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Wilderness Solitude in the 21st Century

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Wilderness Solitude in the 21st Century

By

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Wilderness Solitude in the 21st Century

Chairperson: Bill Borrie

Recent advances in mobile communication technology have led to a decrease in opportunities for individuals to experience alone-time within daily life. As a result, the solitude offered by wilderness landscapes has become all the more valuable. Past research on wilderness solitude has been divided into two distinct frameworks: the Social-Spatial Perspective and the Humanistic Perspective. This distinction has severely limited the development of a comprehensive research model that incorporates all the possible conditions relating to wilderness solitude. This study synthesized past research and theory to create a quantitative model of wilderness solitude which includes elements from both research perspectives, while incorporating novel conditions that relate to digital connectivity. Study participants were wilderness visitors to Montana's Bob Marshall Wilderness Complex during the summer and fall of 2017. Exploratory factor analysis revealed four components of wilderness solitude. These components suggest that our interpretation of the "opportunities for solitude" clause within the Wilderness Act of 1964 ought to consider the themes of Societal Release, Introspection, Physical Separation and De-tethering from Digital Connectivity.

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Chapter I: Introduction

Mobile technology in the 21st century has ushered in a new way of life. Enabled by advances that have placed computing capabilities into the palm of our hands, human beings are now more socially connected and accessible than ever before. As a result, both the community and the workplace have expanded, allowing individuals to maintain continuous connection regardless of their physical location. Mobile communication technology is now a regular feature of our lives; yet, as these technologies proliferate, many of us find that we do not have more time for ourselves, and instead, we have less (Wajcman, 2015). Due to the advances brought on by the agents of digital connectivity and accessibility, “the daydreaming silences in our lives are filled; [and] the burning solitudes are extinguished” (Harris, 2014, p. 8).

These conditions of continuous connection have operated to fuse much of our individual consciousness into a collective stream of information and communication, leaving us perpetually acquainted with social attitudes and requests. The digital age, powered by an endless narrative, has manufactured social conditions that make episodes of momentary alone-time nearly unimaginable. By limiting opportunities to steadily reflect on the passing moments of the day, we hinder ourselves from becoming sincerely engrossed within the reality of our world. Instead of clarifying one’s unique understanding of public and private life, the digital age has worked to augment the appearance of one’s community, which has led to a rise in the cultural significance of being seen, known, or just momentarily considered (Deresiewicz, 2010). What these contemporary conditions fail to offer, is the opportunity to temporarily release oneself from communal expectations and exist as a digitally unconnected individual.

The more reliant individuals become on the social scaffolding of digital life, the more difficult it becomes to understand the subjective properties of the human experience. Without the

opportunity to momentarily exist beyond the multitude of competing voices, one ultimately surrenders the capacity to reflect on personal values, and strengthen one's sense of self. The hindrance that results from conditions of continuous connectivity can be experienced by both the individual, as well as the community in which one is a member.

We live collectively, but each of us must distinguish himself – not over against his fellows, but among them. When rightly reciprocal with society, the creative individual is its growing edge. Therefore, that community stagnates which suppresses solitude (Rolston, 197, p.125).

Maintaining an understanding of the importance that solitude can play in the lives of individuals, as well as society at large, is vital to future health and prosperity.

In the 21st century, wilderness is one of the last environments that offers conditions which promote access to the digitally unconnected self. In contrast to one's everyday environment, wilderness offers a landscape that retains "its primeval character and influence," so that such lands may still offer "outstanding opportunities for solitude or a primitive and unconfined type of recreation" (Wilderness Act of 1964, Sec. 2(c)). For those who wish to experience life beyond the chattering masses which shape the digital age, wilderness landscapes provide an opportunity to function as a self-governing individual, free from the influence of the electronic hive. As the pace of contemporary life continues to accelerate, wilderness provides a refuge from the never-ending transactions of digital-social life.

Section 1.1 – Background – *A New Epoch in the Human Condition*

Human character changed on or about December 2010, when everyone, it seems, started carrying a smartphone. For the first time, practically anyone could be found and intruded upon, not only at some fixed address at home or at work, but everywhere and at all times. Before this, everyone could expect, in the ordinary course of the day, some time at least in which to be left alone, unobserved, unsustained and unburdened by public or familial roles. That era has now come to an end.

~ Edward Mendelson (2016)

The advent of smartphones has dramatically changed the nature of contemporary social interactions. For many, face to face human interactions have quickly become a secondary option due to the overwhelming preference, and ease, of digital exchange. Although the ability to remotely communicate and share information with friends and colleagues serves as an incredible tool, culturally, there has been reluctance toward determining what the appropriate use of our mobile technologies ought to be. As a result of these socio-digital transformations, “rapidly evolving information and communication technologies are seen as marking a whole new epoch in the human condition” (Wajcman, 2015, p. 2).

As we plug-in to our social circles via digital means, we expose ourselves to the norms and attitudes of various communities at all hours of the day; while simultaneously losing sight of the people making such claims. Constant access to social networks has served to amplify the voice and image of a distant public, producing an unrelenting sphere of social updates and political opinions. By dramatically broadening our social networks in such a short amount of time, there is greater potential for our personal connections to lose their depth – as they now remain on the surface of our screens. Instead of increasing the *quality* of interpersonal relationships, mobile communication technology has increased the *quantity* of such relationships; which has stretched the individual thin, and produced a demand for one’s attention that has left many individuals with overwhelming feelings of anxiety and stress (Alter, 2017).

The transition of social interactions from face-to-face towards screen-to-screen has produced a reliance on technological devices that our culture has never experienced. Unfortunately, this newfound reliance has also turned into a behavioral addiction; to the physical medium of our mobile devices, as well as the social networks harbored within them (Gao et al., 2018). In turn, these dependencies have the ability to alienate individuals from the physical environments in which they exist; placing them into a virtual reality, where social relations are facilitated exclusively through text and images (Baudrillard, 1983). However, the social world in this virtual reality is void of human touch, smell or taste – it is an augmented social reality that exists beyond any physical environment traditionally occupied by human life. Nevertheless, as we continue to place our time, money, and attention into the marvels of this augmented reality, we ought to realize that digital simulations are a thin representation of human life, and work to leverage our codependence of a machine with genuine experiences within the physical world.

As it stands, “a constant stream of mediated contact, virtual, notional, or simulated, keeps us wired in to the electronic hive — though contact, or at least two-way contact, seems increasingly beside the point” (Deresiewicz, 2010, p. 3). Therefore, arguments that suggest these novel technologies are bringing people closer together, and improving the nature of interpersonal relationships, are inaccurate and misleading. Research conducted by the MIT Initiative on Technology and Self has found that younger generations of Americans are becoming more comfortable with certain technologies than they are with one another; which led to the conclusion that if “the simplification and reduction of relationship[s] is no longer something we complain about... It may become what we expect, [and] even desire” (Turkle, 2012, p. 295). The continuous growth of personal accessibility, as well as the expansion of the social network, have *not* served to propel us towards higher degrees of interpersonal intimacy; in fact, this growth has

done the opposite, as the act of being more connected and accessible serves to reduce privacy and expose an individual's relationships to a broader social spectrum.

In particular, the platform of social media not only places interpersonal relationships on display, it also promotes a form of social grooming that elicits learned responses so that individuals can repeatedly receive positive feedback from their network (Alter, 2017). By increasing the number of relationships an individual maintains, and by placing these relationships within a public sphere, avenues towards perpetual, yet less personal levels of connectedness are the result. Not only does social media serve as a platform on which to craft a more preferred version of one's self, it also documents one's quantified approval within their network. What this creates is both an automated escape from the physical reality of daily life, as well as a social system that takes the form of a masquerade, rather than a genuine human assembly.

As we relinquish our private time to stay better connected with others, our personalities, and the stories behind them exist in both a physical and digital realm. This dualism has led to the development of a tethered-self: one that is always connected, and always on-line (Turkle, 2008). The notion of the tethered-self is one of electronic co-presence; as the individual is physically present in a fixed location while also available to manage social relationships that exist within online platforms. Cyberspace offers the opportunity for a second life, one where an individual can craft an idealized version of themselves; where idiosyncrasies can be filtered, and a more polished version of one's identity can be put on display. Because of this, individuals become tethered to the task of grooming their online identity while also being drawn to the very devices that offer short-term amusement and gratification (Turkle, 2008).

The emergent utility of device-based diversions is not without its limitations: "inevitably, the constant flow of communication requires negotiation over the allocation of time and

attention in multiple temporal zones, causing communication congestion and conflicts” (Wajcman, p.159). And if such conflicts are not identified, or addressed, an individual can encounter obstructions within their own understanding, both of themselves, and of the information they are receiving. In order to best address incidences of congestion and conflict, an individual benefits most by allocating their time and attention back to themselves, so that they can better analyze the given conditions, and ultimately redistribute their time and attention in a more conscious manner (Buchholtz, 1997).

Since the emergence of the smartphone, and the increased levels of technological reliance that have followed, research has shown that the reported quality of face-to-face interactions has decreased (Misra et al., 2016). Furthermore, extended periods of time spent on social media platforms have been suggested to lead to symptoms of depressions in young adults, who have a tendency to ruminate on negative social comparisons within their networks (Feinstein et al., 2013). As disheartening as these findings are, those who experience these consequences are not completely to blame. When considering the medium of the smartphone, and the lure that social media has on individuals, recent investigation has shown that these products were designed to facilitate behavioral addiction (Alter, 2017). In a 2014 study, Roberts et al. found that throughout the course an entire day, the college undergraduates within their study sample spent an average of 8 hours and 48 minutes on their smartphone – that is analogous to a full-time job.

When considering the negative mental health consequences that have resulted from the overuse of contemporary technologies, it is clear that an alternative way of spending one’s time needs to be suggested. Thankfully, the physical and psychological health benefits of spending time in natural environments has been well documented throughout the past 40 years. In a study conducted in the UK, outdoor recreation activities such as hiking, fishing, horseback riding and canoeing were found to help improve individual’s self-esteem while also serving to quell mood

disturbances such as anger-hostility, confusion-bewilderment, depression-dejection and tension-anxiety (Pretty et al., 2007). Findings that suggest personal well-being improves when in natural environments are further supported by theoretical contributions such as Attention Restoration Theory (ART) (Kaplan and Kaplan, 1989, 1995). ART proposes that symptoms of mental fatigue and decreased concentration can be counteracted by spending time in natural environments which tend to evoke fascination and provide opportunities for personal reflection. Therefore, the contemporary desire to dwell in the synthetic environment of cyberspace, and avoid the aspects of our world that have been proven to promote well-being, is not only detrimental to one's personal life, it is also detrimental to the community in which the individual is a member.

Section 1.2 - Wilderness Solitude in the 21st Century

I invite you merely to accompany me when I seek the silence and repose of that unknown land, Solitude. I call it a land unknown, because in this 20th century of ours few find it, and none abide there long enough to gain possession of its riches. The world around us presents the spectacle of men engaged in a breathless struggle for money, power, or pleasure, which they pursue at a pace that keeps them stretched out on the rack of this tough world, and finally kills them. The modern disease of feverish unrest and worry numbers its victim by thousands, and men nowadays are sold into veritable slavery by their subjection to the craving of their senses and ignorance of any world but the external one which their eyes see.

-Rev. Michael Watson (1908)

When considering the words of Rev. Michael Watson, it is clear that solitude has been an endangered phenomenon for more than a century. Watson's criticism suggests that "a breathless struggle for money, power, or pleasure" has led to an accelerated pace of life, leaving individuals without the ability to comprehend any world that might exist internally. These claims demonstrate how the daily conditions of civilized life had become frantic by the turn of the 20th century, just as industrialized society began to give way to its commercial offspring. "The modern

disease of feverish unrest and worry” that Watson described, is one that many early wilderness advocates in the United States were also concerned about. As several of these advocates feared that this disease, and the breathless struggle for money and power that followed, would eventually lead to the modification of every last area on earth for the purpose of human exploitation and profit (Zanhiser, 1953).

What brought these concerns to light were some of the cultural advancements which took place shortly after the turn of the century in the United States, in what is commonly referred to as the interwar period (1918-1939). During this time, public demand for the conservation of great open landscapes began to grow, as many American’s eagerly sought a withdrawal from the noise and confusion of urban life (Steiner, 1933). What transpired to meet these demands were two signature developments within the United States. The first was the proliferation of automobile manufacturing and road-building; the second was the establishment of federal land management agencies, most notably the U.S. Forest Service and the National Park Service in 1905 and 1916, respectively. The access that automobiles provided, and the connectivity of improved roadways, allowed the expanding recreational public to begin visiting areas of wild nature that were previously not an option. What soon resulted were substantial changes within these wild landscapes. As visitation rates quickly rose, commercial amusements begin to migrate into these remote natural areas, marking a fundament divide in American conservation politics (Sutter, 2002).

The issue, of course, was not that visitation rates were becoming too large, or that visitors were unappreciative of the increased access to natural areas. The issue was that the artificialities and luxuries of modern life were beginning to occupy and transform the wild landscapes that were meant to be a refuge from the clamor of commercial institutions. Rather than immersing themselves in the experience of wild nature, more and more visitors were remaining on

roadways, viewing the outside environment from the comfort of their vehicles. This led to the trend of many Americans viewing recreational nature as an experiential commodity, which greatly upset a number of conservationists who felt that this trend was not only detrimental to remote natural landscapes, but also to the visitors who were no longer interacting with wild nature (Sutter, 2002).

Among those conservationists, Benton MacKaye, a regional planner and designer of the Appalachian Trail, felt that the rising tide of “metropolitanism” was capable of eroding rural traditionalism (Sutter, 2002). MacKaye believed that by designating certain landscapes as primitive roadless areas, the inroads used by commercial society might be limited and wild nature would be preserved. Robert Marshall, a principle founder of The Wilderness Society, agreed with MacKaye’s notion of roadless landscapes, believing that deep absorption in wild nature had the ability to uphold individual autonomy: “one of the greatest advantages of the wilderness is its incentive [towards] independent cogitation” (Marshall, 1930). Aldo Leopold felt that road building and recreational development fragmented public landscapes, while also failing to consider the natural habitat that was being divided. Such resistance to rampant road-building and development is what led to the wilderness preservation movement, which worked tirelessly throughout the first half of the 20th century to ensure that the United States legally protected certain public lands to remain free from modern mechanization and commercial exploitation.

