scientists must also study the attributes of wilderness experience itself, taking into consideration what are the preferences motives and desires of visitors and discerning what constitutes a high quality experience. Managers are oftentimes challenged by this because they feel as if they must manage for their visitors, but at the same time must abide by the Wilderness Act's constraints for safeguarding a "primitive and confined form of recreation" (Cole & Williams 2012). On the other hand, one can see how more direct management may conflict with the desired experience desired by wilderness visitors. In order to attain a balanced management approach,

experiential preference must be understood, and guide but not dictate management frameworks (Dawson and Hendee 2008).

In defining wilderness experiences, one must look at the characteristics and nature that comprise these types of experiences. In some studies, wilderness experience has been viewed as a discrete event where visitors knew what was expected, or what was going to occur during their visit. Other views have seen wilderness experience as a prolonged instance, almost as if creating relationship or connectedness to a place. A third popular view is experience as an emergent opportunity, where visitors are ignorant of what would happen if they chose to engage in wildland recreation or use (Cole 2012).

As alluded to previously, if wilderness is a discrete experience then visitors will know what will be expected, or what could potentially happen during their trips. This brings up the question, however, of what are the motives behind a wilderness experience? Why do recreationists go to Wilderness for experience in the first place? In comparing various sources of research, Cole (2012) suggest that wilderness areas provide an opportunity for multiple goal attainment, and that visitors oftentimes can achieve multiple desired objectives when recreating in these types of wildlands. While this is helpful, it still does not aid in the understanding of why wilderness drives a recreationist to within its boundaries. In a recent study of various wilderness areas in Washington and Oregon, commonly scored motivation scale items referred to closeness to nature, being away from

crowds, sense of being away from the modern world, freedom, remoteness, and sense of challenge ranked as some of the top motivators for wilderness experience (Cole & Hall 2008). All of these motivators seem to fall in line with the mandates set forth by the Wilderness Act of creating opportunities for “primitive and unconfined types of recreation.” Recreationists interested in wilderness tend to gravitate toward this idea of unconfined and primitive, allowing these to be among the chief motivators for their experiences (Borrie 2004). This notion is further reinforced by Cole and Hall (2008), who suggested that despite areas that see heavy visitation and visitors who testify that this may take away from their wilderness experience, sacrificing the unconfined and primitive attributes is always seen as undesirable when suggested to visitors. The two authors go forth to propose that motivations in wildlands are dynamic, and that the visitors are an adaptable group while recreating in wilderness.

Although wilderness experience may be in fact motivation based, it is oftentimes true that visitors are not mindful of the experiences they will have and cannot define experience until the trip has been completed. These wilderness experiences can be labeled as experience based or lived experiences (Cole 2012). The early works of Clawson and Knetsch (1966) explain recreation as a complex experience with many different steps. This may include planning, travel to location, participating in an activity, then concluding and returning to home. While this likely holds true for most recreation areas, little work has been done to look deeper into individual steps, and observe the phases of experience that

occur during the actual event (Borrie and Birzell 2001). One of the early studies to investigate this notion was Hull (1992), who examined the mood of hikers in the Maroon Bells-Snowmass Wilderness in central Colorado. Fifteen check-in stations were positioned in the wilderness, and visitors reported to each, disclosing mood and perception of scenery. The results were stochastic, with visitors having various moods at various waypoints. These differences were proposed to be due to differing scenic quality at each check in, causing a variance in perception. This however, did not correlate to mood, leaving the question of if scenery affected mood or if mood affected perception.

Managers cannot always completely capture the complex multiphasic elements of wilderness experience, and must rely on other means of capturing and understanding this concept of lived experience. In their analysis of experience-based approaches, Borrie and Birzell (2001) suggest questioning either during the immersion event or during the experience, or after the experience has occurred. They additionally argue that a visitor must be allowed to describe their experience, as opposed to simply describing elements such as quality of scenery. Compiled together, this strategy is thought to be less cognitively demanding and enables visitors to respond in a closer period in regard to the experience itself, giving less biased results. These concepts were applied to the Okefenokee Wilderness in Georgia by Borrie and Roggenbuck (2001). They found that visitors were more attentive toward the environment and introspection, especially when asked at the conclusion of their experience as

opposed to first entry. It was also noted that when asked in the middle of their experiences, visitors reported higher scores on humility and primitiveness. Wilderness experience can sometimes be more than just a lived experience or a goal oriented challenge. There are times when visitors report creating a connection to a place, or the formation of a relationship to a certain landscape (Cole 2012). An exhaustive amount of literature approaches empirically observing these connections, however such studies would go beyond the scope of this study.

Previous Studies in the BMWC

Lucas (1985) conducted one of the first and original popular projects in the BMWC. In his study, Lucas compared data amassed from a survey that was administered at 34 trailheads in the BMWC during the summer use season in the years 1970 and 1982. He aimed at comparing the data between the two years in order to draw new conclusions about visitors to the BMWC, and build on at that time new methodologies being explored within the realm of wilderness social science.

To distribute the survey, field workers engaged visitors that were either leaving or entering the BMWC. Contacted visitors were asked of their method of travel and whether or not they had crossed wilderness boundaries. Addresses were also collected so that a follow-up mail in questionnaire could be delivered. In addition to personal contact, deployable registration stations were set up at

various trailheads with information explaining the study to curious visitors.

Wilderness users would fill out the required documents, and leave them at the register to be picked up by field workers.

The second well known study conducted within the BMWC was conducted by Borrie et al. during the 2003 and 2004 summer use season. The goal of this study was to revisit Lucas (2004), using at the time, up to date techniques in wilderness social science to make a comparison between the 1970s, 80s, and the new millennia. This study was never intended to last for two years, but due to large wildfires within the BMWC during 2003, the study was postponed until 2004.

Almost half as many trailheads were surveyed in this study as compared to the 34 by Lucas (1985). These included: Bear Creek, Beaver Creek, Benchmark, Gibson Reservoir, Headquarters Pass, Indian Meadows, Middle Fork Teton River, Monture Creek, Morrison Creek, North Fork, Blackfoot River, Owl Creek, Pyramid Pass, and South Fork of the Flathead River. Visitors entering or exiting the wilderness were surveyed, with visitors needing to be at least 3 hours in the wilderness to qualify as a participant. These trailheads were sampled for four-day weekday blocks, and three-day weekend blocks. A six hour contact period was established between the hours of 8 AM and 8 PM (Borrie et al. 2

CHAPTER 3

METHODOLOGY

Site Description

The BMWC is a large continuous parcel of land encompassing three federal wilderness areas: the Great Bear, Bob Marshall, and Scapegoat. Altogether, the complex covers more than 1.5 million acres. Three national forests are responsible for managing and administering the BMWC: the Flathead, Helena-Lewis and Clark, and Lolo. Of these three forests, five ranger districts control the interior of the complex: Hungry Horse Glacier View and Spotted Bear in the Flathead, Rocky Mountain and Lincoln in the Helena-Lewis and Clark, and Seeley Lake in the Lolo.

Numerous trailheads or entry portals permit access into the BMWC, with some experiencing heavy traffic while others little to no visitation. With the latter point in mind, previous surveys were careful to identify entry portals with higher visitation. These surveys examined 14 to 30 of these trailheads, depending on amount field workers provided. For this survey, due to lack of resources and time, fewer trailheads were utilized.

Areas of Interest

The areas of interest for the new surveys consisted of a total of eight trailheads in the BMWC. These survey areas included Meadow Creek, Silvertip, Morrison Creek, South Fork Sun (Benchmark), North Fork Blackfoot, Monture Creek, Pyramid Pass, and Holland Lake/Owl Creek Trailheads. These trailheads were selected based upon recommendation of forest managers, as well as anecdotal evidence of high use noted by the research team in previous summer work seasons. By focusing survey solicitation at these trailheads the researcher hoped that visitor encounter rate would be maximized to provide an adequate sampling pool of respondents. (Figure 2).

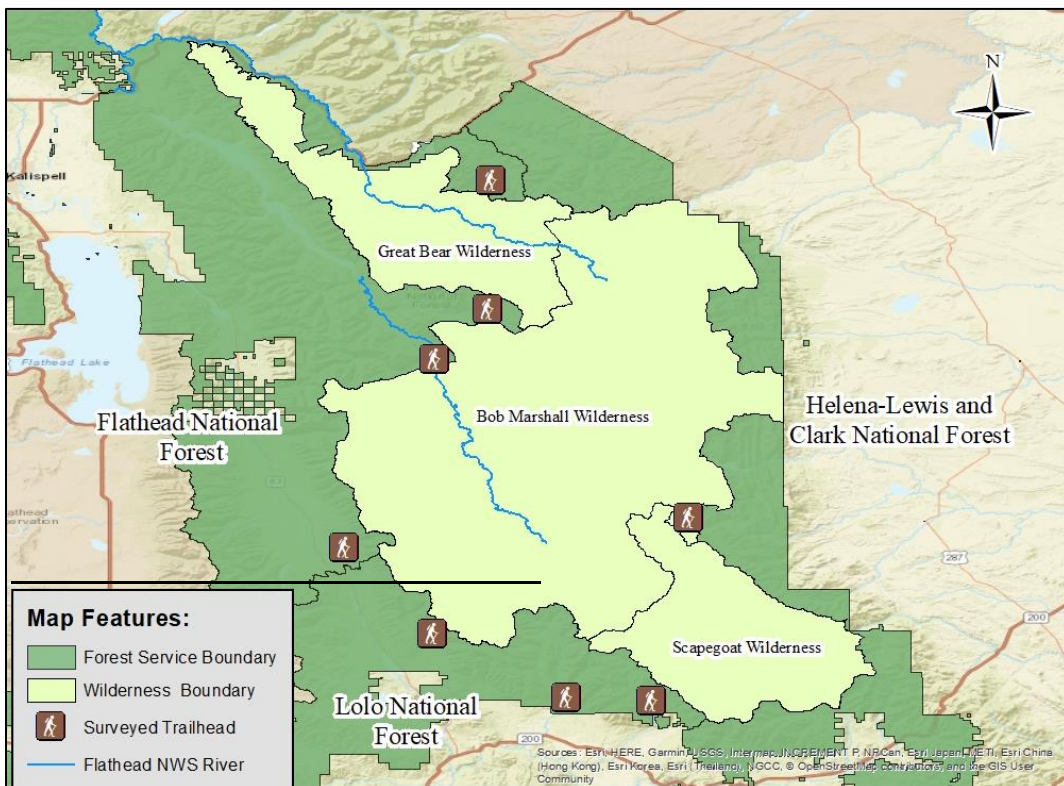


Figure 2. Map of the Bob Marshall Wilderness Complex with indicated locations of trailheads surveyed.

Data Collection

Surveys were administered during the beginning of the 2018 summer use season at the selected trailheads. Onsite data collection took place between the dates of June 1st and August 2nd, 2018. A team of researchers worked eight day on and three day off blocks that systematically circumvented the boundary of the BMWC and surveyed identified trailheads accordingly. At each trailhead, researchers were posted near the main trail access point, and solicited visitors as they are entering or exiting. Researchers spent an eight hour time block at each trailhead, actively surveying from 8 AM to 4PM. This process was repeated for a total of six blocks, with three blocks being modified in the early season due to limiting site conditions present in June and early July. Overall, 48 survey days were completed.