Those efforts culminated with the passing of the Wilderness Act of 1964, the United States became the first country in the world to establish a National Wilderness Preservation System. Howard Zahniser, chief author of the Wilderness Act, once described wilderness as:

The areas of unspoiled nature where we can not only seek relief from the stress and strain of our civilized living but seek also that true understanding of our past, ourselves, and our world, which will enable us to enjoy the conveniences and liberties of our urbanized, industrialized, mechanized civilization and yet not sacrifice an awareness of our human existence (1953, p. 51).

Bearing in mind the broader expansions that American civilization has made since Zahniser expressed these remarks over 60 years ago, it is clear that such a sentiment wholly maintains its relevance in present day. Furthermore, wilderness can be seen as a sanctuary, a place “we visit when we feel the need to remind ourselves of our human frailty, a place to which we return again and again to gain a healthier perspective on our lives” (Dustin and McAvoy, 2000, p. 25).

When considering the continuing relevance of wilderness in contemporary society, one needs to look no further than the glaring similarities between the accessibility and connectivity offered by automobiles and roadways in the early half of the 20th century, and the accessibility and connectivity offered by digital devices and high-speed communication networks of our current era. What makes wilderness environments significant within the current conditions of the digital age, is that these landscapes offer an opportunity to experience relief from the stresses that such technologies can bring with them. Just as roadways served to bring commercialism to remote natural areas, our digital devices now bring that commercialism into the palms of our hands. Therefore, wilderness can once again serve a critique towards the institutions that wish to occupy individual attention, and commodity anything that is bestowed personal value.

Section 1.3 – A Conceptual Definition of Wilderness Solitude

In this section, the tone of the chapter shifts gears, as a conceptual definition of wilderness solitude is produced. In order to accomplish this, a number of themes and conditions relating to wilderness solitude will be echoed through the past writing of Holmes Rolston III. In particular, his 1975 essay, “Lake Solitude: The Individual in Wildness.” Rolston’s account worked to provide a thoughtfully detailed interpretation of the physical and personal elements involved with the experience of wilderness solitude. The four major themes that will be used to shape this conceptual definition are: Separation, Release, Introspection and Impermanent.

Separation

In wilderness, the individual exists in an environment which directly contrasts the typical order and infrastructure of civilized life. The absence of roads and human edifice make wilderness an environment which is primarily shaped by non-human life – conditions that are legally mandated within Section 2(a) of the Wilderness Act. Therefore, the individual traveling in wilderness is unencumbered by the social norms and roles that accompany one’s habitual environment; allowing for a temporary separation from the setting of communal life. This initial separation is one of physical distance, which works to “loosen the hold of society upon [the individual], [and provide] space and sanity within which to establish and maintain the boundaries of the self” (p. 125).

What also results from this physical separation is an estrangement from the “comfort and frugal pleasures” (p.125) that exist within a cultured world. However, the individual in wilderness “makes not so much a rejection of culture, as a shakedown of what in culture is truly essential” (p.125). In this respect, wilderness solitude serves to minimize the advantages of contemporary culture, and place an emphasis on the fundamental interests of personal exploration and survival: “to pack for a solo trip is [therefore] a therapeutic experience, paring life to its boundaries” (p.125). Nevertheless, the influence of culture is not something an individual entirely separates from, as the conditions of wilderness only serve to temporarily reduce the role of one’s culture, so that the parameters of the self might be expanded.

Release

Through such a separation, wilderness solitude provides an individual the opportunity to “release from the matrix of community” (p. 121). Without the contracts of daily life, or the intrusions of digital culture, wilderness offers an individual the freedom to determine what aspects of social, political, or spiritual life they wish to focus on. It is an occasion when physical

distance leads to psychological release – “Space does not simply represent individuality; it is a constituent of the psyche” (p.125). Within wilderness, one’s thoughts or actions are subjected to the same social requests which might take place within a community; therefore, the need to maintain a persona is no longer priority, and one’s attention can be focused inward. “One cannot masquerade in the forest; every back-country stride is a return to the self. [Thus], the elevation gained is not simply topographical... [one climbs] against the gravity that pulls down into social conformity” (p.125).

In order to fully address the internal aspects of the self, the individual must move beyond the fixed understandings bestowed on them by their community. “To know oneself is to know where one resides. And alone, one locates sooner” (p. 122). The internal world, which is seldom questioned in communal life, is revealed to the individual as the distance from the physical and social structures of daily life is enlarged. “We live collectively, but each of us must distinguish [themselves]—not over against [their] fellows, but among them. When rightly reciprocal with society, the creative individual is its growing edge” (p. 125). It is through temporary separation and release from the order of society which grants the creative individual an opportunity to think freely.

Introspection

Due to the quieting of extraneous noise, the conditions of wilderness invite the individual to reflect on the fundamental aspects of personal and social life. Despite the anti-social reputation that wilderness solitude has been given over time, it is through episodes of reflective thought where individuals can gain a greater understanding of the social nature of their world – “subtly, even solitary contemplation is a form of social conversation” (p. 124). The opportunity to explore the unknown regions of one’s mind is seldom offered in contemporary culture. Wilderness provides a setting that allows an individual to listen to their own thoughts, and consider the depth

in which they wish to investigate. Thus, the journey in wilderness is an “odyssey of the spirit traveling afar to come to itself” (p. 122).

There is a mental strength to be had when facing the challenges of wilderness alone. As those who have camped unaccompanied know, what is preserved in the wilderness is not only ecological autonomy, “but [also] a stalwart self” (p. 125). Just as physical separation gives way to communal release, so too does communal release give way to introspection – as the surface of one’s mind is the last remaining domain where a conscious dialog may take place.

Impermanent

What is important to note is that wilderness solitude is a temporary experience: “to seek an absolute solitude is therefore suicidal, for the exiled self disintegrates” (p. 124). As much as one benefits from communal release, it is the community which makes the individual complete – “there can be no single self, for consciousness is social” (p. 124). Consequently, it is the individual’s responsibility to bring the skills and understandings that are gained through solitude back into their community upon return. “Maturity is bred in solitude, and tested in its own domain” (p.125).

Although wilderness solitude is impermanent, the positive consequences of the experience remain with the individual long after they leave the wilderness. Therefore, the experience of wilderness solitude is most distinctly expressed by the temporary nature of one’s release from societal roles and responsibilities that define their daily lives.

Section 1.4 - Research Purpose

Now that the research problem has been illustrated, and a conceptual definition of wilderness solitude has been provided, the purpose of this research can be fully addressed. Within this study there are two primary goals of the research, the first is to develop a comprehensive understanding of wilderness solitude for the purpose of wilderness research and management; while the second is to investigate the level of importance wilderness users place on spending time away from internet and cell phone service. In order to accomplish these goals, an in-depth analysis of past empirical research on wilderness solitude was conducted so that an understanding of the past conceptual frameworks used in solitude research could be developed. Furthermore, an investigation of the indicators and measurements used to study the phenomenon of wilderness solitude was also conducted, which helped inform the development of the operational model of wilderness solitude used in this study. The following research questions provide a framework of investigation for this study:

Research Questions

Q1: What is the meaning of wilderness solitude in the 21st century?

Q2: Can the importance of wilderness solitude be described through a two dimensional model consisting of a physical and a psychological component?

Q3: How do visitor preferences for conditions differ within the physical and psychological dimensions of wilderness solitude?

Q4: Do wilderness visitors value the opportunity to disconnect from internet connections and cell phone service?

Q5: Do visitors who highly value solitude report sensitivities toward the social settings of wilderness?

Q6: Does age, mode of travel, or wilderness experience play a factor in visitor preferences for conditions as they relate to wilderness solitude?

Chapter II: Literature Review

In this chapter, an extensive review of past research and theory surrounding the topic of wilderness solitude will be demonstrated. The chapter will start by explaining the challenges past research has encountered, and the subsequent divide in research perspective that took place because of these challenges. Once the two resulting research perspectives are explained, a detailed look at past research methods and indicators of solitude will be explained. The final section of this chapter will provide a hypothesized model of wilderness solitude which has been developed for the use of this study.

Section 2.1 – Introduction

Wilderness solitude has long been an elusive concept. The relative ambiguities within the Wilderness Act when addressing the topic of solitude have left the phenomenon open for interpretation; as a result, research approaches have fragmented out by subscribing to multiple frameworks of understanding (Hammit & Madden, 1989; Hollenhorst et al, 1994). Among these approaches, researcher focus has predominantly fallen within two distinct frameworks: the social-spatial perspective and the humanistic perspective. The former aimed to measure threats to solitude by placing an emphasis on visitor use density, encounter norms and privacy. The latter perspective was designed to focus on the aspects of a visitor's solitude experience that related to a sense of psychological detachment from society. A common thread between these two perspectives has been the objective of determining the major characteristics that either define an individual's direct experience of solitude, or the measurement of an individual's perceived experience of solitude. These aims of inquiry both attempt to narrow in on the subjective experience of wilderness solitude. Nevertheless, researchers both outside and within the field of wilderness research have acknowledged the challenges of solitude research: "the task of studying

solitary experience is intrinsically difficult, [and] in one sense self-contradictory. In order to obtain information on what takes place when people are alone, their privacy must somehow be broken, thus, to a degree, negating the object of study” (Larson, 1990, p. 159).

Section 2.2 – Past Research on Wilderness Solitude

Within the social-spatial perspective, threats to wilderness solitude have been most closely aligned with the concept of isolation potential, citing such criteria as privacy, encounter norms, personal autonomy, and remoteness as the best indicators of measurement (Lee, 1977; Twight et al., 1981; Hammitt, 1982; Hammitt & Madden, 1989; Hammitt, 1994; Hall, 2001). Because of this, the social-spatial approach “assumes that solitude is a psychological response to social conditions experienced in the wilderness setting. [Which suggests,] if crowding is low or encounter norms are not exceeded, opportunities for solitude are presumably high” (Hollenhorst & Jones, 2001, p. 56). Due to the comparative ease in documenting the number of encounters a wilderness visitor experiences within a given landscape, the themes of crowding and visitor use density have traditionally been the leading models in which “opportunities for solitude” have been measured (Long et al, 2006). Following these themes, the concept of wilderness privacy was developed to signify a more pointed characteristic within the social-spatial perspective. Within the wilderness privacy literature, Hammitt and Madden (1989) found that one of the most important aspects of wilderness privacy “was being in a natural, remote environment that offers a sense of tranquility and peacefulness and that involves a freedom of choice in terms of both the information that users must process and the behavior demanded of them by others” (p. 293).

In contrast, the humanistic perspective concerning wilderness solitude shifted the focus of inquiry away from wilderness conditions relating to social experiences and isolation potential. Instead it concentrated more on the aspects of wilderness solitude which foster personal growth

and development. Specifically, researchers were examining the introspective components of solitude relating to self-examination and self-discovery (Young & Crandall, 1984; Hollenhorst et al., 1994; White & Hendee, 1999). In order to better guide this perspective, Hollenhorst and Jones (2001) developed this definition:

Solitude is psychological detachment from society for the purpose of cultivating the inner world of the self. It is the act of emotionally isolating oneself for self-discovery, self-realization, meaning, wholeness, and heightened awareness of one's deepest feelings, and impulses. It implies a morality that values the self, at least on occasion, as above the common good (p. 56).

Such a conceptualization suggests that instead of building an operational definition of solitude based around the external social conditions of a wilderness setting, solitude ought to be understood through the internal conditions that an individual brings with them into the wilderness. Rather than physical isolation and the limitation of encounters being the standard by which wilderness solitude is understood, Hollenhorst and Jones (2001) proposes that “there are other important factors related to social disengagement and opportunities for contemplative reflection that demand more managerial and research attention” (p. 60). Suggesting that release from societal norms and expectations and emotional isolation are also conditions involved with experiences of wilderness solitude. Within the humanistic perspective, the fundamental authority concerning “opportunities for solitude” is considered to be the predispositional factors a visitor brings with them to the wilderness experience (Hollenhorst et al., 1994).

Despite the bulk of wilderness solitude research being conducted within these two perspectives, the challenge of integrating the various research findings and conceptualizations has proven difficult, and the establishment of a comprehensive model of wilderness solitude has yet to be produced. Efforts in the past however, have been made; one particular research study within the social-spatial perspective saw Hammitt (1982) examined the cognitive dimensions of wilderness solitude. This study placed much of the research focus on how the social and physical

conditions of a “natural environment” can function to provide visitors with an element of improved “cognitive freedom.” Notwithstanding, self-reflective practices such as introspection, self-discovery, and heightened emotional maturity were not incorporated in the study.

On the other hand, the biggest challenge researchers in the humanistic perspective have encountered appears to have been the difficulty of measuring the internal aspects of an individual’s solitary experience, which Larson (1990) has labeled as a paradoxical endeavor. For these reasons, this study will aim to measure visitor preferences for conditions as they relate to wilderness solitude, rather than working to measure the experiential outcome of a visitor’s specific wilderness solitude experience. In order for this to take place, a closer look at the indicators and standards that past wilderness research has used to determine whether “outstanding opportunities for solitude” exist must be conducted.

Section 2.3 – Indicators and Measures in the Social-Spatial Perspective

Encounters

The most commonly used indicator throughout past research to measure opportunities for solitude has been visitor encounters. To measure encounters, researchers have used both qualitative and quantitative methods to determine how many other individuals or groups visitors had seen throughout a given day, with the intent of assessing the social conditions visitors were experiencing (Cole and Hall, 2010). This approach has been closely tied to the managerial outcomes of visitor use limitations, often in the form of permits, under the assumption that encounters are the greatest predictor of solitude achievement (Manning, 1985). Encounters have also found their way into the practice of wilderness character monitoring, which has emphasized the reduction of visitor encounters so that quality of the solitude experience is not degraded (Landres et al., 2012).

When working to establish indicators and standards that effectively measure the experience of wilderness solitude, researchers had to define the experiential attributes that define the phenomenon of investigation (Watson et al., 2016). Due to the ambiguities surrounding the concept of solitude in the Wilderness Act of 1964, Hammitt (1982) speculated that this led to the justification of early researchers and managers to define solitude as a state of complete isolation from all other people – which led to the experiential attribute of encounters becoming a measure that opportunities for solitude were being threatened. Although overall encounters have been theorized to deteriorate the quality of a visitor’s wilderness experience, studies have failed to produce statistical evidence of this being the case (Cole, 2001). Certain studies worked to specify the variables used to measure visitor encounters, citing group size, behavior of visitors encountered, and groups camped within sights and sound as being more predictive of experiential quality; however, such variables were shown to have less of a correlation with solitude, and more of an association with the holistic wilderness experience (Roggenbuck et al., 1993; Watson, 1995; Manning et al., 1999).

Hall (2001) suggests that the total number of visitor encounters experienced throughout a wilderness trip has little consequence on overall solitude achievement, and instead, patterns of encounters were reported to have a greater effect on opportunities for solitude. In a study conducted in the Great Smokey Mountains National Park, Patterson and Hammitt (1990) found that despite 83% of visitors reporting that they encountered more hiking groups in the backcountry than their level of acceptable norms, only 34% of respondents stated that those encounters detracted from their experience of solitude, suggesting there are other variables at play. Dawson (2004) also proposed that more specific variables within encounter norms ought to be monitored in order to determine whether opportunities for solitude are reduced. Moreover, the knowledge that encounters often show a weak but statistically significant negative relationship

with solitude suggests that it is not the ideal standard to use when examining whether opportunities for solitude exist (Stewart and Cole, 2001). Hollenhorst and Jones (2001) argue that within the social-spatial perspective, the operationalization of solitude through the lens of encounters is an overly simplistic view of the concept. Nevertheless, Cole and Hammitt (2000) make the following claim: “Solitude is an important aspect of wilderness management, use encounters have to be involved, and it is the responsibility of wilderness scientists to develop more sophisticated research in order to validly support managing for solitude in wilderness ecosystems” (p. 62).

Carrying Capacity, Crowding and Visitor Use Density

One attempt to develop a more sophisticated understanding of how encounters might affect wilderness solitude was to incorporate the concept of recreational carrying capacity. Directed by the conceptualization of Wagar (1964), social carrying capacity has been used to consider how the social conditions within wilderness impact a visitor’s experience. Wagar’s original interpretation centered around the concern of visitor perceptions regarding their overall outdoor recreation experience, suggesting that once a visitor perceived a particular setting to be crowded, “traditional wildland values are lost” (p. 2). This implies that the social conditions within a wilderness area have the ability to directly affect the perceptions and experiences of the visitors present (Manning, 1985). Efforts to establish an understanding of recreational carrying capacity came in response to issues of crowding, which have long been a concern for researchers and managers alike (Freimund and Cole, 2001). In multiple studies, opportunities for solitude were measured by comparing the quantity of groups encountered, and assessing visitor perceptions of crowding through their reported standards for number of encounters (Hall and Davidson, 2013; Shelby and Heberlein, 1986). This led to the belief that “the problem with increased crowding, then, is that people lose the ability to experience solitude in recreationally

attractive, relatively accessible locations. Since most people seek out these opportunities, this represents a significant loss” (Cole, 2000, p. 6). However, this assumes that all visitors share the same desire to experience solitude, while also holding similar levels of sensitivity towards crowding and encounters. In contrast, Watson et al. (1997) found that tributary boaters in the Frank Church-River of No Return Wilderness who rated their skill level as “intermediate,” were less likely to report negative responses to the physical or social conditions in the wilderness than visitors who rated their skill level as “advanced” or “expert”; suggesting that high numbers of encounters, or experiences of crowding do not negatively affect all wilderness visitors.

Research regarding crowding has also been expanded beyond the single indicator of trail encounters to include visitor experiences at trailheads, water access sites, and campsites. In a study conducted at the Boundary Waters Canoe Area Wilderness, Watson (1995) discovered that “the majority of visitors who reported feeling crowded within the wilderness did not change their route or the length of visit to avoid such crowded conditions. Which suggests that a general report of crowded conditions is perhaps not a serious indication that solitude opportunities do not exist” (p. 14). Additionally, this and other studies have found that when displacement occurs because of crowded conditions in wilderness, such as the difficulty of locating an unoccupied campsite, such conditions appear to have a greater impact on the overall quality of a visitor’s experience, rather than the single dimension of solitude (Cole and Hall, 2009; Watson, 1995). These findings raise the point that solitude is not the only experiential incentive individuals have when visiting wilderness, and that the effort to quantify the concept of solitude not only has the ability to produce uncertain results, but it also simplifies the concept of the wilderness experience as a whole.

As previously discussed, the Wilderness Act of 1964 states that areas designated as federal wilderness must provide “outstanding opportunities for solitude or a primitive and unconfined

type of recreation.” (Sec. (c)). Due to the belief that crowded conditions counter many of these characteristics, past research understandably employed the opportunities mentioned in this clause of the Wilderness Act to represent the conditions that lead to visitor satisfaction and wilderness experience quality. Unfortunately, much of the early research exclusively singled out “opportunities for solitude” as the leading indicator when measuring for visitor satisfaction and wilderness quality (Dawson et al., 1998). This is significant because research regarding recreational carrying capacity and crowding in wilderness have done little to investigate how the social conditions impact aspects of a “primitive and unconfined type of recreation.” This raises the question of whether or not using solitude as the leading indicator to measure visitor satisfaction and wilderness quality is an appropriate use of the concept.

Although crowding has been a central focus of research and management for years, perhaps it is time to explore other indicators of overall trip quality. Further research on wilderness experience quality may suggest alternative indicators for evaluating experience quality or different ways to conceptualize social conditions in wilderness beyond simple measures of the number of other groups seen or heard (Hall and Davidson, 2013, p. 59).

Furthermore, Hollenhorst et al. (1994) found that solitude achievement was most notably influenced by variables that related to the personal importance visitors placed on solitude, rather than levels of crowding experienced throughout a wilderness trip.

Privacy

A handful of researchers have suggested that solitude is a multidimensional construct more closely aligned with the notion of privacy, rather than conditions of perceived crowding (Hammit 1982; Patterson and Hammit, 1990). In an attempt to move beyond the social-spatial perspective, researchers conceptualized wilderness privacy to include a number of dimensions assumed to be analogous with solitude and its attributes of social disengagement (Hammit, 1982; Hammit and Brown, 1984; Hammit and Madden, 1989). More specifically, this research was guided by Westin’s (1967) definition of privacy, which states: “the claim of individuals, groups, or

institutions to determine for themselves when, how, and to what extent information about them is communicated to others.” This suggests that privacy is associated with the level of social control an individual has within their environment, and that the notion of privacy in wilderness circles around the idea of isolation potential. Therefore, if an individual lacks control, they also lack privacy, which in past research has served as a proxy for solitude. In a 1995 study, Hammitt and Rutlin found that increased levels of group encounters led to a decrease in the amount of desired privacy achieved, suggesting that privacy is directly dependent on conditions relating to visitor use density and isolation potential. However, privacy and solitude are not necessarily analogous concepts, and there is nothing within the Wilderness Act to suggest that visitors must be afforded conditions of privacy.

Despite wilderness privacy being an attitudinal concept, because past research made the concept’s measurement dependent on the proximate social conditions experienced in wilderness, it is classified within the social-spatial perspective for the purpose of this study. Additionally, within the research literature, the preoccupation with the theme of “control” suggests that the concept of privacy better aligns with the conditions of “unconfined recreation,” instead of “opportunities for solitude.” For example, Hammitt and Madden (1989) explain privacy in the following way:

Wilderness privacy is not so much individual isolation as it is a form of privacy in a specific environmental setting in which individuals experience an acceptable and preferred degree of control and choice over the type and amount of information that they must process (p. 300).

Within this statement, and the further conclusions of Hammitt and Madden’s report, the use of “control and choice” suggest that without such variables, visitors who experience a loss in privacy would also experience a loss in freedom, leading to a sense of confinement, as their level of control over the conditions of the setting have been limited.

Before moving forward, it's important to note that the concept of wilderness privacy has produced great research when it comes to investigating visitor experiences in wilderness. Nevertheless, the concept's association with the "opportunities for solitude" clause within the Wilderness Act does not seem fully appropriate. To start, Westin's theory of privacy was founded under the context of an individual's right to privacy *within* civilization, not wilderness – suggesting the fundamental tenants of his conceptualization diverge from the conditions of wilderness. Furthermore, in a 1968 Law Review Journal produced by Washington and Lee University, Westin's book, *Privacy and Freedom*, was described as "a detailed and comprehensive evaluation of the conflict between privacy and surveillance in modern society" (pg. 168). Westin's writing addresses the consequences of living within an era of American history when personal surveillance was becoming a public concern, and his intent for establishing such a definition was for it to be related to the societal conditions that directly threaten personal liberties (Bland, 1968). This relates to the idea that American society during the late 1960's, was becoming a more confining environment. Not only were the populations of major cities beginning to swell, but the lives of everyday citizens were starting to become cataloged through the means of electronic records and digital surveillance. Wilderness, in direct contrast to these characteristics that had Westin concerned, does offer a unique condition of privacy. However, once an individual's desired conditions of privacy are met, it would suggest their experience becomes more akin to a sense of freedom, much like the title of Westin's book proposes. As the external threats of unwanted observation and communication are limited by an environment that filters the existence of those mechanisms, the wilderness visitor is exposed to a less confining experience, rather than one of solitude.

Notwithstanding, the concept of wilderness privacy has been used to build a large body of work relating to wilderness solitude, and determining whether or not it is an important aspect to

wilderness visitor's conception of solitude is a goal of this research. Moreover, in much of the research that has been developed through the social-spatial perspective, the main objectives had been to identify indicators that diminish or threaten a visitor's experience of solitude. As this section has outlined, encounters, crowding, and privacy have all been utilized to measure visitor responses to the social conditions of wilderness, and have served as variables that reflect dimensions of wilderness solitude. Questions regarding personal definitions of solitude, or the values associated with wilderness solitude, were never straightforwardly addressed within this perspective. This left the concept of wilderness solitude solely in the hands of wilderness researchers and managers.

Section 2.4 – Indicators and Frameworks in the Humanistic Perspective

The overarching theme within the humanistic perspective is that solitude achievement is found within the individual's desire to disengage from societal norms for the purpose of introspection (Hollenhorst and Jones, 2001). Instead of exclusively viewing the phenomenon of solitude as the aspiration to achieve a state of physical isolation, this approach looks toward the interpretations of solitude that have been used in both the philosophical and psychological literature, proposing that solitude is “the capacity to cope positively with time spent alone” (Hollenhorst et al., 1994). Rather than examining the social conditions of the wilderness setting, the humanistic perspective sought to investigate how the individual themselves considers a sense of solitude. In a study titled, *The Subjective Experience of Solitude*, Long et al. (2007) concluded, “while the absence of others may facilitate both achieving and maintaining solitude, we believe it is not strictly necessary for this state to occur; in many respects, solitude is a personal rather than a place-based concept” (p. 68). This notion of solitude being a personal concept is further echoed by Hollenhorst et al. (1994), who believed that the most effective predictors of solitude

achievement were not the physical conditions of the wilderness setting, but rather the predispositional factors a visitor brings with them to the wilderness experience. Therefore, when attempting to measure the subjective experience of solitude, research approaches in the humanistic perspective have employed themes such as self-development, the capacity to be alone, and perceived detachment from society.

Attitudes towards Solitude

Outside of the natural resource literature, the intellectual framework for solitude is rooted in philosophical elements of the romantic and transcendental movements, which in turn were passed down from classical antiquity. Within this framework, solitude is viewed as a striving for independence and detachment from social constraints, norms, and expectations (Hollenhorst and Jones, 2001, p. 56).

One major consideration that ought to be taken from Hollenhorst and Jones' assessment is the deep-rooted tradition within wilderness research that places its interpretation of solitude around the spatial variables of visitor use density, encounters, and privacy. In the effort to move beyond those variables, the humanist perspective sought to examine solitude as it is experienced by the individual, with a focus on the psychological conditions of wilderness visitors. In order to accomplish this task, early research first sought to establish how the attitudes of wilderness visitors were oriented towards solitude. In their 1994 study, Hollenhorst and others developed a 13-page survey to establish visitor perceptions and attitudes towards solitude, as well as the factors that influence solitude achievement. Factor analysis of 19 different dimensions of solitude found that the three dominant attitudes and perceptions visitors had towards solitude were: *positive*, *wholeness* and *solemn*. The *positive* dimension represents the optimism visitors expressed towards the experience. *Wholeness* was interpreted to speak to the benefits of solitude, suggesting that it was a strong and fulfilling experience. And *solemn* was understood to highlight the serious and consequential nature of the experience. Within these three dimensions, "the most important items related to independence, disengaging from social roles, individuality, and escape from

social expectations” (p. 237). However, the study also concluded that solitude is a learned behavior, and in order for visitors to encounter opportunities for solitude, wilderness managers have a responsibility to educate and promote “the intrapersonal capacity for solitude in the wilderness user” (p. 239).

Psychological Detachment from Society

The notion that solitude is a psychological detachment from society is founded within the belief that by releasing oneself from the social norms and constraints that dictate interpersonal life within society, one becomes a self-governing individual (Hollenhost and Jones, 2001). Additionally, the psychological detachment is believed to come about when an individual removes themselves not only from their habitual built-environment, but also when they move beyond the fixed definition of self, assigned by peer groups or family members (Larson, 1990). This detachment is seen as a withdrawal from the norms of societal life, a liberation from existence “on-stage,” where social observation and participation are an expected condition within daily life (Akrivou et al., 2011).

When working to measure a psychological detachment, researchers have equated it with the aspects of emotional release and personal renewal (Hollenhost and Jones, 2001). However, trying to pin down the exact circumstances that promote such experiences has proven difficult. In contrast to measuring the impact of the social conditions within wilderness, investigations concerning a psychological detachment from society have been geared towards assessing the intrapersonal dynamics of reflective thought, creativity and personal intimacy that wilderness is believed to promote (Atchley et al., 2012). Research that has measured these subjectivities, and has arrived at these conclusions, have done so by asking respondents to report the perceived benefits they achieved throughout a solitude experience (Long and Averill, 2003).