Three data collection methods were developed and utilized for this study. The first was a physical onsite survey for visitors to complete. To qualify for the onsite survey, visitors must have spent no less than three hours beyond the wilderness boundary, and must have been of 18 years of age or older. The former of these two requirements was a standard established in previous surveys, and included likewise in this study. The onsite survey inquired of visitor's basic demographics, previous experience in wilderness, and notable factors that influenced the planning of their trip. Participants were given a survey by hand unless they requested to complete the survey verbally, which in this

case responses were recorded by the researcher. The onsite survey took an average of three minutes to complete, and voluntary. If the survey was declined, a non-response data collection form was then used to record at least pieces of visitor information that could be gained by visual observation such as group size, perceived user type, and group characteristics.

Following the completion of the onsite survey, visitors were prompted to voluntarily provide their email address for a follow up online survey. This survey was much more extensive than the onsite questionnaire and posed questions that pertained to the elements of trip experience, length of stay, perceived management actions and influences, and trip satisfaction. The online survey was administered using Qualtrics Survey Software, and took on average 10 minutes to complete. Online surveys were additionally sent no earlier than three weeks following the onsite questionnaire in effort to minimize the lapse in time between the visitor and their wilderness trip. Reminders were also sent one week following the initial request to better ensure completion of the online survey.

Study Plan and Schedule

The schedule used for surveying during the summer 2018 use season in the BMWC is shown below in Table 1. A total of six blocks of eight days was created for the study, with the first three blocks being modified due to site limitations. During the modified blocks, researchers spent one day at Meadow Creek and Silvertip Trailheads, three days at South Fork Sun Trailhead and three

days at North Fork Blackfoot Trailhead. Block three was adjusted further due to the access roads to South Fork Sun Trailhead being washed out by a significant precipitation event that occurred. In this block, three days were spent at Pyramid Pass Trailhead.

In the remaining three blocks, all eight trailheads were surveyed, with researchers being present at a new trailhead every day. The order of these trailheads were: Meadow Creek, Silvertip, Morrison Creek, South Fork Sun, North Fork Blackfoot, Monture Creek, Pyramid Pass, and Holland Lake. It should be noted that the Holland Lake trailhead was surveyed at two separate sites: Holland Lake Trailhead and Owl Creek Packer Camp. Researchers split up at these trailheads, with one researcher being at Holland and the other at Owl Creek. Surveys done at these trailheads were still counted as the same site, because trails originating from these access points eventually terminate at a common junction that allows access to the BMWV. The reason for splitting these sites was due to the fact that the Holland Lake Trailhead restricts horse use, and Owl Creek Packer Camp as a result was the primary access point from this location for that form of recreation use.

Table 1. Schedule for the 2018 survey season in the BMWC

	Date	Location
Block 1	6/1/2018	Meadow Cr. Trailhead
	6/2/2018	Silvertip Trailhead
	6/3/2018	South Fork Sun Trailhead
	6/4/2018	South Fork Sun Trailhead
	6/5/2018	South Fork Sun Trailhead
	6/6/2018	North Fork Blackfoot Trailhead
	6/7/2018	North Fork Blackfoot Trailhead
	6/8/2018	North Fork Blackfoot Trailhead
Block 2	6/12/2018	Meadow Cr. Trailhead
	6/13/2018	Silvertip Trailhead
	6/14/2018	South Fork Sun Trailhead
	6/15/2018	South Fork Sun Trailhead
	6/16/2018	South Fork Sun Trailhead
	6/17/2018	North Fork Blackfoot Trailhead
	6/18/2018	North Fork Blackfoot Trailhead
	6/19/2018	North Fork Blackfoot Trailhead
Block 3	6/23/2018	Meadow Cr. Trailhead
	6/24/2018	Silvertip Trailhead
	6/25/2018	North Fork Blackfoot Trailhead
	6/26/2018	North Fork Blackfoot Trailhead
	6/27/2018	North Fork Blackfoot Trailhead
	6/28/2018	Pyramid Pass Trailhead
	6/29/2018	Pyramid Pass Trailhead
	6/30/2018	Pyramid Pass Trailhead
Block 4	7/4/2018	Meadow Cr. Trailhead
	7/5/2018	Silvertip Trailhead
	7/6/2018	Morrison Cr. Trailhead
	7/7/2018	South Fork Sun Trailhead
	7/8/2018	North Fork Blackfoot Trailhead
	7/9/2018	Mounture Cr. Trailhead
	7/10/2018	Pyramid Pass Trailhead
	7/11/2018	Holland Lake/Owl Cr. Trailhead
Block 5	7/15/2018	Meadow Cr. Trailhead
	7/16/2018	Silvertip Trailhead
	7/17/2018	Morrison Cr. Trailhead
	7/18/2018	South Fork Sun Trailhead
	7/19/2018	North Fork Blackfoot Trailhead
	7/20/2018	Mounture Cr. Trailhead
	7/21/2018	Pyramid Pass Trailhead
	7/22/2018	Holland Lake/Owl Cr. Trailhead
Block 6	7/26/2018	Meadow Cr. Trailhead
	7/27/2018	Silvertip Trailhead
	7/28/2018	Morrison Cr. Trailhead
	7/29/2018	South Fork Sun Trailhead
	7/30/2018	North Fork Blackfoot Trailhead
	7/31/2018	Mounture Cr. Trailhead
	8/1/2018	Pyramid Pass Trailhead
	8/2/2018	Holland Lake/Owl Cr. Trailhead

Data Analysis

For the onsite data, descriptive analyses were conducted on the demographics for both the recorded recreation user type groups and variables collected pertaining to factors influencing wilderness trip preference. Appropriate tests on this survey were then performed out with regards the goals and objectives of this study. One-way Analysis of Variance (ANOVA) tests were performed to detect potential statistical significant relationships between user group types and trip preferences, motivators for visiting wilderness, and motivators for visiting certain trailheads. In addition, mean differences in trip preferences and age was analyzed with a one-way ANOVA. An independent samples t-test was lastly was carried out to detect possible statistical significance between previous wilderness experience, trip preferences, motivators for visiting wilderness, and motivators for visiting a specific trailhead. Alpha level (α) was set at 0.05 when determining statistical significance for these tests.

Collected online data were imported from Qualtrics into IBM SPSS Statistics Version 25 for data management and analysis. From here, the data were cleaned and organized, and descriptive analyses were conducted on both demographics as well as questions regarding preference toward certain wilderness management items. Univariate and multivariate analyses were also performed on variables regarding trip and group characteristics.

Limitations

While creating a sound methodology that contributed to the highest quality data was prioritized, working in an outdoor environment sometimes creates challenges and limitations that cannot be planned for and therefore have to be mitigated and managed as encountered by researchers. During the summer of 2018, northwestern Montana encountered colder than average temperatures that lingered during the month of June. This delayed the melting of high elevation snows until nearly the end of the month. In addition, the region had experienced an estimated 180% above normal snowfall during the preceding winter. This further increased the length of time necessary for complete snowmelt at higher elevations. The ramification of this was that trailheads providing access to the BMWC via high elevation mountain passes remained unused until nearly early July. As alluded to previously the first three eight day blocks of the summer were modified to focus surveying efforts on trailheads that were actively being used during the early season.

Northwestern Montana also experienced a plethora of large landscape level fires during the summer of 2017, many of which affected the selected high use trailheads and their associated trail networks that provide access to The Bob. These occurrences, combined with constraints of USFS trail work crews in summer 2018, increased the time needed to clear and open trails and trailheads damaged by fire.

In late June northwestern Montana additionally received record rainfall levels, especially along the Rocky Mountain Front which creates the southeastern boundary of the BMWC. These significant precipitation events affected Morrison Creek, South Fork Sun, and North Fork Blackfoot trailheads mainly, with one event closing South Fork Sun for one survey block due to road washouts. As alluded to previously, schedules were modified in order to focus capturing efforts at trailheads that were still being used during these times

CHAPTER 4

RESULTS

Demographics-Onsite Data

Of the total group observations made at BMWC trailheads (n=209), 183 (87.6%) individuals agreed to take the onsite survey. Almost 70% of these indicated they were male. All of the respondents identified as non-Hispanic or Latino, and all but one identified as white. The range of ages for respondents varied from 18 to 77 years. The median age of all onsite respondents was 40 years and mean age 43.2 years (SD=15.4 years) (Figure 3). Amongst those who agreed to take the survey, 34.4% carried a graduate degree, 39.3% a bachelor's degree, 15.3% only some college experience, and 10.9% had a high school education or less.

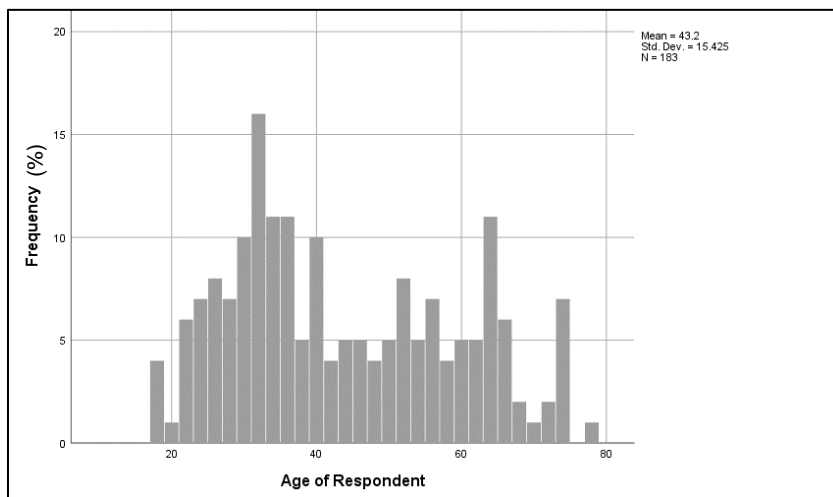


Figure 3. Distribution of ages for onsite respondents in the Bob Marshall Wilderness

Overall, a majority of the respondents presented themselves as white males between the ages of 25 and 40 years old carrying a bachelor's or more advanced degree. This is consistent with previous findings within the BWMC, as well as other surveys done within wilderness areas North America (Borrie & McCool 2007; Lucas 1980). These parallels will be further elaborated on in the following chapter.

Group and Visitor Characteristics-Onsite Data

The majority (64.6%) of user groups were observed to be hikers with the next largest group being paddlers and rafters (19.6%) (Figure 4). Average group size was 2-3 individuals with maximum group size being over seven individuals and minimum being solo travelers. Overall, 77% observed wilderness users spent a night or more in the backcountry, leaving 23% as day users.

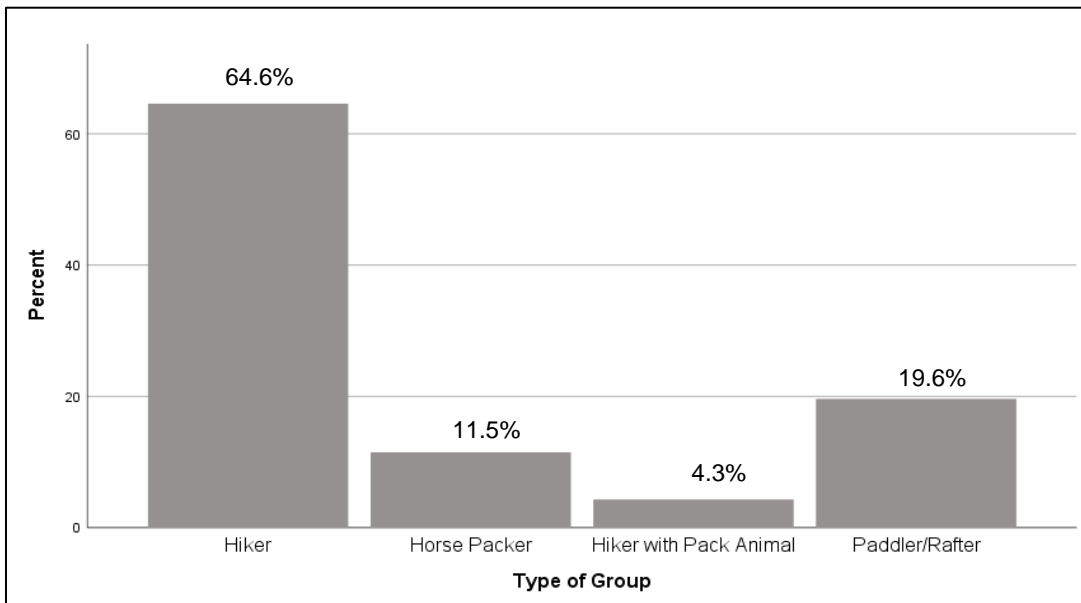


Figure 4. Distribution of user types for onsite respondents in the Bob Marshall Wilderness Complex

This is unsurprising, as being federal wilderness area, the nature of many trips taken to the BMWC tend to be multiple days.

When gauging previous wilderness experience among onsite survey respondents, a majority (86.4%) reported having prior experience in federal wilderness areas. Of these, over half of the cases visited the Scapegoat Wilderness (62.1%), a little less than half the Bob Marshall Wilderness (46.7%) and about a quarter the Great Bear Wilderness (28.6%). A little under a third (31.9%) of the respondents had never before been to the BMWC. Many individuals visiting The Bob typically have previous experience traversing some part of the complex previously. Researchers observed that many visitors were local citizens from Montana themselves, which lead one to believe that they would already have had exposure or experience to The Bob (Table 2).

Table 2. Visitors who had previously visited a portion of the BMWC

Wilderness Area	n	Percent of Response	Percent of Cases
Bob Marshall	113	36.7%	62.1%
Scapegoat	85	27.6%	46.7%
Great Bear	52	16.9%	28.6%
Never visited BMWC	58	18.8%	31.9%
Total	308	100.0%	169.3%

Visitors were posed with a list of factors that could have influenced their wilderness trip, given the option of not important (1), somewhat important (2), and very important (3). Users reported on average finding natural place ($\bar{x} = 2.87$), finding remoteness ($\bar{x} = 2.87$), and finding scenic beauty ($\bar{x} = 2.93$) to be the most important. Finding opportunity for quality river ($\bar{x} = 2.51$) and fishing ($\bar{x} = 2.11$) experiences was also important to some visitors, as well as exploring a new area ($\bar{x} = 2.37$). Recent occurrence of wildfire ($\bar{x} = 1.51$), opportunity to test outdoor skills ($\bar{x} = 1.80$), familiarity with the area ($\bar{x} = 1.55$), and suggestions from family and friends ($\bar{x} = 1.92$) were the lowest reported factors to influence the visitor's wilderness trip (Table 3). The top three most important aspects to visitors are basic elements of wilderness character and desired conditions that help promote the experiences sought in wilderness. What is interesting, however, is the relatively high standard deviations that exist among the next three variables. While many of the means fall into the "somewhat important" category, greater variances exist here to suggest less uniformity of participant response. This is likely due to these factors highly depending upon user ambition and motivations for visiting wilderness. The same can be said for the four lowest scoring variables. This will be looked at more in depth with analysis of variance testing later in this chapter, as well as in the next chapter.

Table 3. Influencing factors in a visitor's wilderness trip

Factor	n	Mean	Standard Deviation
Scenic Beauty	182	2.93	0.26
Natural Place	181	2.87	0.36
Remoteness	181	2.87	0.37
Quality River Experience	182	2.51	0.67
Exploring a New Area	178	2.37	0.70
Quality Fishing Experience	180	2.11	0.87
Suggestion of Family or Friend	175	1.92	0.83
Testing Outdoor Skills	182	1.80	0.74
Familiarity with the Area	182	1.55	0.76
Recent Occurrence of Wildfire	181	1.51	0.63

When visitors were posed with why they were visiting the BMWC, a majority of cases (63.7%) sought to participate in a specific type of recreational activity. A little over a quarter of cases (28.0%) made mention of seeking after some attribute of wilderness character such as remoteness, solitude, or primitive conditions. The remaining cases made various other commentary of their reason for visiting, such as looking for prospective hunting grounds in the fall, knowing the area, being recommended by family or friends, and seeking a specific destinations within the wilderness. (Table 4).

Table 4 Motivators for visiting the BMWC

Motivator	n	Percent of Responses	Percent of Cases
Activity Focused	116	56.9%	63.7%
Wilderness Character	51	25.0%	28.0%
Specific Destination	17	8.3%	9.3%
Area Location	9	4.4%	4.9%
Prospective for Future Trips	5	2.5%	2.7%
Recommendation of Family or Friend	3	1.5%	1.6%
Previous Experience	3	1.5%	1.6%
Total	204	100.0%	111.8%

When posed with why they had selected the specific trailhead they were at, a majority (51.7%) of visitors reported that the location of the trailhead was important in their decision. Other cases contained various comments that were somewhat related to the previous question, mentioning conditions such as wilderness character, access to specific destination, suggestion from family or friends, and hazardous conditions at other trailheads (Table 5). It is interesting to observe that despite responses being categorized analogously for these two questions, the nature of the responses seems to shift based upon the subject of the question. When queried about their motivation for visiting wilderness, focus on their activity appears to be the dominant reason. When asked why they visited the specific trailhead, however, over half of the total cases reported making remarks toward the convenience of the trailheads location.

Table 5. Motivators for visiting specific trailheads in the BMWC

Motivator	n	Percent of Responses	Percent of Cases
Area Location	91	47.6%	51.7%
Suggestion of Family or Friend	25	13.1%	14.2%
Wilderness Character	21	11.0%	11.9%
Previous Experience	15	7.9%	8.5%
Activity Focused	13	6.8%	7.4%
Area Conditions	10	5.2%	5.7%
Specific Destination	7	3.7%	4.0%
Ease of Access	5	2.6%	2.8%
Prospective for Future Trips	4	2.1%	2.3%
Total	191	100.0%	108.5%

Group Type and Preference

Among the 10 factors by group type, four influenced visitor's trips, four were found to have a significant difference ($\alpha=0.05$). These factors included natural place ($F(3,177)=3.197$, $p=0.025$), quality river experience ($F(3,178)=7.243$, $p=0.000$), quality fishing experience ($F(3,178)=5.180$, $p=0.002$), and recommendation by friend or family ($F(3,174)=2.911$, $p=0.036$). A post hoc Tukey test further revealed that there was a significant difference ($p=0.013$) in preference toward conditions that promoted natural place between horse packers ($\bar{x} = 2.56 \pm 0.333$) and paddlers ($\bar{x} = 2.95 \pm 0.22$). There additionally was a significant difference ($p=0.001$) in preference toward quality river experiences between hikers ($\bar{x} = 2.42 \pm 0.678$) and paddlers ($\bar{x} = 2.88 \pm 0.331$). Significant differences ($p=0.020$, $p=0.001$) in quality fishing experiences existed between hikers ($\bar{x} = 2.07 \pm 0.870$) and hikers with pack animals ($\bar{x} = 1.22 \pm 0.667$) as well as between hikers with pack animals and paddlers ($\bar{x} = 2.41 \pm 0.774$). Lastly, there was found to be a significant difference ($p=0.029$) within the group friend or family recommendation between hikers ($\bar{x} = 1.88 \pm 0.815$) and hikers with pack animals ($\bar{x} = 2.67 \pm 0.707$).

Within those that preferred a setting promoting natural place, more desire was found among paddlers as compared to horse packers. This is an interesting finding, but it is not entirely certain why paddlers may desire these elements more than horse packers. When looking at those who were pursuing quality river

experiences, favor existed again in paddlers as opposed to hikers. This is clear, however, because not all hikers are seeking a river experience in The Bob. When it came to fishing experiences however, more favor was found among hikers as opposed to hikers with pack animals. There was also greater preference toward rafters as compared to hikers with pack animals. This again makes sense due fishing being a primary motivator for many hikers and paddlers during their trips.

Group Type and Wilderness Motivation

The majority of the nine motivators for wilderness visitation yielded no significant differences when compared type of group. It was found that there was statistical significance only within the group of those who were motivated by reaching a specific destination ($F(3,178)=2.701$, $p=0.047$). A post hoc Tukey test revealed that there was a significant difference ($p=0.039$) between hikers with pack animals ($\bar{x} = 0.330 \pm 0.500$) and paddlers ($\bar{x} = 0.500 \pm 0.218$). This is expected since these two users have a differing motivation for visiting wilderness typically, and are seeking very specific types of experience. Paddlers, for example, may be more destination driven because they are restricted in where they can travel within the complex

Group Type and Trailhead Motivation

When looking at the nine motivators for visiting a specific trailhead, four of them were found to be statistically significant based on type of group. These included groups that were motivated by reaching a specific destination ($F(3,172)=3.901, p=0.010$), seeking certain attributes of wilderness character ($F(3,172)=3.763, p=0.012$), found the location of the trailhead ideal ($F(3,172)=9.438, p=0.000$), and found conditions provided by the specific entry portal favorable ($F(3,172), p=0.001$). A post hoc Tukey test further showed that there was a significant difference ($p=0.017$) in the preference of trailhead selection between destination driven hikers ($\bar{x} = 0.040 \pm 0.200$) and hikers with pack animals ($\bar{x} = 0.250 \pm 0.463$). There additionally was a significant difference ($p=0.048, p=0.005$) between destination driven horse packers ($\bar{x} = 0.000 \pm 0.000$) and hikers with pack animals, as well as between hikers with pack animals and paddlers ($\bar{x} = 0.000 \pm 0.000$). Amongst those who were seeking certain attributes of wilderness character, a significant difference ($p=0.018$) existed between hikers ($\bar{x} = 0.170 \pm 0.380$) and paddlers ($\bar{x} = 0.000 \pm 0.000$). For those who sought the trailhead because of its location, there was a significant difference ($p=0.000, p=0.001$) between hikers ($\bar{x} = 0.440 \pm 0.498$) and paddlers ($\bar{x} = 0.85 \pm 0.366$), as well as horse packers ($\bar{x} = 0.13 \pm 0.354$) and paddlers. Finally for those who sought the trailhead because of ideal site conditions, there was a significant mean difference ($p=0.000, p=0.005, p=0.001$) between hikers ($\bar{x} = 0.04 \pm 0.200$)

and horse packers ($\bar{x} = 0.13 \pm 0.354$), horse packers and hikers with pack animals ($\bar{x} = 0.00 \pm 0.000$), and horse packers and paddlers ($\bar{x} = 0.05 \pm 0.223$).