The Capacity to be Alone

Within the humanistic perspective, a guiding conceptual understanding is that in order for individuals to experience positive episodes of solitude, they must first possess the ability to cope with the absence of social engagement (Hollenhorst and Jones, 2001; Long and Averill, 2003; Long et al., 2007). Furthermore, Winnicott (1958) suggests that solitude achievement rests on the ability of the individual to not succumb to loneliness, impulse, or fear within a solitary experience; and that the capacity to be alone is “one of the most important signs of maturity in emotional development” (p. 416). These are all notions that suggest that solitude achievement is determined by a combination of social, environmental, and personal conditions.

Larson (1990) proposes that “solitude is distinguished as a situation when a person’s thoughts, feelings, and actions are less subject to the matrix of social regulation” (p. 176). This further advocates that social conditions play a large role in one’s experience of solitude, but also suggests that an individual must be comfortable with existing without the structure, or reassurances afforded by, the matrix of social regulation. Through both of these interpretations of solitude, the more the literal definition of being in a state of physical isolation gets succeeded by the notion that in order to experience solitude, one must possess the ability to positively cope with the conditions of aloneness. To be unaccompanied, and not succumb to negative emotions associated with one’s social separation, is not only a fundamental aspect of the capacity to be alone, it is also a key factor within solitude achievement (Storr, 1989).

Without the capacity to positively cope with a disengagement from others, no such opportunities for solitude exist (Hollenhorst et al., 1994). This makes the capacity to be alone a condition that determines whether opportunities for solitude exist. Therefore, prior to measuring the threats that encounters or crowding have on solitude achievement, a baseline understanding of a visitor’s willingness to spend time alone should be established.

Introspection

Traditionally, researchers have used the reported benefits of the solitude experience to support the claim that self-development does, in fact, take place (Hollenhorst et al., 1994; White and Hendee, 1999). Within the White and Hendee study (1999), development of self was the most highly reported outcome of the solitude dimension within the wilderness experience. Furthermore, participants in the study expressed that the benefits associated with self-development ranged from self-actualization and self-concept, to reduced anxiety and restored levels of personal functioning. Many of these reported benefits are supported by previous studies suggesting similar outcomes from time spent in natural environments (Young and Crandall, 1984; Kaplan and Kaplan, 1989; Ewert, 1988). However, several of these studies were not exclusively measuring the experience of solitude; instead, the aim of inquiry was the overall wilderness experience. This suggests that self-development might be an experiential outcome that is gained through a multitude of different experiences in wilderness, not just solitude.

What has typically been recognized within traditional psychological research, where the wilderness setting is not an immediate consideration, is that “by freeing [one’s] attention from social participation and self-monitoring, solitude provides a situation suited to deep absorption” (Larson, 1990, p. 165). These findings highlight the very challenge of attempting to measure subjective understandings – as the very indicators researchers are working to discover, are often times different across populations (Larson and Johnson, 1985).

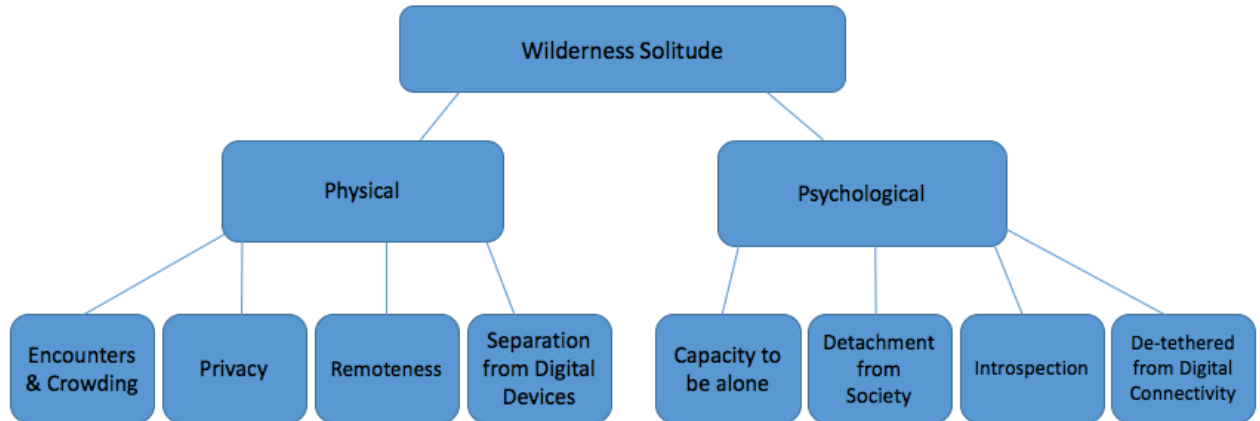
It’s been said that because solitude is a personal phenomenon, efforts to generalize the experience are not only contradictory, but they serve to narrow the spectrum of the solitude experience (Larson, 1990). Therefore, this research study has worked to develop a model that aims to measure aspects solitude that relate to a wilderness visitor’s preference for conditions, rather than their retrospective experience. The challenges of measuring the subjective experience

encountered by the humanistic perspective shows the difficulty in measuring the psychological aspects of wilderness solitude. This challenge also helps explain why the social-spatial perspective has been able to accrue such a large body of work. However, the shortcoming of this is that wilderness solitude has not been investigated through a model that considers all aspects of the phenomenon. Therefore, the study aims to fill this gap in the understanding of wilderness solitude.

Section 2.5 – Hypothesized Two Dimensional Model of Wilderness Solitude

In order to propose a model of wilderness solitude that covers both the social-spatial and humanistic perspectives, this section will provide the conceptual outline for the physical and psychological dimensions of wilderness solitude. Based on prior research and theory, the hypothesized model is broken down to have four subcomponents within each of the two primary dimensions. This model has been designed to measure recreational preferences for conditions as they relate to the experience of wilderness solitude. The physical dimension within the model was developed to represent the social spatial perspective; while the psychological dimension was meant to represent the humanistic perspective. The section that follows explains the conceptual reasoning for selecting each of the eight subcomponents that constitute the two dimensional model, and highlights what type of indicator items might be useful when developing the operational model in the methods chapter. Figure 2.1 provides an image of the hypothesized model.

Figure 2.1: Hypothesized Two-Dimensional Model of Wilderness Solitude



The Physical Dimension

Encounters & Crowding

The encounter and crowding component of the two dimensional models serves to address the long held belief that visitor encounters and perceptions of crowding serve to reduce opportunities for solitude (Steward and Cole, 2001; Manning, 2003). Furthermore, in the recently revised and republished *Keeping It Wild 2*, the federal interagency approach for conducting wilderness character monitoring in accordance with the Wilderness Act, stated, “seeing or hearing other people inside a wilderness directly affects opportunities for solitude” (Landres et al., 2015, p.53). The monitoring strategy laid out in *Keeping It Wild 2* suggested that indicators used for measuring solitude achievement can be, “number of visitor encounters on travel routes; [and] number of occupied campsites within sight and sound of one another” (p.54). In keeping with these recommendations, this subcomponent within the physical dimension of the model will investigate visitor preferences for conditions relating to encounters and crowding when associated with wilderness solitude.

Privacy

The privacy component of the physical dimension will follow Westin's (1967) definition which has commonly been used to guide wilderness research surrounding solitude (Hammitt, 1982; Hammitt, 1984; Hammitt, 1989; Hammitt, 1991). Westin defines privacy as: "the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others." In accordance with this theoretical definition, and with the past indicators used to measure achievement of privacy, this component will seek to investigate the validity of privacy's relationship with the experience of wilderness solitude.

Isolation Potential: Remoteness

The component of remoteness falls into the physical dimension of this model based on the wilderness character monitoring suggestions of *Keeping It Wild 2*, and the findings of Hammitt and Madden (1989). In *Keeping It Wild 2*, "remoteness from sights and sounds of human activity outside the wilderness" was listed as one of the four indicators suggested for monitoring solitude or primitive and unconfined recreation quality. Furthermore, Hammitt and Madden (1989), found that one of the most important aspects of wilderness solitude and privacy "was being in a natural, remote environment that offers a sense of tranquility and peacefulness..." (p. 293). Remoteness, in this respect, will aim to measure visitor importance regarding physical remoteness from other people within the wilderness, as well as physical remoteness from the structures, sights, and sounds of civilization.

Separation from digital means of communication

The notion of digital separation within the physical dimension pertains mostly to literal separation from mobile devices and access to cyberspace. By entering wilderness, the technology

that typically connects individuals to their social networks no longer functions to the same degree. As Harris (2014) suggests, “the sheer volume of time we devote to our devices means we each are carving ‘expendable’ hours away from other parts of our lives” (p. 19). In wilderness, those ‘expendable’ hours are given back to the individual, and this component seeks to understand the importance of this condition. The separation from technological means of communication which are a result of the physical conditions of the wilderness, serve to represent a component of the wilderness experience that are novel to the times. Because of this, respondents will be asked how important this form of digital separation is towards their experience of solitude.

The Psychological Dimension

Capacity to be Alone

The capacity to cope positively with time spent alone has often been thought to be a critical factor when striving for solitude achievement (Hollenhorst et al., 1994). Winnicott (1958) suggests that solitude achievement rests on the ability of the individual to not succumb to loneliness, impulse, or fear within a solitary experience. Therefore, without the capacity to positively cope with a disengagement from others, no such opportunities for solitude exist (Hollenhorst et al., 1994). This subcomponent of the psychological dimension will aim to measure the importance visitors place around their own capacity to experience positive episodes of time alone.

Introspection

A longstanding theme within the wilderness solitude literature is the role of solitude in developing a truer understanding of the self. According to Hollenhorst and Jones (2001), solitude is: “the act of emotionally isolating oneself for self-discovery, self-realization, meaning, wholeness and heightened awareness of one’s deepest feelings and impulses” (p. 56). Such claims are

supported by research findings from Larson (1990) that state, “aloneness is a time when one steps outside the fixed definition of self assigned by [others], and may provide an important opportunity to consolidate a personally defined self” (p. 171). Therefore, these items will investigate the importance wilderness visitors place on self-reflective thought pertaining to personal or spiritual development, and the opportunity to release from any fixed definitions of self, that are imposed by communal life.

Psychological detachment from society

The experience of wilderness solitude is one that can be best understood because of its antithesis: an individual’s existence within a society. Therefore, a psychological detachment from society comes from the consideration of society’s inability to immediately impact the individual when detached from its constructs. The further one travels into wilderness, the more self-governing they become: “solitude is distinguished as a situation when a person’s thoughts, feelings, and actions are less subject to the matrix of social regulation” (Larson, 1990. p. 176). One of a society’s most common functions is to regulate social life. Subsequently, in order to psychologically detach from this influence, a sense of decreased regulation ought to be attained. In order to determine if this notion holds true among wilderness visitors, respondents will be asked how important it is for them to experience a feeling of freedom from social regulation and constraint.

De-tethering from Digital Connectivity

Information and communication technologies have become a defining aspect of the human condition with the 21st century. However, this transformation towards device-based living is not without its limitations: “inevitably, the constant flow of communication requires negotiation over the allocation of time and attention in multiple temporal zones, causing

communication congestion and conflicts” (Wajcman, 2015, p.159). Feelings of anxiety brought on by increased access and social expectations have led to major concerns regarding the frequency and format in which our social relationships are carried out through digital technology (O’Keefe et al., 2011). The need to de-tether from these avenues of communication have been seen as a way to gain better access to one’s self for the purpose of personal renewal (Turkle, 2008). In respect to these suggestions and findings, respondents will be asked how important it is for them to spend time away from digital connectivity when it comes to experiences of wilderness solitude.

Section 2.6 – Study Hypotheses

The following hypotheses have been developed to parallel and further amplify the research questions that are guiding this investigation. The six hypotheses were established through careful consideration of past research on wilderness solitude and aim to test the assumptions associated with visitor preferences for conditions.

H₁: High levels of motivation will be reported towards experiencing solitude.

H₂: If high motivation toward experiencing solitude is reported, then visitors will place importance on the conditions of disconnecting from internet and cell phone.

H₃: If low motivation toward experiencing solitude is reported, then visitors will place low importance on the conditions of disconnecting from internet and cell phone service.

H₄: Preferences for conditions relating to wilderness solitude will differ among types of users.

H₅: Preferences for conditions relating to wilderness solitude will differ among length of stay in wilderness.

H₆: Preferences for conditions relating to wilderness solitude will differ among age demographics.

Chapter III: Methods

Section 3.1 – Introduction

This study used an on-site, quantitative survey to assess the level of importance wilderness visitors place on various experiential conditions relating to wilderness solitude. The main objective of this research approach was to develop an operational model of wilderness solitude by assembling past research measurements and theoretical approaches while also incorporating novel components relating to contemporary technology. This chapter is divided into several sections that explain the methodology of this study. The first section will provide an overview of the study location. The second section will explain the study population and sample design. The third section will outline the survey instrument. The fourth section will explain the data collection procedures. And the final section will summarize the data analysis process.

Section 3.2 – Study Location

The Bob Marshall Wilderness Complex (BMWC) located in northwestern Montana encompasses over 1.5 million acres of rugged and remote federally designated wilderness. The BMWC is made up of three contiguous wilderness areas: the Bob Marshall, the Great Bear, and the Scapegoat. Known to many in the region as “the Bob,” the BMWC is a landscape which includes timber forests, high mountain lakes, craggy peaks, wild rivers and large alpine meadows. The BMWC also serves as a habitat to a large variety of wild animals: grizzly, elk, moose, mountain lions, wolves, wolverines and various birds of prey all live across the landscape. Situated along the Continental Divide, the BMWC protects the headwaters of several watersheds that flow towards both the Pacific and Atlantic Oceans.

The BMWC is managed by the United States Forest Service (USFS), and is part of four separate USFS administrative units: the Lolo National Forest, the Flathead National Forest, the

Lewis and Clark National Forest, and the Helena National Forest. With much of the BMWC being established through the passing of the Wilderness Act of 1964, this vast and storied landscape offers recreational visitors a wide variety of access points leading into the wilderness area. Throughout the summer and fall, the BMWC host visitors from all across the United States. With over 1,000 miles of trail, the BMWC provides visitors incredible opportunities to explore one of the largest wilderness areas in the lower 48 states. Additionally, the BMWC does not offer much service when it comes to cell phone function or network connections, which is very much a condition of interest for this study. Overall, consistent visitation numbers, along with a varied population of recreational user groups, helped make the BMWC an ideal location for this study.

At the project's onset, field research was intended to be centralized to the southwestern region of the BMWC, which is classified by the USFS as the Seeley Lake Ranger District. However, the summer of 2017 quickly became a historic wildfire year in Montana, and due to active fires within the southwest portion of the BMWC, field research was extended across two additional Ranger Districts within the southern half on the BMWC: the Lincoln R.D. and the Rocky Mountain R.D.. Across these three districts, a total of nine trailheads were used in field research, those trailheads are listed below and marked in red on Figure 3.1 which represents the map of the entire south half of the BMWC.

Figure 3.1: Map of Trailheads in Southern Half of BMWC

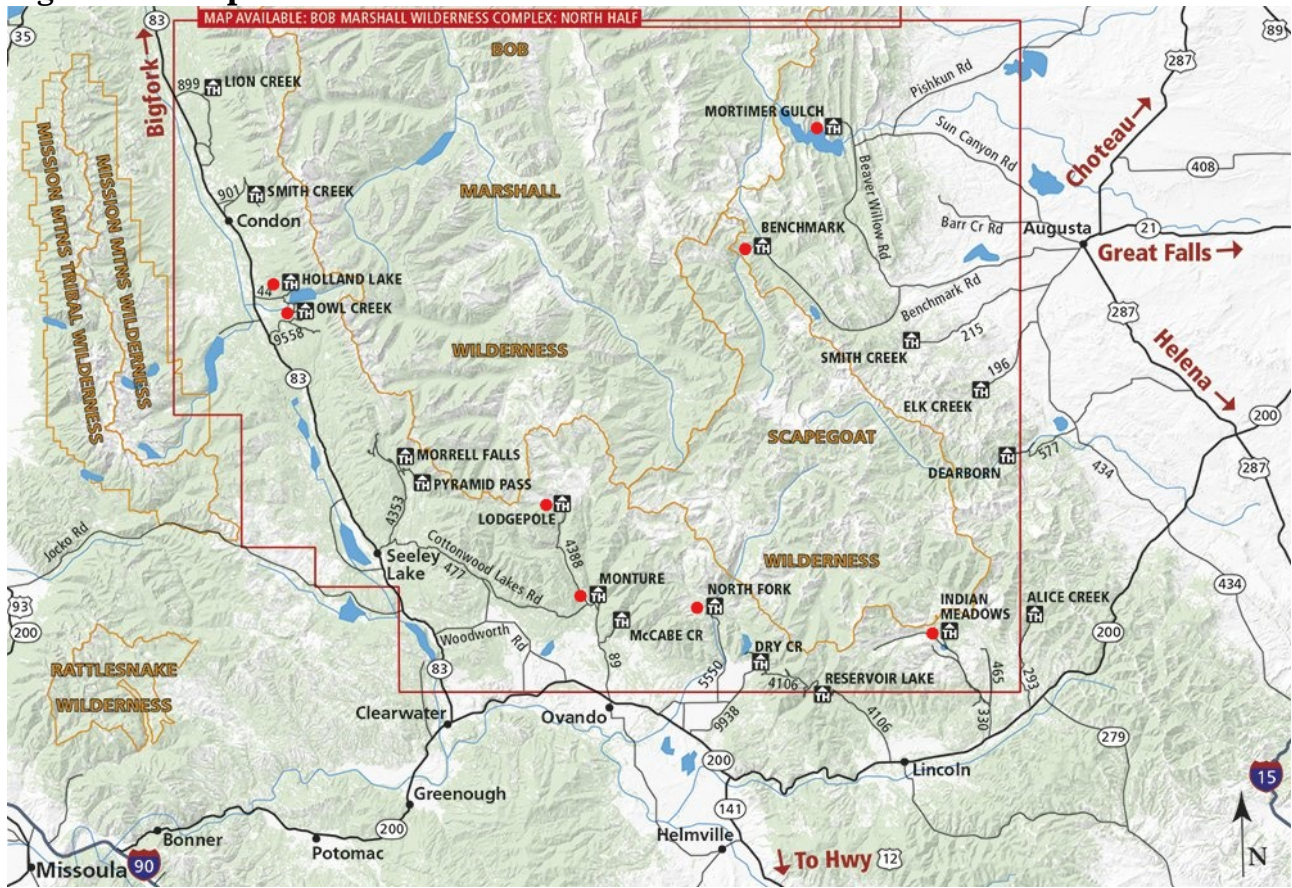


Photo: Cairn Cartographics

Trailheads: Holland Lake; Owl Creek; Lodgepole; Monture Creek; North Fork Blackfoot River; Indian Meadows; Benchmark; South Fork Sun River; Mortimer Gulch.

Section 3.3 – Study Population & Sample Design

The population of interest for this study were wilderness users of the southern half of the BMWC during the summer and fall of 2017. Therefore, the unit of analysis within this study was the individual wilderness visitor. The sampling method used in this study is classified as convenience sampling. According to Sproull (2003), a convenience sample is “a nonrandom sampling method in which the researcher uses some convenient group or individuals as the sample” (p. 119). For the purpose of this study, a convenience sampling method offered several benefits that increase time-effectiveness and allowed for greater ease of access to the desired

population of wilderness users. Due to the difficulty of attaining a random sample with only one researcher, a convenience sample allowed for greater flexibility within the sampling plan, which resulted in sufficient variation across wilderness users and data collection sites. The danger that a convenience sample presents is one of sampling error, which is the extent to which a sample is limited in its ability to accurately describe a specific population because some, rather than all, of the elements in the population are sampled (Vaske, 2008). Nevertheless, while the resulting data from this study is not a representative sample of wilderness users across the BMWC, within the results sections in the following chapter, representative sample populations established through past research in the BMWC were used to identify whether any sampling error likely exists or not. With this being said, the analysis and results of this study do not aim to make generalized claims about the sample population (Babbie, 2013). Instead, the sample population works to test the validity and reliability of the two-dimensional wilderness solitude model developed within this study.

Section 3.4 – Survey Instrument

As discussed in the literature review, past studies focusing on wilderness solitude have traditionally fallen within two research frameworks: the social spatial and the humanistic. Within these two frameworks, much of the research investigating wilderness solitude has been performed through a quantitative approach; which has produced a large body of knowledge that greatly contributed to the development of this study's survey instrument. In order to build on past findings, while also furthering the knowledge base surrounding wilderness solitude, the survey instrument used in this study and conclusions from analysis needed to be valid and reliable. The first step toward meeting this criteria was to assemble survey items that perform in a consistent, and predictable manner (DeVellis, 2017). This required consistency out of the scoring measure,

which was a 6-point Likert scale, so that an item's rating could be recorded in a uniform manner, and all survey respondents could respond to the same questions and scale. The desired degree of predictability does not relate to the overall results of the entire survey, instead, predictability is concerned with the manner in which participants respond to the particular survey items, which is most commonly affected by the wording used within the questions (Babbie, 2013). For these reasons, the majority of survey items assembled within this study were selected from previous research on wilderness solitude. By selecting items that have already been defined and tested, the likelihood of improving this survey's sampling adequacy becomes much greater. Previously tested items aid in this process because they serve to justify and explain content validity, which is the assurance that the survey instrument accurately reflects the concept it is intended to measure (Babbie, 2013).

Survey Breakdown

The first section of the survey instrument was a group and/or individual summary gathered through observational means and recorded by the primary researcher. The variables within this section aimed to gather baseline information regarding the visitors contacted at the BMWC; it also served as a tool to help determine if there was a nonresponse bias within the sample. A nonresponse bias is often the result of a sampling error that occurs when a particular segment of a population is underrepresented within the dataset – a nonresponse bias becomes a concern when a high response rate is not achieved (Vaske, 2008). The data gathered in this section included visitor sex, direction of travel, length of stay, and primary use of group. Also documented in this section was the trailhead in which the visitors were contacted, as well as the date and time of each contact. This section of the survey helped categorize users so that multiple sub-populations could be established and further the data analysis process.

The second section of the survey instrument was completed on-site by visitors who were willing to participate in the study. In this section, questions asked about individual levels of interest relating to various wilderness activities, and inquired about personal demographic characteristics. In order to gain an understanding of visitor familiarity with the wilderness conditions of the BMWC, visitors were asked if that had previously visited the wilderness area, and if so, they were asked to list how many times they had visited.

Questions regarding different wilderness activities were used to establish an understanding of how individual visitor interests positioned in relation to the phenomenon of solitude. There were eight activities mentioned, and visitors were asked to rate how important each activity was on a 4-point categorical scale, with 1 indicating (*not important*), and 4 indicating (*most important*). The eight activities mentioned were: “spending time with family and friends”; “quality hunting”; “quality fishing”; “finding solitude”; “testing outdoor skills”; “revisiting a familiar area”; “being away from internet and cell phone service”; “challenge and adventure”. Seven out of the eight items were taken from the Whitmore et al. (2005) visitor use survey of the BMWC. The novel item that was added asked about being away from internet and cell phone service. The personal demographic questions within this section covered age, level of education, and current residence.

The final section of the survey instrument was the 23-item scale which worked to operationalize the conceptual definition of wilderness solitude explained within the introduction and literature review. The advantage gained by using a conceptual definition to aid in the process of scale development is that it allows the concept to be clearly and rigorously articulated, which further supports content validity (DeVellis, 2017). Additional guidelines used during the scale building process considered whether the items reflected the dimensionality hypothesized within scale, and if appropriate levels of redundancy among items were utilized to help examine

the reliability of the scale (DeVellis, 2017). Below, the eight subcomponents of the two dimensional model are explained and the items used to represent those subcomponents are provided. Of the 23 items, two were selected from the *Keeping It Wild 2* (Landres et al., 2015) report published by the Forest Service’s Rocky Mountain Research Station to promote a national protocol for wilderness character monitoring. Four items were taken from Hammitt’s (1982) study titled, *Cognitive Dimensions of Wilderness Solitude*. And eleven items were taken from Driver’s (1983) *Master list of items for Recreational Experience Preference scales and domains*. The six items used to operationalize the subcomponents relating to digital technology were novel to the field of wilderness research, and therefore, no previously tested items existed. With this in mind, the six items that were created aligned with the conceptual themes of digital connectivity and accessibility described in chapter one.

Scale Items for the Physical Dimension

Encounters & Crowding

“To encounter low numbers of people on the trail” (Landres et al., 2015)

“To camp free from the sights and sounds of others” (Landres et al., 2015)

Privacy

“To be free from observation by all other people” (Hammitt, 1982)

“To be alone” (Driver, 1983)

“To be away from crowds of people” (Driver, 1983)

“To feel isolated” (Driver, 1983)

Isolation Potential: Remoteness

“To get away from the noise back home” (Driver, 1983)

“To be in an environment mostly free of human-man intrusions” (Hammitt, 1982)

“To experience the tranquility and peacefulness of a remote environment” (Hammitt, 1982)

Separation from digital means of communication

“To be away from cells phones and other digital devices”

“To experience life without everyday technologies”

“To not multitask with digital devices”

Scale Items for the Psychological Dimension

Capacity to be Alone

“To be on my own” (Driver, 1983)

Introspection

“To think about my personal values” (Driver, 1983)

“To think about who I am” (Driver, 1983)

“To develop personal and spiritual values” (Driver, 1983)

Psychological detachment from society

“To give my mind a rest” (Driver, 1983)

“To be relieved from the rules and constraints of society” (Hammitt, 1982)

“To get away from the usual demands of life” (Driver, 1983)

“To avoid everyday responsibilities for a while” (Driver, 1983)

De-tethering from digital connectivity

“To disconnect from social media”

“To be away from emails and instant messaging”

“To be away from internet connections”

Measurement Scale

In order to establish standardized response categories within the survey instrument, a 6-point Likert scale was used. This technique allowed visitor preference for conditions to be measured through the metric of “importance,” ranging from lowest value of 1 (*Extremely Unimportant*) to the highest value of 6 (*Extremely Important*). Likert scaling is a widely used practice when the aim of investigation is measuring opinions, beliefs, and attitudes (Devellis, 2017). In order to examine visitor preferences for conditions, a lead in question was used to introduce the respondent to the 23-item solitude scale. The lead in question was: “How important are the following items to your wilderness solitude experience?”

Section 3.4 – Data Collection

Prior to the start of data collection, The Institutional Review Board (IRB) for human subjects in research at the University of Montana reviewed the research proposal and survey instrument of this thesis and provided an approval for this study. Additionally, a letter of nominal effects was required on the part of the USFS, this was required to ensure that visitors to the BMWC who were contacted to partake in the study would not be negatively affected by the content of the survey, or the on-site procedures of the researcher.

Starting on July 28th, 2017, data collection began. Sampling was initially scheduled to begin at an earlier date, but due to unforeseen circumstances the data collection process was delayed close to a month. Sampling days were scheduled to be in either four or five day blocks, covering both weekends and weekdays; however, due to the intensity of the wildfire season during this time period, the majority of successful sampling days occurred on weekends. Throughout the data collection process there was a total of 32 sample days, however, many of those days yielded no successful data collection. Because of the historical wildfire season, sample

locations shifted away from active fire proximity and extreme smoke, and trailhead selection was also limited due to closures enacted by the USFS.

In order to recruit the sample population, the primary researcher was stationed at one of the nine trailheads, and invited individuals who were either entering or exiting trails leading into the wilderness area to participate in the research project. All respondents participated voluntarily, and were free to stop taking the survey at any time. Respondent anonymity was maintained by not requesting any personally identifiable information from respondents within the questionnaire, and placing a numerical code on each completed survey.