When looking at these findings, it is noteworthy that hikers with pack animals appeared to be more destination driven based upon their trailhead of choice. This could also be due to the trailhead they were using, because not all trailheads offered ease of loading/offloading stock, so bias could exist for those trailheads having those amenities. Based upon the means, it appears that no horse packing nor paddling group seemed to note destination as their impetus for visiting a specific trailhead. Therefore, the significance found within these pairs tells little. Trailhead preference based upon opportunity to experience an attribute of wilderness character however seemed to be more prevalent among paddlers as compared to hikers. Paddlers were also favored when looking at the convenience of the trailhead's location. This is reasonable since groups pursuing paddling and rafting are very trailhead dependent on their access point in the BMWC. Lastly, it appears horse packers were more concerned with conditions when compared to hikers as well as rafters. Horse packing parties are very dependent on open trail conditions that are free of blowdown or hazards to their stock. Therefore, it is logical to conclude that they would care more for conditions at the trailhead.

Age Groups and Preferences

When testing the means the 10 preferred trip characteristics by age, statistically significant differences emerged between the groups that sought a quality fishing experience ($F(3,178)=2.742$, $p=0.012$), looked to test outdoor skills ($F(3,177)=4.651$, $p=0.004$), and that were seeking a new area to explore ($F(3,178)=3.701$, $p=0.013$). A post hoc Tukey test further revealed that within the group that sought quality fishing experiences, significant ($p=0.006$) mean differences existed between the 25-34 age category ($\bar{x} = 2.22 \pm 0.878$) and the 35-54 age category ($\bar{x} = 2.34 \pm 0.829$). Amongst those seeking to test outdoor skills, significant ($p=0.006$, $p=0.011$) mean differences existed between the 18-24 age group ($\bar{x} = 2.39 \pm 0.608$) and the 25-34 age group ($\bar{x} = 1.60 \pm 0.693$), as well as between the 35-54 age group ($\bar{x} = 1.39 \pm 0.585$), and 55 and older age group ($\bar{x} = 1.45 \pm 0.580$, $p=0.002$). Of those that were looking for a new area to explore, significant mean differences occurred between the 25-34 age group ($\bar{x} = 2.48 \pm 0.641$) and the 55 and older age group ($\bar{x} = 2.10 \pm 0.755$, $p=0.026$).

Overall, it does appear that age of respondent influenced certain preference categories. Testing outdoor skills as a unique comment that only a handful of cases made mention of. Typically these were younger and more inexperienced groups that were eager to use their wilderness experience as a proving ground for new skills they wished to practice. Similarly, middle age respondents tended to be ones that were usually seeking new places to explore

when compared with older cohorts. Differences between the age classes within the group of those seeking fishing experience is expected, but it is interesting to see that middle aged groups did not exceed younger groups by much when comparing their means.

Means were additionally tested between age groups and motivation for visiting wilderness as well as motivators for visiting the specific trailhead; however, there was no statistically significant difference detected between means of these variables.

Wilderness Experience, Motivation, and Preference

When testing the mean differences between previous wilderness experience and the 10 categories of trip preferences there was statistical significance found among four of these categories, including those seeking remoteness ($t(179)=1.020$, $p=0.017$), those who were visiting the area due to familiarity ($t(180)=2.547$, $p=0.012$), those looking to explore an new area ($t(180)=-2.436$, $p=0.016$), and those who were recommended to area by a family or friend ($t(176)=-2.082$, $p=0.039$) (Table 6). This is expected since less experienced wilderness users were likely recommended their trip by family or friends, or had personal motivations for visiting a new area. Additionally, many comments were made by hikers deferred from the neighboring Glacier National Park, who made mention of the BMWC offering better opportunities for desirable recreation conditions.

Testing the relationship between previous wilderness experience and the nine categorized motivators for visiting wilderness yielded significant mean differences amongst groups that were destination driven ($t(180)=-1.982$, $p=0.049$) and those who were recommended to visit by a friend ($t(180)=-2.725$, $p=0.007$) (Table 7). Similar to previous comments, reported inexperienced users were typically the ones attracted to The Bob for its iconic locations. In addition, recommendations also likely played a part for inexperienced users who were looking where to recreate in the complex.

Table 6. Independent samples t-test results between factors that influenced a visitors trip and previous wilderness experience

Factors	t	df	Sig. (2-tailed)
Testing Outdoor Skills	2.547	180	0.012*
Familiarity with the Area	-2.436	180	0.016*
Natural Place	2.398	179	0.017*
Recent Occurrence of Wildfire	-2.082	176	0.039*
Scenic Beauty	1.020	179	0.309
Quality River Experience	0.524	180	0.601
Quality Fishing Experience	-0.465	178	0.643
Suggestion of Family or Friend	-0.282	179	0.778
Remoteness	0.178	180	0.859
Exploring a New Area	-0.062	180	0.950

*Statistical significance at $\alpha=0.05$

Table 7. Independent samples t-test results between driving factors for visiting wilderness and previous wilderness experience

Factors	t	df	Sig. (2-tailed)
	-		
Area Location	2.725	180	0.007*
	-		
Specific Destination	1.982	180	0.049*
Prospective for Future Trips	1.441	180	0.151
Previous Experience	1.226	180	0.222
Activity Focused	0.902	180	0.368
Recommendation of Family or Friend	0.694	180	0.489
	-		
Wilderness Character	0.475	180	0.635

*Statistical significance at $\alpha=0.05$

When previous wilderness experience was tested against motivation for visiting a trailhead, no statistical significance between means could be detected. This is not unreasonable for as seen previously, a majority of respondents selected their trailhead due to proximity and ideal location. With this point in mind, many respondents likely did not weigh their experience into their decision for selecting their access point into The Bob.

Demographics-Online Data

A total of 147 respondents agreed to participate in the online survey, and gave their emails at the conclusion of their participation in the onsite questionnaire. Of these 147, 74 (50.3%) submitted a survey online. Within those that submitted an online survey, 16 did not either fully complete the survey or

provide sufficient response that could be used as data. Therefore, only 58 surveys were accepted as complete. This yielded a final response rate to the online survey of 39.5%

Of those these completed usable surveys, 60.3% identified as male and 39.7% identified as female. All of these respondents further identified as white, and of non-Latino or Hispanic origin. The median age of online respondents was 41 years and mean age 42.9 years (SD=13.7 years) (Figure 4). Among those who took the online survey, almost three quarters (70.7%) carried at least a bachelor's degree. These findings are almost analogous with the onsite data, and further show that a majority of those visiting the BMWC were educated white middle aged individuals.

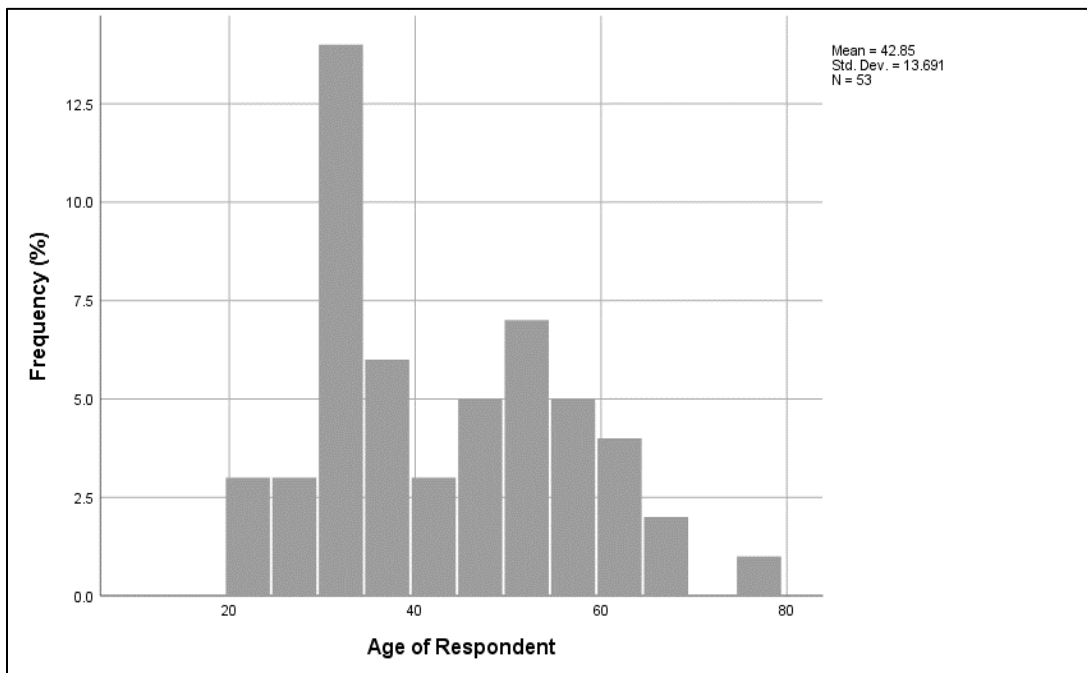


Figure 5. Distribution of ages for online respondents in the Bob

Group and Visitor Characteristics-Online Data

When looking at the mode of travel on their wilderness trip, almost half of all responses (46.3%) identified as backpackers, nearly a quarter (23.2%) day hikers, and the remaining additionally or alternatively answering as packrafters, horse packers, utilizing some other form of water craft, or other form of identified travel (Table 8).

Table 8. Types of travel in the BMWC

Group Type	n	Percent of Responses	Percent of Cases
Backpacker	38	46.3%	65.5%
Day Hiker	19	23.2%	32.8%
Packrafter/Paddler	12	14.6%	20.7%
Horse Packer	10	12.2%	17.2%
Other Watercraft	2	2.4%	3.4%
Other Travel	1	1.2%	1.7%
Total:	82	100.0%	141.4%

Upon being asked what sorts of activities visitors participated in during their trip, over a quarter (28.9%) of all responses answered hiking, another quarter taking photos (26.6%), and the remaining half within the various other activities that were of selection (Table 9). These observations are similar to with onsite findings, seeing hiking as the primary form of recreation activity they prefer. Taking pictures additionally proved to be popular, and oddly enough was followed by hunting. Though the summer use season does not see such activity legally, many hikers and recreationists used this time to scout new territories for

the fall. Observing visitor's previous experience in wilderness, nearly half of all responses (45.2%) had visited the Scapegoat, a little under a third (31.0%) the Great Bear, over a sixth the Bob Marshall (16.7%), and the remainder never visiting before visiting the BMWC (7.1%) (Table 10). Visitors also tended to travel with family (45.6%) or friends (41.2%) when recreating in complex (Table 11).