Section 3.5 – Data Analysis

Throughout the data analysis process, the Statistical Package for the Social Sciences (SPSS) version 25.0 was used. Once the recorded data were entered into SPSS, the dataset was scanned for any irregularities such as missing values or incorrect responses to prepare the data before applying any statistical methods (Sproull, 2003).

Descriptive analysis served as a procedure that allowed a better understanding of the data structure to be gained. Through the analysis of the observational, demographic, and 23-item scale data, the story surrounding the sample population of this study began to unfold. To further analyze the sample population, cross tabulations were conducted to examine the difference in preferences across types of users, length of stay, current residence, and age. Following the extraction of the descriptive statistics, Principle Components Analysis (PCA) was utilized to investigate the underlying structure of the 23-item scale. Once the latent components within the dataset were identified, comparison of means testing was conducted, with the principle components serving as the dependent variables and subgroups within the population serving as the independent variables. By comparing means across subgroup within the sample population,

the principle components were able to be further tested, while more information about the sample population, and possible trends towards preferences for conditions were explored.

Chapter IV: Results

Section 4.1 – Descriptive Statistics

This section provides a description of the sample population of wilderness visitors who participated in this study by completing on-site surveys during the summer and fall of 2017. The sampling plan resulted in 189 individuals being contacted at nine different trailheads around the southern half of the BMWC. Of those 189 visitors contacted, 166 individuals were willing to complete the research survey, which resulted in a response rate of 88%. A list of these trailheads, organized from west to east, and the amount of completed surveys at each site can be seen in Figure 4.1.

Table 4.1: Respondents According to Trailheads

Trailhead	Frequency	Cumulative Percent
Holland Lake	11	6.6
Owl Creek	1	7.2
Lodgepole	1	7.8
Monture Creek	5	10.8
North Fork Blackfoot River	106	74.7
Indian Meadows	14	83.1
Benchmark	11	89.8
South Fork Sun River	14	98.2
Mortimer Gulch	3	100.0
Total	166	100.0

Of those 166 respondents, 129 (77.7%) were male, and 37 (22.3%) were female. This low percentage of female respondents in the sample can be better understood when it is compared to the most recent Bob Marshall Wilderness Complex visitor study conducted in 2004 (Whitmore et al., 2005), which reported 29% of the sample to be female. The smaller percentage of female respondents in this study may be in part to the difference in sampling techniques, as the 2004

study collected a representative random sample of BMWC users, while the 166 respondents in this study constitute a convenience sample.

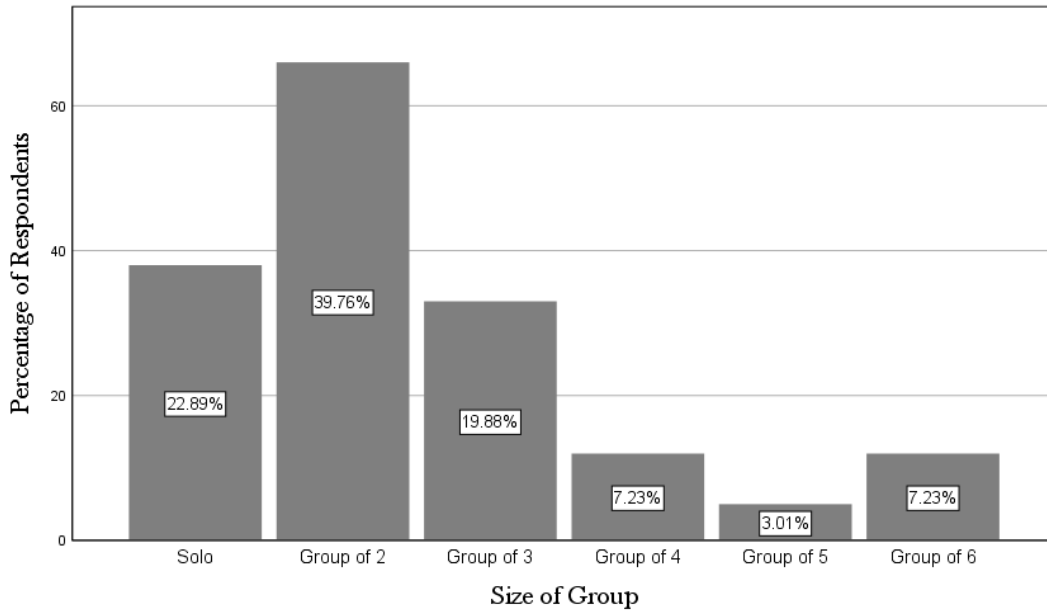
When examining the sample’s previous visitation to the BMWC, 37 respondents (22.3%) had no previous experience in the BMWC, while 129 (77.7%) had visited in the past. Further description of the sample’s previous experience in the BMWC can be seen in Figure 4.2.

Table 4.2: Respondent’s Previous Experience in BMWC

Previous Experience	Frequency	Percent	Cumulative Percent
First time visitor	37	22.3	22.3
1-5 visits	49	29.5	51.8
6-10 visits	18	10.8	62.7
11-20 visits	25	15.1	77.7
21-50 visits	17	10.2	88.0
50+ visits	20	12.0	100.0
Total	166	100.0	

At the nine different trailheads, 101 of the respondents (60.8%) were traveling into the wilderness, while 65 respondents (39.2%) were leaving the wilderness. The variation of group sizes within the sample spanned from solo travelers to groups as big as six. Of the sample, there were 38 respondents (22.9%) who were alone; 33 groups of two (39.8%); 11 groups of three (19.9%); three groups of four (7.2%); one group of five (3%); and two groups of six (7.2%), seen in Figure 4.3. As a result, respondents who traveled into the BMWC with others had an average group size of 2.6 visitors.

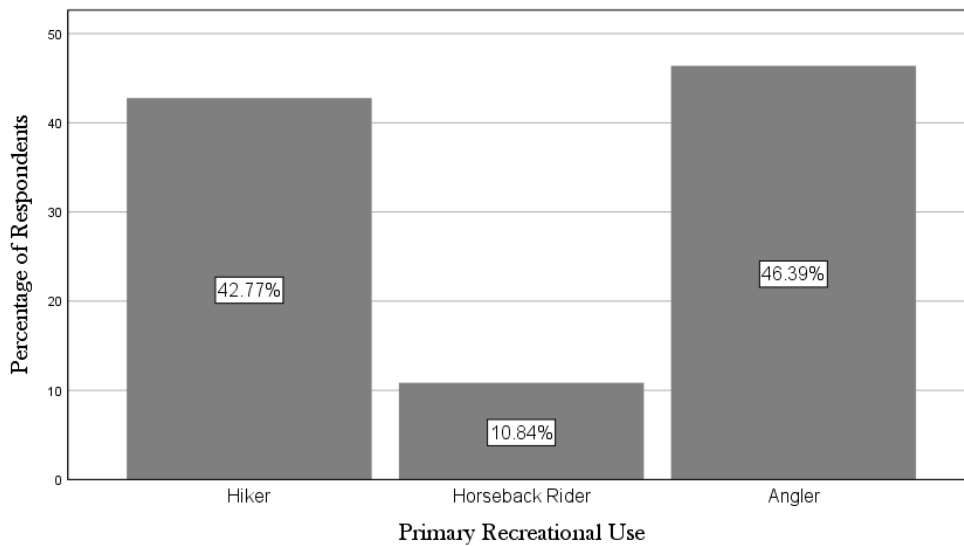
Figure 4.3: Group Size of Study Respondents



Note. This includes both day visitors and overnight visitors. n=166

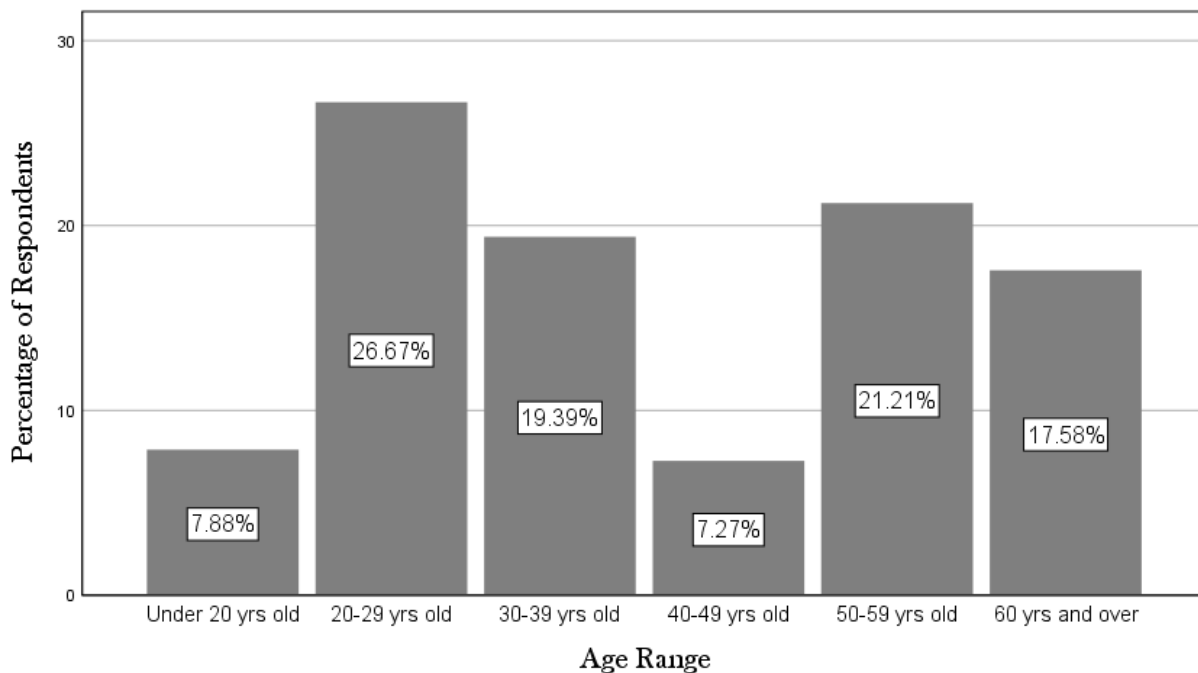
In terms of the primary recreational use of respondents, categories from the (2005) Whitmore et al. report were used to describe the sample, this revealed: anglers (77 respondents – 46.4%); hikers (71 respondents – 42.8%); and horseback riders (18 respondents – 10.8%), seen in Figure 4.4.

Figure 4.4: Primary Recreation Use of Respondents



The average age of wilderness visitors in this study was 41.8 years old – male respondents had an average age of 42.9 years old, while female respondents had an average age of 38 years old. Within the sample, the most common age range was represented by those who were 20-29 year (44 respondents – 26.7%). The second most represented age range was 50-59 years old (35 respondents – 21.2%), followed by 30-39 years old (32 – 19.4%), 60 years and over (29 - 17.6%), under 20 years old (13 - 7.9%) and 40-49 years old (12 – 7.3%), seen in Figure 4.5.

Figure 4.5: Age Ranges across Respondents

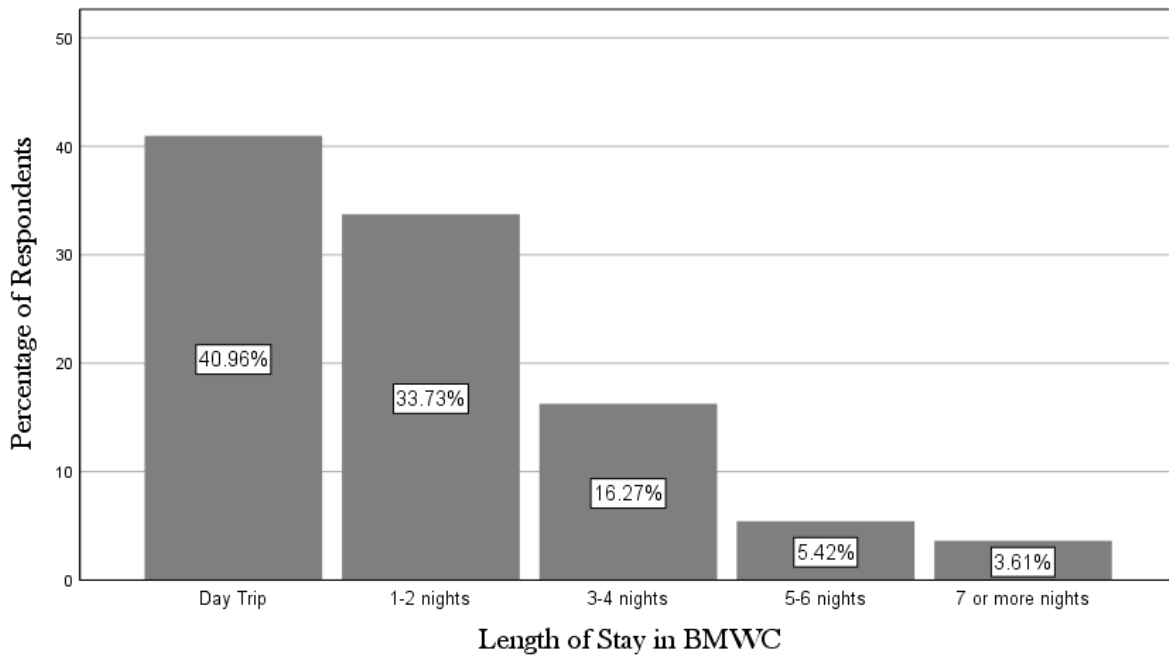


When examining the average ages of the three different user groups, hikers had an average age of 39.9 years old (with a 58 year range between the oldest and youngest respondent), horseback riders had an average age of 56.1 years old (with a 55 year age range), and anglers had an average age of 40.1 years old (with an age range of 67 years).

When asked about length of stay in the wilderness, 69 respondents (41.6%) were day visitors, while 97 respondents (58.4%) were staying in the wilderness overnight. Of those 97 who reported staying overnight: 56 respondents (33.7%) stayed in the BMWC for one or two nights;

27 respondents (16.3%) stayed three or four nights; 9 respondents (5.4%) stayed five or six nights; and 6 respondents (3.6%) stayed seven or more nights, seen in Figure 4.6. On average, visitors who stayed in the BMWC overnight, spent 2.8 nights.