Table 9. Types of activities in the BMWC

Activity	n	Percent of Responses	Percent of Cases
Hiking	50	28.9%	86.2%
Taking Pictures	46	26.6%	79.3%
Hunting	22	12.7%	37.9%
Rafting	20	11.6%	34.5%
Other Activity	13	7.5%	22.4%
Horse Packing	10	5.8%	17.2%
Foraging	9	5.2%	15.5%
Nature Watching	2	1.2%	3.4%
Fishing	1	0.6%	1.7%
Total	173	100.0%	298.3%

Table 10. Visitors who have previously visited a portion of the BMWC

Wilderness Area	n	Percent of Responses	Percent of Cases
Scapegoat	38	45.2%	80.9%
Great Bear	26	31.0%	55.3%
Bob Marshall	14	16.7%	29.8%
Never visited BMWC	6	7.1%	12.8%
Total	84	100.0%	178.7%

Table 11. Types of groups for online survey respondents in the BMWC

Travel Type	n	Percent of Responses	Percent of Cases
Traveled With Family	31	45.6%	53.4%
Traveled with Friends	28	41.2%	48.3%
Traveled Alone	4	5.9%	6.9%
Other	3	4.4%	5.2%
Traveled with Formal Party (Boy Scouts/Guided/etc)	2	2.9%	3.4%
Total:	68	100.0%	117.2%

When asked what sorts of information sources they utilized to plan their wilderness trip, over a quarter (27.5%) of all cases were recommended by friend or family, a fifth (20.2%) had already had utilized previous experience in The Bob, and the remaining half noted other sources of information such as websites or social media, guidebooks, or USFS resources (Table 12). It appears that visitors commonly referred to family or friends when planning their trip, and many additionally showed to already have previous experience guiding them in their trip decisions. It is alarming, however, to see that the lowest information resources reported utilized were those provided by the USFS. These observations will be looked at closer in the following chapter.

Table 12. Informational sources utilized by visitors utilized in their wilderness trip planning

Information Source	n	Percent of Responses	Percent of Cases
Family or Friend Recommended	30	27.5%	51.7%
Previous Experience	22	20.2%	37.9%
Viewed a Separate Webpage/Social Media Posting	15	13.8%	25.9%
Guidebook	14	12.8%	24.1%
Other Source	10	9.2%	17.2%
Contacted a USFS Office	9	8.3%	15.5%
Viewed a USFS Webpage/Social Media Posting	8	7.3%	13.8%
Obtained No Information Prior	1	0.9%	1.7%
Total	109	100.0%	187.9%

Visitor Perceptions toward Management

A list of items was presented to visitors through the online survey that inquired of their preference toward management, regulation, or developments within The Bob. Visitors answered whether or not the proposed item was undesirable (1), neither desirable nor undesirable (2), and desirable (3). Visitors were first asked their preference toward management activities. Of the 10 management activities listed, the most desired, on average, appeared to be an established guidebook ($\bar{x} = 2.91$), closing some areas off to horse users ($\bar{x} = 2.58$), leaving some areas with no trails ($\bar{x} = 2.51$), and presences of rangers in the wilderness ($\bar{x} = 2.50$). The remaining six factors all fell within a neutral category of neither being desirable nor undesirable (Table 13). In terms of management, visitors seem to overall feel strongly mostly about limiting horse use, as well as

are interested in the creation of an informational publication. Anecdotally, it can be affirmed that desire to encounter wilderness rangers is also a desired condition by visitors based upon interactions in previous use seasons. Standard deviations were relatively high as well for some of these responses, and many were likely based heavily upon type of use and other motivators not captured in this study.

Table 13. Perception of visitors toward wilderness management activities

Management Activity	n	Mean	Standard Deviation
A Guidebook for the Wilderness	55	2.91	0.29
Closing Some Areas to Horse Use	55	2.58	0.69
Leaving Some Areas With No Trails	55	2.51	0.69
Rangers in the Wilderness	54	2.50	0.69
Establishment of High Standard Trails	56	2.43	0.63
Establishment of Low Standard Trails	54	2.22	0.63
Using Chainsaws to Clear Downed Trees	54	1.91	0.81
Few Blowdowns (1-2/mile)	54	1.89	0.60
Stocking Fish in Backcountry Lakes	53	1.83	0.75
Control of Natural Wildfires Caused by Lightning	55	1.82	0.80

When asked about their preference toward developments, structures, facilities, and other amenities in wilderness visitors reported that among the nine items listed, bridges over major waterways (\bar{x} =2.82) and signs that aid in wilderness navigation (\bar{x} =2.53) were the most desirable . The least desirable of these items were the presence of cemented fireplaces with metal grates (\bar{x} =1.32). The remaining six variables fell into the neutral category of neither desirable nor undesirable (Table 14). The codes used for this questions were analogous with the previous question set.

During the early season in the BMWC, traveling over waterways can be incredibly hazardous, especially during years of record snowmelt. Some bridges do exist for visitors, but where they do not, inconvenient reroutes must be taken to find safe passage until waters subside. What is more noteworthy is that bridges over minor water crossings was more neutral ($\bar{x}=2.09$) when compared the former. Even during high snowmelt flows, some of these minor crossings are still doable; however, and they are even easier to “dry ford” when the waters subsided.

Table 14. Visitor’s perceptions toward wilderness facilities and developments

Facility/Development	n	Mean	Standard Deviation
Bridges Over Major Waterways	56	2.82	0.51
Signs Along the Trail Giving Direction and Mileage	55	2.53	0.74
Small, Loose Rock Fireplaces	55	2.27	0.73
Bridges Over Minor Waterways	55	2.09	0.80
Interpretive/Educational Signage	54	2.02	0.92
Outhouses/Pit Toilets	55	1.95	0.80
Pole Corrals at Campsites for Horses	55	1.85	0.71
Split Log Picnic Tables at Campsites	56	1.68	0.77
Cemented Fireplaces With Metal Grates	56	1.32	0.58

Lastly, when posed with a list of potential regulatory actions that could be established in the BMWC, visitors found that among the 10 regulations listed those that enabled them to catch, keep, and consume fish ($\bar{x}=2.73$), and party size limitations ($\bar{x}=2.65$) were the most desirable. Once again, codes remained the same. The least desired potential regulations were those that would impose

camping permits (\bar{x} =1.29) and those that required the burying of trash (\bar{x} =1.20). The remaining six variables fell within the neutral category of neither desirable nor undesirable (Table 15). It has already been mentioned that the BMWC is a high profile location for fishing experience, and therefore it is reasonable here to see that looser regulations with regards to fishing are more favored. With regards to party size, however, observations in previous years' suggest that despite already existing party size limitations, enforcement has been difficult. Finding that such regulations are desired however by visitors may help strengthen causes to better monitor this if it poses to be prevalent issue. As a final note for this section, unregulated camping is one of the more attractive aspects federal wilderness offers. Seeing that it was the factor that garnered the greatest opposition is therefore expected.

Table 15. Visitor's perceptions toward wilderness regulations

Regulation	n	Mean	Standard Deviation
Allowing Visitors to Catch and Consume Fish	55	2.73	0.53
Party Size Limitations	55	2.65	0.65
Prohibiting Wood Fires Where Dead Wood is Scarce	54	2.35	0.76
Eliminating Grazing by Visitor's Horses	54	2.11	0.66
Required Destruction and Dispersal of Constructed Fire Rings	54	2.04	0.75
Mandatory Visitor Registration	54	1.91	0.73
Prohibiting Camping within 200 ft. of Waterways	54	1.72	0.83
Mandatory Human Waste Pack out Policy for River Users	55	1.71	0.74
Permits Requiring Visitors to Camp at Specific Locations	55	1.29	0.57
Burying Trash	55	1.20	0.52

Visitor Experience

Visitors were given the opportunity to discuss some specific experiential components of their trip. When asked about their ability to find available camping in the wilderness, over three-fourths (91.8%) of all cases reported that this was never an issue. In addition, a clear majority (77.6%) mentioned that they never found themselves discouraged from using a campsite due to its condition or location. Those who did however mentioned some campsites having unfavorable qualities such as excess stock manure, no access to water, or no amenities such as fire rings or primitive benches.

When asked about group encounters, over half (53.4%) of all respondents cases reported seeing no more than three groups during their trip, about a quarter (22.4%) reported seeing four to five groups during their trip, and the remaining individuals either saw no one (8.6%) or six or more individuals (15.5%). Overall, when reporting their perception of crowding in the backcountry, 87.9% reported that it was not perceived as an issue. To further reinforce this, 79.3% additionally commented that they either saw the right amount of people or that this factor was not of importance to them. Encounter rates overall for visitors were low, which is an encouraging finding given that many wilderness and wildland recreation areas manage the issue of crowding very delicately. Based upon the results gathered from The Bob, however, it appears to not be a serious issue among the majority of visitors.

Lastly, visitors were asked about their overall satisfaction with their trip, 93.1% claimed to be satisfied, with 74.1% these members stating they were very satisfied. Visitors additionally logged their highs and lows for the trip. A majority of highs mentioned the beautiful scenery, the experience of solitude, and other forms of expression noting their joy with recreating in wilderness. A majority of lows were centered on environmental factors such as rain, presence of biting insects, or adverse conditions such as those on the river in the early season. Visitors were also asked what they would change about their trip. Many answered that they would change nothing, but another significant amount made mentions about various group conflicts they wish they could have avoided. These comments, due to there being so few of them, were not coded for additional analysis, but were utilized to help foster discussion that will be continued in the next chapter.

CHAPTER 5

DISCUSSION AND RECOMMENDATIONS

Visitor Characteristics: Demographics

Based upon the observed results in the onsite survey, a majority of visitors to the BMWC during the summer of 2018 were middle-age white males. Amongst these individuals, a majority (73.7%) had at least at least a bachelor's degree or higher. Of the online respondents, over half (60.3%) identified as male, and about a third (39.7%) female. None of the online respondents described themselves as anything else but white in terms of race, but one did mark themselves as being of Hispanic or Latino ethnicity. Respondents for this survey were middle-age on average (\bar{x} =41 years), and over three quarters (70.7%) of them carried at least a bachelor's degree.

These findings are not only consistent with much of the previous research conducted in the BMWC, but also preexisting literature observing visitor use characteristics in other wilderness and wildland recreation areas throughout the United States (Borrie & McCool 2007; Hull & Young 1992; Lucas 1980; Lucas 1985). There are repeated instances of dominant visitor use types being white, higher educated males. This is an interesting trend to observe, given that more developed recreation areas tend to see greater diversity when it comes to rac

and ethnicity (Hammit & Monz 2015). Wildlands such as primitive recreation areas and wilderness areas are unique in that they have many barriers that prevent easy access such as rough four wheel drive roads or remote trailheads that are hard to locate. These barriers possibly attract then a more specialized crowd of users whom are more familiar and comfortable entering into the specified uses of wildland and wilderness recreation areas (Hammit & Monz 2015). These characterizations are true for much of the BMWC's access points, but not all wilderness areas in the United States may be as difficult to reach. Studies that cover multiple geographical areas like that carried out by Lucas 1980 may be helpful in affirming trends the entire National Wilderness Preservation System. In addition, a more focused look at origin of visitors would also be something useful for future users of the BMWC to look into. Many visitors in conversing with researchers alluded that they locals from Montana, and past year's anecdotal interaction with visitors similarly suggest that individuals are from the surrounding communities or from within the state. While this may be true, collection of this data would be very helpful in future studies

Visitor Characteristics: User Types and Activities

Average group size was reported in both surveys to be two to three individuals. A majority of these groups were either traveling with friends (41.2%) or with family (45.6%). With wilderness areas typically being so remote in their locations and more difficult to navigate compared to other wildlands, traveling in

groups is oftentimes most prudent for safety reasons. That being said, some still presented themselves as traveling alone. While more risky, traveling solo can offer many benefits as well for some recreationists such as more autonomy over personal experience, and ease in planning and implementation of personal trip ambitions.