Figure 4.6: Respondent Length of Stay at the BMWC



Among the 129 repeat visitors, 76 respondents (58.9%) stayed in the BMWC overnight; while of the 37 first time visitors, 22 of those respondents (59.5%) stayed overnight. In regards to the different lengths in overnight stays among the three user groups: 52 hikers (73.2%) stayed overnight, and as a group spent an average of 2.4 nights; 18 horseback riders (100%) stayed overnight, for an average of 3.2 nights; and 27 anglers (35.1%) stayed overnight, for an average of 2.5 nights. The high percentage of anglers who were day visitors (64.9%), is understandable considering the relative proximity many of these trailheads had to the medium sized cities of Helena and Missoula, Montana.

Education demographics revealed that 84.1% of respondents have completed at least some college level coursework, seen in Figure 4.7. This high percentage of educational

attainment within the sample population can be better understood when recognizing that high levels of education has been a strong and consistent trend found in wilderness populations for a number of decades (Cole et al., 1995).

Table 4.7: Level of Education among Respondents

Education	Frequency	Percent	Cumulative Percent
High school diploma	24	14.5	15.9
Some college	38	22.9	41.1
Four year college	61	36.7	81.5
Some graduate school	28	16.9	100.0
Total	151	91.0	
Missing	15	9.0	
Total	166	100.0	

Section 4.2 – Cross-tabulations

In the effort to extract more information from the descriptive characteristics of the sample population, cross-tabulations were performed to further examine the frequency distribution across the categorical variables within the sample (Vaske, 2008). This technique allowed any significant differences between descriptive characteristics within the sample population to be identified. A chi-square test of independence was performed to determine whether there were any statistically significant differences across the categorical variables.

As seen in Table 4.8, a significant difference was found when examining the type of user group and the distribution of male and female respondents. A chi-square test of independence showed the differences between these variables was significant, $X^2(2, n = 166) = 7.3, p = .026$. Within the variation of recreational uses, anglers were more likely to be male than hikers or horseback riders. Among hikers and horseback riders, large differences were also found, however, the distribution in those groups were more closely related to the variation of males and females across the entire sample, which is 78% male, and 22% female.

Table 4.8: Recreational Use of Respondents by Sex

		Sex		Total
		Male	Female	
Recreational Use	Hiker	50 (70%)	21 (30%)	71
	Horseback	12 (67%)	6 (33%)	18
	Angler	67 (87%)	10 (13%)	77
	Total	129 (78%)	37 (22%)	166

*Percentages report gender representation within recreational use

In Table 4.9, the age ranges within the sample were cross-tabulated with the distribution of male and female respondents. A chi-square test of independence showed the difference between these variables was significant, $X^2(5, n = 165) = 14.8, p = .011$. The most significant differences of gender distribution exist within the age ranges of 30-39 years old, where male respondents accounted for 94% of the sample in that age range, and in the age range of 50-59 years old, males accounted for 89% of respondents. The 40-49 was more representative of the total distribution in the sample; and within the 18-29 age range, females, who accounted for 42%, was the highest distribution percentage for all female age ranges.

Table 4.9: Age Range of Respondents by Sex

		Gender		Total
		Male	Female	
Age Range	Under 20 yrs old	10 (77%)	3 (23%)	13
	20-29 yrs old	28 (64%)	16 (36%)	44
	30-39 yrs old	30 (94%)	2 (6%)	32
	40-49 yrs old	7 (58%)	5 (42%)	12
	50-59 yrs old	31 (89%)	4 (11%)	35
	60 yrs and over	22 (76%)	7 (24%)	29
	Total	128 (78%)	37 (22%)	165

*Percentages report gender representation within age range

In table 4.10, the age ranges within the sample were cross-tabulated with the distribution of recreational activities. A chi-square test of independence showed the differences between these variables was significant, $X^2(10, n = 165) = 24.7, p = .006$. The most significant differences of age range distribution exist within horseback riders, which saw only 2% of respondents under the age of 40. Furthermore, of the 18 horseback riders, 72% were 50 years or older. And of the respondents in the 30-39 age range, 62% were anglers.

Table 4.10: Age Range of Respondents by Recreational Use

		Recreational Use			Total
		Hiker	Horseback	Angler	
Age	Under 20 yrs old	7 (54%)	0 (0%)	6 (46%)	13
Range	20-29 yrs old	22 (50%)	1 (2%)	21 (48%)	44
	30-39 yrs old	12 (38%)	0 (0%)	20 (62%)	32
	40-49 yrs old	5 (42%)	4 (33%)	3 (25%)	12
	50-59 yrs old	11 (31%)	7 (20%)	17 (49%)	35
	60 yrs and over	13 (45%)	6 (21%)	10 (34%)	29
	Total	70 (42%)	18 (11%)	77 (47%)	165

*Percentages report recreational use within age range

When examining difference between recreational activity and length of stay in the BMWC, significant differences were found across all three recreational activities, which can be seen in Table 4.11. A chi-square test of independence showed the differences between these variables was significant, $X^2(4, N = 166) = 39.3, p = .000$. Across the entire sample, 69 respondents (42%) were day visitors, while 97 respondents (58%) were overnight visitors. Among anglers alone, 50 respondents (65%) were day visitors, which accounted for 72% of all day visitors. Among horseback riders, 100% of respondents stayed in the BMWC overnight. And among hikers, the 73% of respondents stayed overnight, which was the least significant difference across groups.

Table 4.11: Recreational Activity of Respondents by Length of Stay

		Length of Stay		Total
		Day Visit	Overnight	
Recreational Use	Hiker	19 (27%)	52 (73%)	71
	Horseback	0 (0%)	18 (100%)	18
	Angler	50 (65%)	27 (35%)	77
	Total	69	97	166

*Percentages report recreational use within length of stay

Section 4.3 – Comparison with Past Visitor Characteristics in the BMWC

As a way to further describe and examine this study’s sample population, this section will compare sample population characteristics to those documented in the Whitmore et al. (2005) study of visitor use in the BMWC during the summer and fall 2004, as well as the Lucas (1985) study which looked at visitor trends from 1970 and 1982 within the BMWC. Again, it needs to be emphasized that unlike the Whitmore and Lucas study’s, the population sample for this study was not a representative random sample, however, by comparing trends among past BMWC samples, a better understanding of this study’s sample strength might be established.

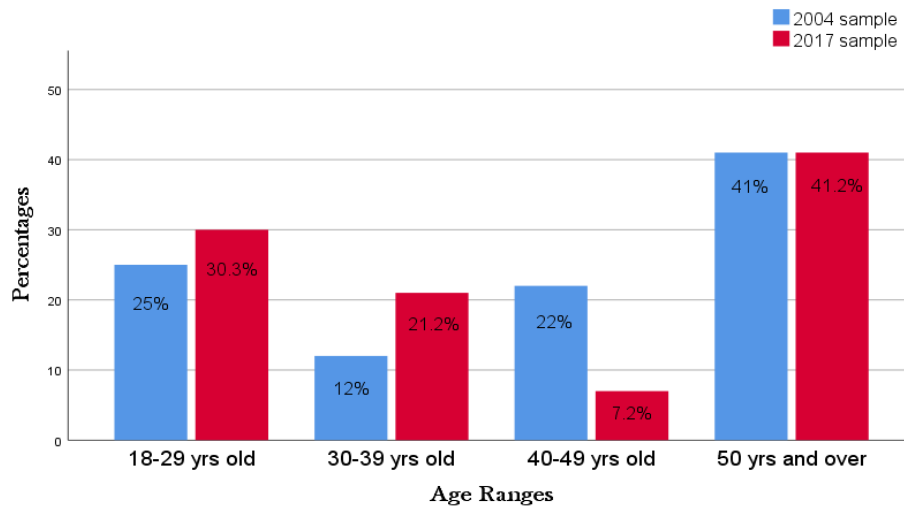
Age

When compared to the age demographics of the Whitmore et al. (2005) study, the average age of wilderness visitors in this study was 41.75 years old, while the 2004 study reported an average age of 43.5 years old. Among age ranges, one aspect of both sample populations that is consistent is the percentage of visitors 50 years and over – the 2004 study reported 41% of respondents, while this study found 41.2% in that age range. Where findings begin to slightly differ are in the reported percentages of visitors in the 18-29 age range – the 2004 study reported 25%, while this study found 30.3% in that age range. Moreover, the 2004 study reported only 12% of the sample to be between 30-39 years old, whereas this study saw that age range

represent 21.2% of the sample. The most considerable shift was seen in the 40-49 age range, which in 2004 was reported as 22% of visitors, yet in this study was only 7.2%, seen in Figure 4.12. Across user groups, hikers in this study had an average age of 39.9 years old, which is just slightly younger than the average age of 40.1 years old reported in 2004 study.

Horseback riders in this study were an average age of 56.1 years old, which is much greater than the average age of 46.7 that was reported in 2004.

Figure 4.12: Percentages of Age Ranges in BMWC



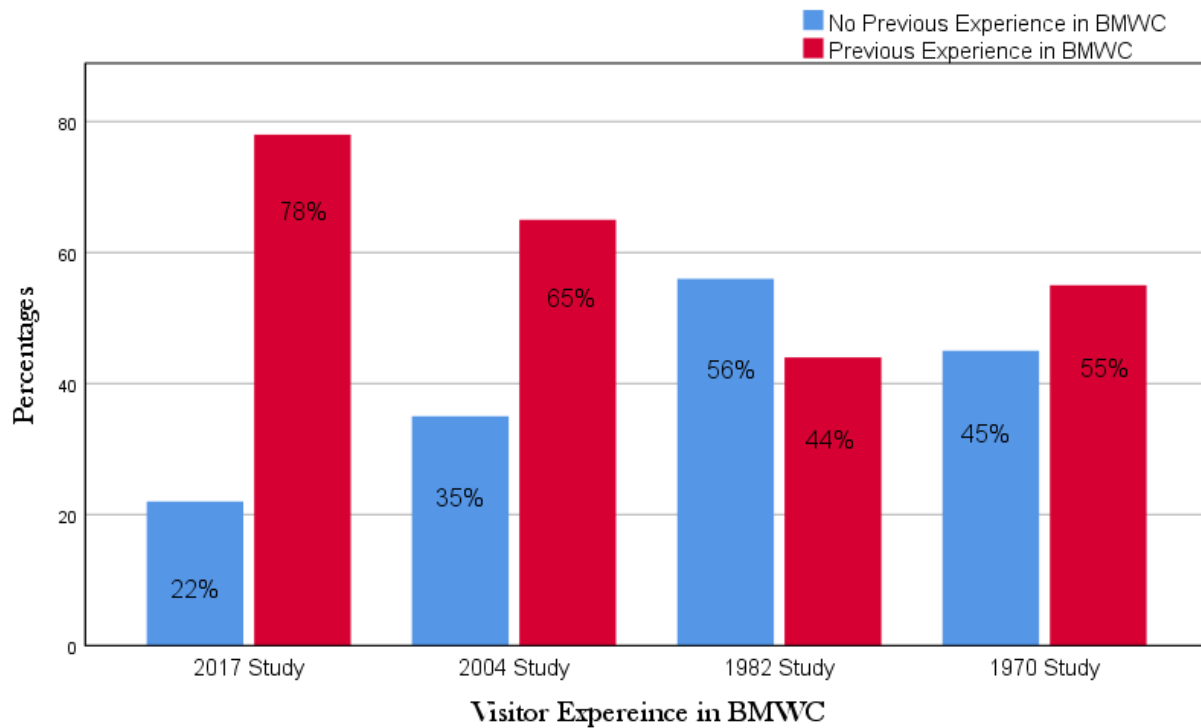
Previous experience in BMWC

As seen in Figure 4.13, the 2004 study reported 65% of respondents having previous experience in the BMWC, while 35% were first time visitors. In this study, 77.7% of respondents reported previous experience in the BMWC, while 22.3% were first time visitors. When looking at the data from Lucas (1985), respondents in 1982 were split with 44% of the sample having previous experience in the BMWC, while 56% were first time visitors. Going back to the data from 1970, 55% of respondents reported previously visiting the BMWC, while 45% were first time visitors. One possible explanation for the high percentage of experienced users in this study’s sample would be the effect of the wildfire season on visitation from users who were not

familiar with the area, or those not willing to travel to the BMWC from outside the region.

Regardless, the high level of previous experience within this study's sample bodes well for testing visitor preferences of wilderness conditions relating to solitude as the respondents are experienced and familiar with the conditions of wilderness.

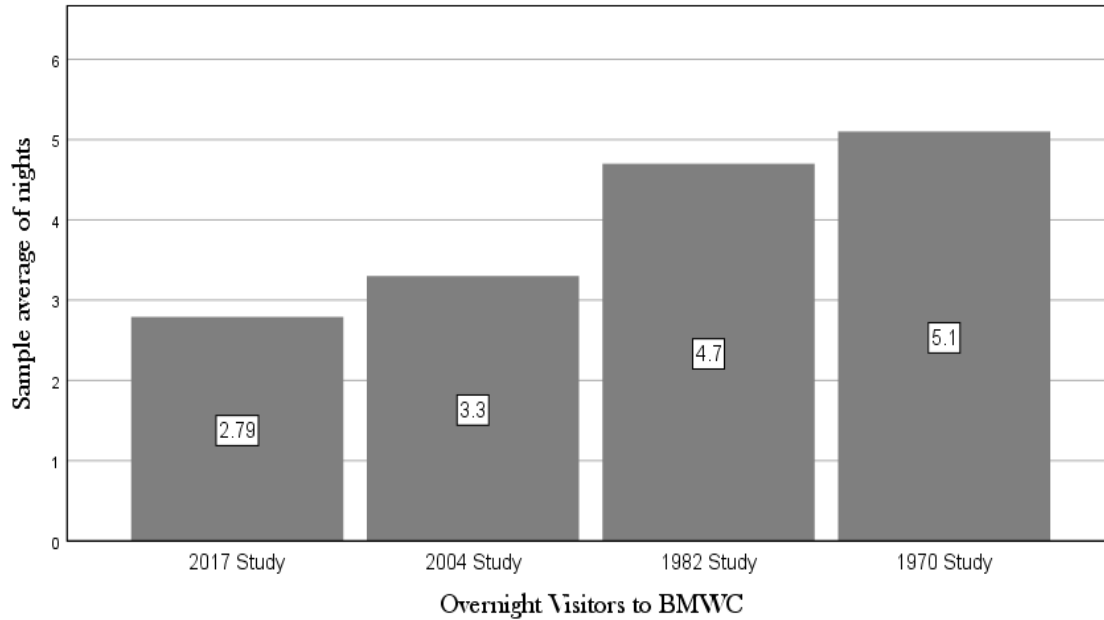
Figure 4.13: Percentage of Visitors with Previous Experience in BMWC



Length of stay

Average length of stay in the BMWC has been documented to be steadily declining since the first visitor use study was conducted in 1970. In the 1970 study, overnight visitors reported staying an average of 5.1 nights in the BMWC. In 1982 that average had dropped to 4.7 nights, and in 2004 the figure had dropped even further to 3.3 nights. The resulting data gathered in this current study suggests that this figure is further declining as the average overnight visitor spent 2.79 nights in the BMWC, seen in Figure 4.14.