Onsite survey responses showed that hikers comprised the highest user type (64.4%). The remaining respondents were distributed amongst horse packers (11.5%), hikers with pack animals (4.3%), and rafters (19.6%). Online data revealed similar observations with backpacking (46.3%) and day hiking (23.2%) representing the dominant method of wilderness travel. When looking at the different types of activities that were conducted during visitor's trips, the majority was found between hiking (28.9%) and photography (26.6%). Interestingly, the online survey reported fishing as a minority activity (0.6%) and hunting the third most popular activity (12.7%). This could have been from visitor misinformation of the question, as fishing is most certainly one of the commonly observed uses of the wilderness. In addition, hunting is not permitted during the summer use season, but perhaps this also can be attributed to visitor misunderstanding of the question. Visitors also reported and were observed to be visiting wilderness to scout for future hunting trips in the fall, so this is also a potential reason for marking hunting for an activity.

Another noteworthy remark is that in previous use seasons, anecdotal evidence has suggested that river users are becoming more dominant use of the Bob Marshall Complex. Conversely, both surveys conversely indicate that these users are in the lower tiers of identified activities, with the onsite survey observing 19.6% rafters, and the online 17.0% traveling by river. These lower responses could be due to the fact that only two of the trailheads experience as greater frequency of river users. Adverse river conditions existed for much of June and early July as well in 2018, which further would have discouraged many river users from pursuing these types of recreational opportunities.

With regard to stock users, it should also be noted that due to the difficulty of approaching these groups, the unwillingness of many to take an onsite survey, and some not desiring to release additional information that their numbers are likely underrepresented in this study. Many packers left from separate camps and trailheads and it was difficult to intercept parties before they were mounted and heading into the wilderness. Some packers also desired their clients to not be disturbed and therefore declined opportunity for data collection. Despite this limitation, it is unquestionable that hikers were by far the dominant user observed at trailheads. This is further reinforced by the fact that they have been perceived to be dominant by observations in previous use seasons. This finding is important for the management of the Bob Marshall, because the wilderness was initially established and historically used as a horse packing site. Many visitor comments, identified to be from hikers or other user groups, were indifferent

toward stock parties, making remarks towards both encountering them on trail and experiencing damaged trail conditions, backcountry facilities, and structures caused by stock. Overall, it is suggested that better methods be developed to capture a more accurate representation of stock and horse users for the Bob Marshall in order that this group be better represented. Investigating better ways of assisting these parties and enhancing their ability to perceive shared recreation use on public land would also be something that could be worth exploring.

Visitor Characteristics: Previous Experience

When looking at previous experience of wilderness visitors, the onsite results suggests that a vast majority (86.4%) of those visiting the BMWC had previously visited federal wilderness. In addition, a majority (68.1%) of visitors had previous experience within the three wilderness areas comprising The Bob. Online results echoed this with 82.8% having previous experience in federal wilderness and 92.7% reporting to have visited part of the BMWC prior to their trip. This is unsurprising because the very nature and setting of wilderness areas tend to fall in the more remote and primitive opportunity classes, with regards to the ROS (Manning & Lime 2000). Therefore, more highly experienced users tend to be the ones that are utilizing wilderness resources. It is still important for managers to understand the experience levels of their visitors so that they can

better provide opportunities and services that can accommodate their various backgrounds and abilities.

Results from the onsite survey indicated statistical significant difference among the groups seeking remoteness, visiting due to familiarity, those exploring new areas, and those recommended by family or friends when compared to previous wilderness experience. Significance may be due to a multitude of factors for these cases. For the first group, many wilderness users in The Bob are seasoned veterans who have prior experience in recreating in primitive settings. Therefore, these group's experience levels likely led to the significant divergence as many groups would have been seeking remoteness as a key attribute to their trip, while less experienced users may not have had this factor to characterize their primary motivations. Those who were previously familiar with The Bob, also, de facto had previous experience as well. Therefore, a split would have occurred between experienced (familiar) individuals when compared to inexperienced (unfamiliar) ones. Similarly, in the group of those exploring new areas, significant difference is reasonable since both less experienced users are likely visiting for the first time. This factor of experience could also encapsulate those who are repeat visitors seeking a new area of the complex, as well as complete newbies. The last grouping rides along some of the same themes as the others, in that recommendations can play a key role in a visitor finding a new place to explore. Once again, experience likely played an important role in the application of recommendations by others.

Visitor Motivations and Preferences

Natural place setting, opportunities for remoteness, and scenic beauty were the highest scored categories that influenced visitors when planning a trip. These three factors are common elements of wilderness character, so it is not unreasonable that they were deemed the most important by visitors (Roggenbuck et al 2003). Quality river and fishing experiences scored lower, but were still “somewhat preferred” on average by some visitors. The BMWC has a tremendous amount of river resources, both for fishing and for rafting. These activities, however, are not mutually inclusive at all times, despite many hikers and rafters pursuing fishing opportunities. In addition, rafting was only found to comprise about a fifth of the visitors surveyed, so it is likely that not all were seeking specific river resources as the primary objective or experiential component of their trip. The factor “exploring a new area” was also deemed somewhat important on average by visitors. This can be supported at least anecdotally as many seasoned wilderness veterans noted during their survey time that they were checking out a new location, or had been to previous locations in The Bob, and were exploring a new region. With the BMWC being such a large land area, a visitor could certainly spend a lifetime exploring its vastness.

The lowest scored factors for this section of the survey were recent occurrence of wildfires, opportunity to test outdoor skills, familiarity with the area,

and suggestion based on family and friends. As already observed and discussed, many wilderness visitors are experienced recreationists and therefore likely have no need to focus on testing their skills as a central component to their visit. Getting recommendations from peers, while sometimes is important, was also not a pivotal component to planning some group's trips. The same could be said for have a familiarity with the area. It is surprising, however, to see that recent occurrence of wildfires did not have a significant impact on visitor's desire to visit wilderness. Some of the largest fires in the history of the BLM occurred in 2017 and many popular areas of the complex were burned over as a result. Access points in the southern portion of the wilderness were the most effected. Regardless, visitors reported frequently that despite the recent occurrence of fires, certain areas held sentimental value to them and therefore they were still compelled to visit them. Others reported, interestingly, that they preferred burned areas because they provide better scenic vistas and more open forest conditions. It was beyond the scope of this research to focus on preference and perception of recreationists toward wildfires and burned areas, but it may serve managers well to collect these data in the future.

Almost two-thirds (63.7%) of responses mentioned interest in participating in a specific activity or recreation type as the motivation for visiting wilderness. Wilderness areas provide ample opportunity for various forms of recreation, and therefore there is a possibility that some people's impetus for visiting was simply to engage in a specific type of use (Lucas 1980; Manning & Lime 2000). Visitors

additionally noted in 28.0% of these responses that they sought after some sort of wilderness characteristic such as remoteness, quietness, or solitude. The remaining had various additional comments towards their motivation for visiting wilderness, such as seeking out a specific destination, looking for prospective hunting grounds, being there recommended by friend or family, the access point being convenient, and prior experiences. Because these frequencies are smaller, no additional conclusions can be supported.

Visitors were asked additionally why they were visiting a specific trailhead. Interestingly enough, many separated themselves into similar groups that were created by the wilderness motivation query, and as a result analogous categories were defined for this question. Over half of respondents selected the specific trailhead they were surveyed at due to the trailhead's location. This was the most common response, only to be followed by mentions that related to wilderness character (11.9%) and that they were recommended to utilize the trailhead by family or friends (14.2%). This is not unreasonable since only about four of the eight trailheads were conducive for quick access to popular resources in the Bob Marshall's backcountry. For example, many rafters departed out of Meadow Creek and South Fork Sun trailheads because these trailheads offered quick access to river resources. Therefore, the trailhead's location becomes paramount to the user's needs. Of these responses, it is also interesting to note that a small percentage (5.7%) made mention that they were diverted to the trailhead due to adverse conditions elsewhere. While not collected or represented in the data,

these findings are also supported by anecdotal mentions by some visitors, especially earlier in the season.

The questions in the online survey inquired visitors on how they came to know about where they were going on their trip, and what informational resources they utilized. The most commonly reported response was that visitors received a recommendation from a family or a friend (27.5%) or already had previous experience to inform them of their trip logistics (20.2%). In their comments, some visitors mentioned that many locals and guides also were useful in helping them determine where they were going to travel and recreate in the BMWC. One noteworthy observation from this question is lowest ranking sources of information were that of the USFS (15.6%). This agency, being the one that manages and administers the totality of the BMWC, should be providing the most accurate and informative resources that will both educate and assist the public during their visit. This is not to say that they are not already, but it is curious to see that so few reported using the USFS as a resource. One possible explanation could also be that because many have already had previous experience, and consulting the Forest Service was seen as a nonessential need. Regardless, perception of the Forest Service's presence is thought to be favorable, for as it will be seen in the next section of this chapter there seemed to be a desire to have a presence of rangers and personnel in the backcountry among visitors. To further support this, some comments collected included

praises toward the professionalism of backcountry rangers, the affability of trail building staff, and the helpfulness of personnel encountered on the trail.

Visitor Perception toward Conditions and Management

Index questions were used to help discern various dimensions of visitor perception toward certain attributes of management, established facilities and amenities in wilderness, and potential regulations that could be enforced. Looking first at these management attributes, the most preferred by visitors included the desire for a guidebook, closing some areas to horse use, leaving some areas with no trails, and presence of rangers in the wilderness. It is noteworthy that the lattermost of these reveals that there did seem to be favor toward presence of wilderness and backcountry rangers. Rangers have been found to be comforting to visitors upon encounter, as well as provide evidence for the public that agencies are taking time to monitor and patrol the lands that are in their care (Lucas 1980; Shindler & Shelby 1993; Cole & Williams 2012). Rangers additionally provide opportunity for education and support to any logistical issues groups might be encountering. These sorts of personnel are few in the Bob Marshall, but many trails offer high chance of exposure to one of complex's many hard-working trail crews. While these crews do not formally do the job of a ranger, they still provide many of the same duties listed. These inferences are further supported by comments made by visitors that laud backcountry rangers

and trail crews encountered, describing the professionalism and helpfulness they provided some visitors during their trip.

A guidebook to wilderness was deemed most favorable need among the top four wilderness management actions. While not many individuals from the online survey mentioned gathering information from a guidebook in the previous section, it was noticed that through comments made that current guidebooks for the wilderness were dubbed “useless” or “outdated.” It may warrant either the Forest Service or another private publisher to create such a resource that reflects modern conditions within The Bob. Visitors additionally answered on average that it was very desirable to close some areas to horse use. As alluded to previously, horse users oftentimes comes into conflict with hikers leading the two user types to engage in disagreements on trail condition preferences. It is then unsurprising, because a majority of respondents were hikers, that closing areas to horse use was very desirable. This again was supported through comments made expressing dissatisfaction with trail conditions affected by horse use.

Establishment of high standard as opposed to low standard trails was a divided topic for visitors, with both receiving mean scores of 2.43 and 2.22 respectively. This placed them within the “neither desirable nor undesirable” category. Overall, visitors tend to be indifferent on some of the more “nitty gritty” elements of specific trail build, so long as these resources are built to last for a

long duration, are maintained appropriately, and permit ease of travel for the intended user.

The most undesirable of management actions was the use of chainsaws, limiting blowdowns, stocking fish in backcountry lakes, and controlling prescribed natural fires caused by lightning. While rated low on average, variability was very high for those discerning whether the use of chainsaws or control of prescribed fires was acceptable. Anecdotally speaking, many have mentioned the use of chainsaws in previous years in order to speed up the clearing and opening of trails in The Bob, so it is noteworthy to see even here there is high variability in those answering for this category. The same can be said for prescribed natural fires, in that a number of peoples have negative attitudes towards destructive natural fires impacting their beloved valleys, drainages, and other scenic corridors, regardless of the benefits the fire may bring with it. While these proposed activities were still looked at with lower preference on average, they are still ones to observe carefully (Borrie 2004; Borrie & Birzell 2001; Knotek 2006). Stocking backcountry lakes with fish has been likewise controversial in that non-native rainbow trout (*Oncorhynchus mykiss*) have be used in prior years to fill lakes that previously had no fish. Steps are being taken now to cull nonnative fish in these lakes and reintroduce native westslope cutthroat trout (*Oncorhynchus clarki lewisi*) where they were historically present. Attempts also are being made to restore lakes that did not truly have fish in them historically in order to enhance wilderness character. Lastly, it is interesting to see a lower

preference toward limiting blowdowns. Perhaps having blowdowns creates a more authentic wilderness experience to some, and seeing frequently logs that have been sawn comprises experiential opportunity. No anecdotal or reported qualitative data can additionally support this finding at this time.

Questions that focused on perception of backcountry facilities and amenities yielded the highest average preferential ratings in bridges over major waterways ($\bar{x}=2.82$) and signs that delineated trail direction and mileage ($\bar{x}=2.52$). Both of these amenities are serious factors that create more ease for wilderness travelers. Crossing major rivers with no bridges can be a daunting task, especially during higher water and if one is unexperienced in fording deep rivers. Likewise, navigation in wilderness is oftentimes difficult, and having signs that inform users with direction or mileage to certain junctions or waypoints can provide additional comfort and help.

Visitors were mostly indifferent about the other seven listed facilities and amenities, but some noteworthy observations are still able to be made. The highest variability was found for development of interpretive and educational signage. While these may be more conducive at trailheads, backcountry ranger stations, or major waypoints in the wilderness, there was nevertheless a great varying interest in their presence. This is tricky in wilderness areas because establishment of high quality interpretive signage requires careful planning, strategical placement, adequate funding, and additional care and upkeep that in

reality may be beyond the scope of what managers seek to prioritize (Dawson & Hendee 2008). The remaining resources such as pit toilets, primitive fire places, and log benches are all things that visitors seem to apathetic toward, but do serve as additional comforts when visitors are looking for places to camp.

The last grouping of questions was a list of possible regulations that could be administered in the BMWC. The most preferred of these included those that allowed visitors to catch and consume fish and party size limitations. The former of these two is obvious in that with such a high fishing use within the wilderness, it is experientially beneficial to be able to eat fish that are caught, with certain respect paid toward sensitive species present in the wilderness. Nevertheless, regulations are already set in place to protect such species, and additional laws for bag limits on catchable species are enforced both by Forest Service and Montana Fish and Game. Because river use has expanded over the past year with the advent of new technologies such as the pack raft, it is expected to see that party size limitations will be viewed with increased favor. One noteworthy reoccurring anecdote from river users was that there were days where visitor encounter was very high due to increased density of individual watercrafts. This risks completely waking one from a sense that they are in an environment of remoteness or solitude. Likewise, when a hiker rounds a bend to a scenic overlook of the river, seeing these parties with numerous individual boats has been reported to be distracting or unwanted. It was not specified in this section whether the group limits would be set for rafters or hikers, but comments suggest

that instances of party intersection on the river was high, and that many raft parties were distracting due to their number of individual boats. Party size regulations have already been set for wilderness users, save those that are traveling with special use permits, but a new regulation may need to be considered to aid the preservation of river experiences (Dawson & Hendee 2008; Lucas 1983).

Another two controversial regulations that were posed were making visitor registration mandatory, and permitting campsites at specific locations. For mandatory registrations, visitors answered on average that they neither agree nor disagree ($\bar{x}=1.91$) with these types of constraints. While registration is sometimes intrusive on visitor experience, it does aid managers in collecting valuable data on visitors. It additionally opens up the opportunity for managers to have contact with the visitor, and impart onto them any educational or informational materials they may be in need of. (Lucas 1983). Permits, however, were deemed unfavorable on average which is entirely expected for an already unpermitted wilderness area. The only permits for the BMWC that exist at the time of this survey were for special uses such as exceeding group sizes for guides, registering a group as a guided group, or setting up special long term camps in the backcountry. Camping, rafting, hiking, and all other non-consumptive forms of recreation use are unpermitted and for the large part unregulated. Of the uses in The Bob however, the freedom from permitting on the river is seemingly cherished the most. Many of scenic rivers of the United

States require long permit wait times or even uncertain lotteries that prohibit many users from experiencing these river resources (Hammitt et al 2015). The scenic forks of the Flathead River, however, lack such constraints which make it tremendously easier to plan and participate in use. Visitors in previous seasons, as well as some by way of commentary in the online survey, suggest that these permits be withheld so that the liberty of the backcountry can be preserved. With regards to the previous remarks made about visitor use increasing on the river however, permitting may still be a solution managers can explore in the coming years. It would be efficacious to gain continued input from river users, as well as study these recreation uses more intently before committing to adding unnecessary permitting hurdles.

The remaining factors, such as fire ring maintenance, camping regulations with regards to water resources, grazing restrictions, and firewood collection were mostly looked at with indifference. These regulations are a bit more flexible for visitors however, and many of them focus on preserving components of the recreational and natural resources in the backcountry (Hamitt et al 2015). Therefore, more tolerance toward them is expected. Burying trash received less favorability however, and it is speculated that many visitors would advocate packing out materials. This regulation is also already enforced by the Forest Service.

Visitor Experiences

Visitors were allowed the opportunity in the online survey to both discuss their experiences and describe their highs and lows during these experiences. Crowding can be a serious problem in many wildland and wilderness areas because it erodes the opportunity for solitude and remoteness that many of these areas attempt to achieve their management objectives (Monz et al 2000). While a few visitors marked that they were unhappy with the amount of people they saw, an overwhelming majority (87.9%) indicated that it was not perceived as an issue. An additional 79.3% made remarks that they saw either just the right amount of people or that this factor was not of serious importance to them. It is encouraging to get this feedback, for it suggests that opportunity classes of solitude are being managed effectively in the BMWC.

In observing another component of visitor experience, a large majority (91.8%) mentioned that they never had trouble finding campsites in the wilderness, and an additional 77.6% marked that none of their campsites that they happened upon were perceived unusable. Those that were passed over were noted that they were damaged by horse users or devoid of amenities (e.g. water access, primitive benches).

Respondents were given the opportunity to mention their experiential high points and low points for the trip, as well as comment on what they would have changed or their own personal suggestions for improving conditions. Common

high points made mention of some aspect of wilderness character, with many alluding to the picturesque scenery, satisfaction with arriving at their destination, and being in a setting that promoted remoteness and quietness. Common low points involved environmental conditions such as rain, insects, heat, or hazardous river conditions. Reported low points also captured certain accidents that happened due to planning or conflicts with other groups.

When asked what they would have changed or done differently, a majority stated none, and lauded wilderness managers or The Bob itself for being “an awesome place” and “a refuge of wildness”. Others made mentions again about group conflicts or trail conditions. Overall, when asked with their satisfaction with their trip, over 90% said that they were satisfied.

It is good to see so much positive feedback from visitors, even if the sample or respondents from the online survey was a small one. These are affirming to managers that conditions are in fact promoting satisfactory experiences for visitors, which certain comments suggesting minor changes or additions for consideration.

Comparison to Previous Years

As already mentioned, many of the results generated from this report seem to fall in line with previous studies conducted in the BMWC. In their assessment of visitors in the Bob Marshall in 2004, Borrie and McCool had a total of 294 respondents on their mail-in visitor use survey. That survey found

that over the half of the respondents (50%) were middle age. They additionally were mostly male (70%) and held a bachelor's degree or higher (62%). Over half (62%) of these visitors had previous experience in the Bob Marshall, and a vast majority (91%) had visited a federal wilderness prior (Borrie and McCool 2007).

Looking at recreation user types, Borrie and McCool (2007) report 42% horseback riders and 7% traveling by raft. Of course, with new rafting technologies now and greater popularity of the Bob Marshall as a resource, this number has increased. One noteworthy observation is that when this study compared their results to those of the surveys conducted by Lucas in 1970 and 1982, they found that horsepacking decreased since 1970. Average group size has changed, however, between previous surveys, being on average 4 individuals per group as compared to the 2-3 individuals reported in this study (Borrie and McCool 2007; Lucas 1985).

Borrie and McCool (2007) found that 24% of their visitors reported seeing "too many people" in the backcountry, which is consistent with the 20% in the new survey. Also of their respondents, 75% mentioned their trip quality was satisfactory, which again is mirrored in the majority reported in the new survey. Finally when looking at management conditions, many of the findings of the new survey fell still in line with Borrie and McCool's

While limitations existed that prevented the research team in this survey to generate a higher sample number for the summer of 2018, it is still affirming to

see that many of the results are congruent with previous surveys. This is good news for managers for the Bob Marshall, for it indicates that conditions in the backcountry have likely not changed significantly. Hikers that were trekking across the scenic highlands during Lucas's surveys in 1970 and 1982 likely saw much of the same wilderness that those in 2004 and 2018 did. Of course vegetation has changed over time and fires have had their effect on the landscape as well. While the aesthetics may have changed over time, the experience offered by the BMWC seems to have remained the same. Continually monitoring the experience of visitors in the backcountry and preserving these experience should be in the priority of managers going forward. This will enable them to remain tuned into the visitor perceptions of conditions and management, and allow them to adjust as needed.

Management Considerations

Based upon the results that were derived from this study, as well as some of the concordant findings from other surveys in the Bob Marshall, some management considerations can be suggested. To preface, wilderness management is a very difficult and sensitive topic to approach in that it is not only recreational dimension that must be viewed, but the ecological components the wilderness is preserving as well (Dawson & Hendee 2008). Therefore, because much of this survey captured the recreational perspectives of wilderness use, management toward these resources will be focused upon. In addition, this

survey should not serve as a basis in which management should solely be determined. It is believed that data captured and represented in this study will provide a constructive contribution toward further revelation of visitor use, as well possible issues being encountered within The Bob. Further research is suggested in order to more clearly ascertain key issues that are in need of remedy.

Firstly, managers should continue to maintain elements in the backcountry that preserve wilderness character. A majority of respondents when given the opportunity to give general comments and feedback make statements such as “keep wilderness wild” “don’t sell out this place”, or “make public lands as accessible as possible.” These comments and more are affirming in that they are already suggesting that quality of wilderness character is good, and that experiences that managers have been successful in appropriately managing for this respective opportunity class.

While it may be positive to see visitors are having enjoyable experiences in The Bob, a question still arises of how can opportunity for such experiences be sustained for generations to come? The BMWC has a longstanding tradition of excellence when it comes to recreational and wilderness programming, however, with continual budget cuts of such programs, will these conditions begin to erode in the future? Only time will tell, but strategies should be being developed now in order to provide resilience toward these wilderness programs. To give a brief

example would be to look at The Bob's trail maintenance program. The Forest Service relies heavily on not only seasonal staff, but also volunteer conservation positions. The former of these two are typically more highly skilled with primitive tools used in wilderness, such as single bit axe or crosscut saw, and therefore are much more efficient opening trails for use before major visitation surges during the summer months. Volunteer crews may also carry this expertise, but turnover in these groups tends to be much higher. As a result, new crews emerge each year that must be retrained in use of primitive tools, taking time and limiting the time needed to be in the field clearing trail.

Seasonal federal employees are not immune to this effect either, and a well-oiled and tuned trail crew can be functioning for multiple years, then dissolve with all choosing not to return the following season. As already alluded to, limited funding to wilderness programming is reducing the sizes of some of these hired crews, and therefore puts further at risk the potential for not even hiring a crew. It can be argued that the Forest Service cannot operate alone on volunteer trails maintenance, and that skilled laborers are very much needed in order to successfully clear and open trails for users. An alternative solution would be to make permissions to use chainsaws to clear trail quicker, but this is against the precepts of the Wilderness Act and also risks wilderness experience opportunity for visitors. One may still wonder though that if maintenance was frontloaded at the beginning of the season, and crews with chainsaws entered into wilderness only briefly to clear trail, that this would only be a small impact to visitor

experience. A few weeks to half a month would be all that would be necessary unless a significant number of blowdowns are present. Even then, chainsaws could be used to clear priority trail corridors then rescinded when lesser priority trails are needed to be cleared. Such ideas and notions should continue to be open for discussion, and not left off the table. Although this is just one of many issues facing wilderness areas such as the BMWC.

Environmental factors also pose an interesting challenge to managers of the Bob Marshall, such as presence of invasive plant species and lasting effects of wildfires that could affect scenic recreation corridors in the wilderness. The former may fall prey to the personnel dilemma that is facing the trail crews. With less funding for staff, current technicians and specialists will be less available to perform their specialized tasks of managing backcountry noxious weeds. These technicians are sometimes staffed voluntarily as well, but like trail crews, required quite a bit of time to gain competency in weed identification and herbicide application. The latter environmental factor is one that is a bit trickier to tackle. Forest management practices can be carried out such as human prescribed fires and thinning operations that reduce fuel loads in fire prone areas in the wilderness. This would especially help areas where mountain pine beetle (*Dendroctonus ponderosae*) and spruce bark beetle (*Ips typographus*) have caused widespread damage and die off, which has resulted in large acreages of standing dead timbers ready to be burned. Again, such forest management

actions would be antithetical to objectives laid out in the Wilderness Act, and therefore difficult to accomplish.

In concluding this section, it must be asked: when will the rigidity of the Wilderness Act begin to potentially compromise and undermine the very ecosystems it seeks to protect? With limited management being able to be accomplished, many wilderness areas are awaiting their own demise as longer hotter summers has led to further tree die off from insects and subsequently larger fuel loads for more severe fires. At what point will a line be crossed that forces managers hand in committing personnel to effectively manage areas of backcountry to better safeguard the opportunities for recreation? How long will preservation management last as ecosystems continue to be chipped away and compromised each year? Either two options are then available. The first is that active management can deter some of these adverse effects and good silvicultural practices may be instituted to augment both the ecological components of the Bob Marshall as well as the recreational resources. Such silvicultural practices may briefly require much human interaction with the current primitive landscape, but could greatly help in the effort of preserving this ecosystem. The second option would be to wait and let nature take its toll, a management ideology that many systems of wilderness and wildlands are managed on today. Perhaps this is more authentically giving respect to the philosophical definition of wilderness, or better adheres to the vision the drafts of the Wilderness Act had envisioned, but greatly puts at risk the long-term integrity

of the ecology present here. Currently, character criteria and management frameworks are developed to promote certain desired conditions managers have for The Bob. This method is done for other federal wilderness areas as well (Cole and Yung 2012). Serious consideration should be given moving forward to adding traditional forest management and silvicultural practices to accomplish these criteria and frameworks.

Limitations and Need for Further Study

As it has been alluded to throughout the document, many limitations prohibited this project and its initial proposal from being as effective as it possibly could have been. To start, lack of funding created interesting logistical problems for the research team to travel and stay within close proximity to The BMWC for the duration of the summer. The deficit of funds also forbade the payment of researchers which greatly put stress on the time they could be away from their home state. While funding could not be granted, resources were committed to the research team in form of vehicle for the summer, lodging, and free stay at many of the recreation sites. These were only committed however from one of the five ranger districts. Regardless of these challenges, research members did the best they could with what little was allotted.

Environmental hazards in the summer of 2018 also impeded efforts of the research team. The previous winter provided over 180% of the normal snowpack usually observed by this region of Montana and this created massive snow melt

events that slowed the movement of visitors coming into the BMWC. A prolonged spring chill also lingered well into late June which likely discouraged many recreationists. Finally, intensive rain events created access issues to some of the trailheads, and methodology was needed to be changed for some of the survey blocks. Once again, the research team adapted and did what best they could to overcome these challenges.

More research is needed to be done in the Bob Marshall and it is recommended that this survey be used to compliment already existing research as well as be a catalyst to spur more studies on recreation and wilderness use in the complex. Namely, this survey could be replicated again during multiple summers to get better views of how visitor use has changed over time. With better funding and an extended survey window, more quality data should be obtained. While this survey captured summer use of the BMWC, additional research could also be done for the fall use as well. Fall in The Bob receives the majority of the hunting use, and it would be valuable to capture these users' perspective and management preferences for the complex.

It has been mentioned as well that river use will continue to be a subject of conversation moving forward as new recreation technology seems to be promoting and enabling recreationists to participate in such uses. Things like the use of the packraft and other inflatable water crafts should be further investigating to see whether or not the greater volume of these crafts truly risk

degradation of the wilderness experience. These crafts are also being deployed in areas where river use has never historically occurred. It would be prudent of the Forest Service to better monitor this new burgeoning use of the complex.

Lastly, wildfire continues to be a sensitive topic to not only wilderness users, but also lay public of the United States. The Bob Marshall serves as a unique setting to capture some of these human dimensions of fire management, especially in gauging perception of recreationists toward the effects of wildfires.

Conclusion

Visitors to the BMWC appear to not have changed too significantly from the first time they were approached by Lucas and his staff in the late twentieth century, but research projects such as this one are still important to continue the monitoring of these visitors and observe noteworthy changes that may be occurring. The world looks much different since the Bob Marshall's creation in the 1970s, and the human relationship with natural resources continues to be a dynamic one. What is most affirming from the results of this project is that a good deal of visitors still seem to cherish the elements of primitive experiences laid out in the Wilderness Act, and use this unique resource as a place to seek such experiences. While specific data on visitor connectedness was not collected, it has still be revealed that visitors were passionate about the wilderness, and made frequently claims that they desire the BMWC to forever maintain its rugged charm.

Wilderness areas are continuing to garner attention as outdoor recreation becomes increasingly popular and some once isolated areas are being discovered. That being said, the increased visitation that could potentially come to wilderness in the impending years solicits the need to preserve the opportunity for primitive experiences established in the mandates of the Wilderness Act. The method in which these experiences are preserved, however, may have to change from what the original framers of the Act envisioned when attempting to establish wilderness over 50 years ago. Studies such as this one will be one of many that will be needed to continue to monitor conditions throughout not only the BMWC, but other units comprising the Wilderness Preservation System. In addition, social science is just one of the various disciplines that are needed when evaluating the conditions within wilderness. Other research studies from fields such as forest science, fire ecology, and wildlife biology must be considered when attempting to make informed decisions about management. The application and development of these interdisciplinary approaches will further benefit not only the designated wilderness areas in the United States, but other wildlands and primitive recreation areas throughout the world.

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APPENDIX A.

Onsite Survey Questionnaire

Bob Marshall Wilderness Complex: 2018 Visitor Use Survey

1. Is this your first time visiting a Wilderness area?

- No
 Yes

2. Have you visited the following Wilderness areas before? (Check all that apply)

- Great Bear Wilderness
 Bob Marshall Wilderness
 Scapegoat Wilderness
 I have not visited the listed Wilderness areas

3. Why are you visiting this Wilderness area? (Provide a brief response)

4. How important or unimportant were each of the following factors in determining where you were going to recreate in the Wilderness this trip?

	Unimportant	Somewhat Important	Very Important
Natural place, lack of human evidence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remoteness, solitude	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scenic beauty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality river experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality fishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recent occurrence of wildland fires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Test outdoor skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Familiarity, been there before	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A new area, variety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A friend or family member suggested it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Why did you select this **trailhead** for your Wilderness visit? (Provide a brief response)

6. What is your gender?

- Female
- Male
- Other

7. Are you Hispanic or Latino?

- No
- Yes

8. What is your race?

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or other Pacific Islander
- White

9. What is your year of birth?

10. Please indicate the highest level of education you have completed

- Some high school
- High school/GED
- Some college
- Bachelor's degree
- Graduate degree

11. What is the zip code of your primary residence?

Thank you for taking the time to complete this survey. Your responses will be used to enable better opportunities for recreation in the Bob Marshall Wilderness Complex. Please print your email address (neatly) so that we may send you a follow up survey for your Wilderness visit. This information will be kept confidential, and be used only for the purpose of contact and data analysis for this survey. All information will be erased at the conclusion of this study.

Email: _____

APPENDIX B.

Non-Response Visitor Observation Form

2018 BMWC Visitor Study: Monitoring Form

Date: _____ Time of contact:

Ranger District: _____ Trailhead:

Sky Weather: _____

Group Size: _____ Number of
males _____

Number of females: _____ Number of children (persons under
18): _____

Direction of travel:

- Entering
- Exiting

Type of group:

- Hikers
- Horse packers
 - o Number of stock: _____
- Hikers with pack animals
 - o Number of stock: _____
- Paddlers/Rafters
- Other _____

Length of stay:

- Day users
- Overnighters

Outfitted?

- No
- Yes

Agreed to take survey?

- No
- Yes

Comments: _____

VITA

Sam Rhodes attended Stephen F. Austin State University (SFA) from the fall of 2013 to the fall of 2016. There he earned his Bachelors of Science in Forestry, with distinguished honors of both Summa Cum Laude and graduation from the School of Honors. During his time at SFA, Sam spent many of his summers traveling out west to assist with graduate projects in the Yellowstone and Grand Teton National Parks, as well as in northwestern Montana. These experiences earned him a temporary wilderness ranger position that also spurred his interest into graduate school and helped form his thesis project. Upon returning from his work in the summer of 2016, Sam began constructing the study that would become his thesis research for his Master's in Forestry. Sam currently works for the Texas A&M Forest Service in College Station, Texas, and strives to assist in the advancement of conservation and stewardship of natural resources in the state.

Permanent Address: 1219 Berkeley Street
 College Station, TX 77840

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This thesis was typed by Samuel J. Rhodes