Figure 4.14: Average Number of Nights Spend in the BMWC



Party Size

When comparing group sizes between the 2004 report and this study, there was a big difference in the percentage of respondents who were traveling alone: in 2004, only 3.2% of respondents traveled alone, while in this study 22.9% of respondents were alone. This might be explained by the high number of anglers in the current study's sample, as well as the particular trailheads sampled. In regards to party sizes of 2-4 people, the 2004 study reported 64.3% of its sample within this party size, this study saw 66.9% of its sample in groups that size. Party sizes of 5-7 people were reported to be 18.1% of the 2004 research sample, while in this study that size group represented 10.2% of the sample. For parties greater than 8 people, the 2004 study reported 14.3% of its sample, this study did not encounter groups larger than 6.

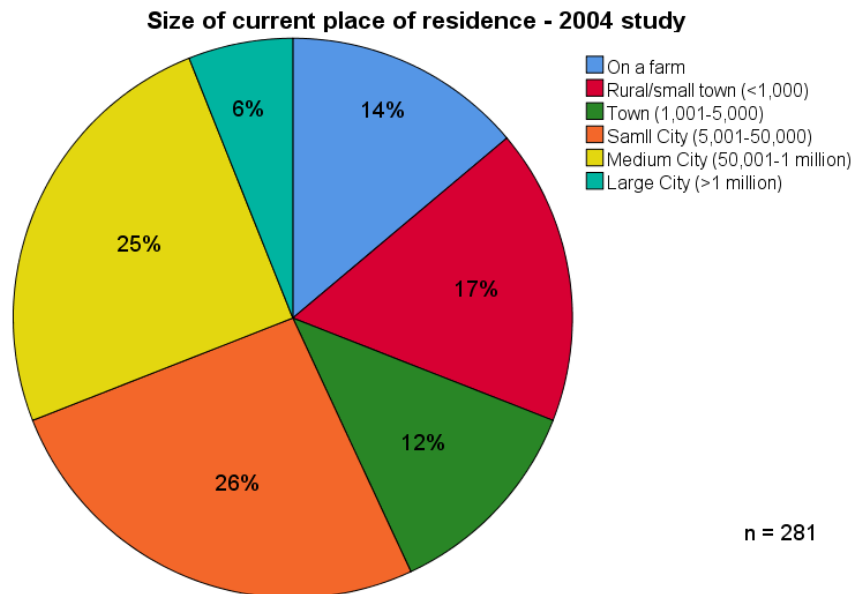
Place of Residence

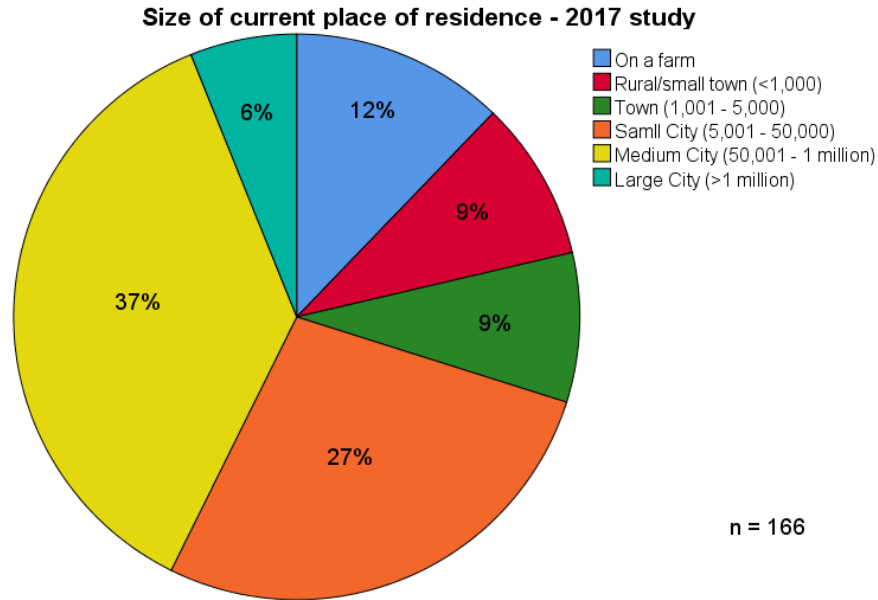
Another characteristic that shows similarities to a previous BMWC research sample is the data that was collected regarding respondent's current place of residence. In Table 4.15, the six response options are listed, followed by the frequency and percentage of respondent's answers.

Table 4.15: Current Place of Residence among Respondents in 2017

Current Residence	Frequency	Percent	Cumulative Percent
On a farm	20	12.0	12.2
Rural/small town (<1,000)	15	9.0	21.3
Town (1,001 - 5,000)	14	8.4	29.9
Small City (5,001 – 50,000)	45	27.1	57.3
Medium City (50,001 - 1 million)	60	36.1	93.9
Large City (> 1 million)	10	6.0	100.0
Total	164	98.8	
Missing	2	1.2	
Total	166	100.0	

Figure 4.16: Comparison of Respondent's Current Residence – 2004 & 2017





Section 4.4 – Visitor Motivations

In an effort to further understand the characteristics of the sample population, respondents were asked to rank the importance of eight different wilderness activities. Level of importance was measured using a 4-point categorical scale – 1 (*not important*); 4 (*most important*). This portion of the survey functioned as a way to look at some of the potential motivations respondents had for visiting wilderness – a list of the eight activities is provided below. Among the eight, two items of particular interest to this study’s investigation are: “finding solitude,” and “being away from internet and cell phone service.” The purpose of asking these questions was to develop a baseline understanding of visitor motivations towards experiencing solitude, and their desire to be away from mobile communication technology. Additionally, the remaining items in the list provided a greater understanding of the variety of wilderness motivations within the sample.

Table 4.17 displays the ranked responses of respondent motivations regarding all eight activities, the exact wording used in the survey is represented in the table. Based on those responses, “finding solitude” was reported to be “very” or “most important” to 88% of the sample. While “spending time with family and friends” was reported to be “very” or “most important” to 78% of the sample; furthermore, “being away from internet and cell phone service” was reported to be “very” or “most important” to 71% of the sample.

Table 4.17: Respondent Importance towards Wilderness Motivations

Wilderness Motivations	N	Not Important	Somewhat Important	Very Important	Most Important
Finding solitude	165	0 (0%)	20 (12%)	78 (47%)	67 (41%)
Spending time with family and friends	164	3 (2%)	37 (22%)	72 (44%)	52 (32%)
Challenge and adventure	166	7 (4%)	31 (19%)	84 (51%)	44 (26%)
Being away from internet and cell phone service	166	11 (7%)	36 (22%)	72 (43%)	47 (28%)
Quality fishing	166	22 (13%)	29 (18%)	61 (36%)	54 (33%)
Testing outdoor skills	166	17 (10%)	69 (42%)	57 (34%)	23 (14%)
Revisiting a familiar area	166	26 (16%)	81 (49%)	40 (24%)	19 (11%)
Quality hunting	166	68 (41%)	18 (10%)	49 (30%)	31 (19%)

When examining if there were any significant differences among motivations between the three different recreational user groups, there was a significant difference between motivations towards quality fishing beyond the .01 level. A chi-square test of independence was performed to examine the relation between recreational use and the importance of quality fishing. The relation between these variables was significant, $X^2(6, N = 166) = 51.8, p = .000$; seen in Table 4.18, anglers reported quality fishing to be significantly more important to their wilderness experience than hikers and horseback riders.

Table 4.18: Respondent Motivation toward Quality Fishing by Recreational Use

		Recreational Use			
		Hiker	Horseback	Angler	Total
Quality	Not Important	18 (81%)	0 (0%)	4 (19%)	22
Fishing	Somewhat Important	17 (59%)	9 (31%)	3 (10%)	29
	Very Important	24 (39%)	7 (12%)	30 (49%)	61
	Most Important	12 (22%)	2 (4%)	40 (74%)	54
	Total	71 (43%)	18 (11%)	77 (46%)	166

* Percentages report importance levels within recreational uses

Additionally, there was a significant difference found within motivations between the three different groups toward experiencing challenge and adventure. A chi-square test of independence was performed to examine the relation between type of group and the importance of challenge and adventure. The relation between these variables was significant, $X^2 (6, N = 166) = 15.8, p = .015$; horseback riders reported that challenge and adventure was significantly less important to their wilderness experience.

Further investigation into respondent motivations found a significant difference between previous experience in the BMWC and the importance of being away from internet and cell phone service. The relation between these variables was significant beyond the .05 level, $X^2 (3, N = 166) = 8.2, p = .042$; first time visitors reported being away from internet and cell phone service to be significantly less important to their wilderness experience than respondents with previous experience. When examining if there were any significant differences among motivations and length of stay in the BMWC, a significant difference was found towards “being away from internet and cell phone service” beyond the .01 level. A chi-square test of independence showed the relation between these variables was significant, $X^2 (3, N = 166) = 15.1, p = .002$; seen in Table 4.19, overnight visitors reported “being away from internet and cell phone service” was significantly more important to their wilderness experience than day visitors.

Table 4.19: Respondent Motivation toward No Cell Service by Length of Stay

		Length of Stay		Total
		Day Visit	Overnight Visit	
No Cell Service	Not Important	7 (64%)	4 (36%)	11
	Somewhat Important	23 (64%)	13 (36%)	36
	Very Important	27 (38%)	45 (62%)	72
	Most Important	12 (26%)	35 (74%)	47
	Total	69 (42%)	97 (58%)	166

* Percentages report importance levels within length of stay

Furthermore, a chi-square test of independence was performed to examine the relation between length of stay and the importance of “challenge and adventure.” The relation between these variables was also significant, $X^2(6, N = 166) = 18.7, p = .005$; overnight visitors reported “challenge and adventure” was significantly more important to their wilderness experience than day visitors

Section 4.5 – The 23-item Wilderness Solitude Scale

Prior to running the 23-item wilderness solitude scale through Principle Components Analysis, the raw data produced through the sample population’s responses to the questionnaire were examined. Within this section of the survey, respondents were asked to rate the importance of each of the 23 items that worked to measure different environmental conditions relating to wilderness solitude. The lead in question stated: “How important are the following items to your wilderness solitude experience?” The 23-items scale was then listed, and respondents could answer on a scale from 1 (*Extremely Unimportant*) to 6 (*Extremely Important*). The order of the 23 items was randomized on the survey form so that respondents would not be purposefully affected by the order of the questions (Devellis, 2017). In Table 4.20, a list of the descending means of the

23-items, accompanied by their standard deviations, begins to show how respondents answered the wilderness solitude scale.

Table 4.20: Descending Mean Responses to 23-item Wilderness Solitude Scale

Wilderness Solitude Scale Items	N	Min	Max	Mean	Std. Deviation
To experience the tranquility and peacefulness of a remote environment [Tranquility]	166	3	6	5.39	.736
To be in an environment mostly free of human-made intrusion [Intrusions]	166	2	6	5.16	.962
To be away from crowds of people [Crowds]	166	1	6	5.11	.985
To give my mind a rest [Mental Rest]	166	1	6	4.96	1.014
To camp free from the sights and sounds of others [Camp]	166	1	6	4.92	1.053
To encounter low numbers of people on the trail [Encounters]	166	2	6	4.90	.925
To experience life without everyday technologies [Everyday Tech]	166	1	6	4.75	1.048
To be away from cell phones and other digital devices [Devices]	166	1	6	4.62	1.253
To get away from the noise back home [Noise]	166	2	6	4.57	1.157
To get away from the usual demands of life [Demands]	166	1	6	4.52	1.254
To avoid everyday responsibilities for a while [Avoid]	166	1	6	4.50	1.230
To be away from emails and instant messaging [Emails]	165	1	6	4.42	1.349
To think about personal values [Values]	166	1	6	4.40	1.250
To disconnect from social media [Disconnect]	166	1	6	4.37	1.449
To feel isolated [Isolated]	166	1	6	4.30	1.228
To be away from internet connections [Connections]	166	1	6	4.29	1.367
To develop personal and spiritual values [Spiritual]	166	1	6	4.25	1.447
To be on my own [Individual]	166	1	6	4.16	1.250
To be relieved from the rules and constraints of society [Relieved]	166	1	6	4.14	1.420
To not multitask with digital devices [Multitask]	166	1	6	4.14	1.505
To be alone [Alone]	166	1	6	4.05	1.278
To think about who I am [Self]	166	1	6	3.95	1.400
To be free from observation by all other people [Observation]	166	1	6	3.75	1.282

* Lead in question: “How important are the following items to your wilderness solitude experience?”

** Bracketed words represent abbreviated items used in Chapter 5 analysis

Within the 23-item scale, 19 items received varied responses that ranged from 1 (*Extremely Unimportant*) to 6 (*Extremely Important*). Of the four items that did not span the complete range,

three items saw a response range go as low as 2 (*Unimportant*), while one item saw its lowest response to be 3 (*Somewhat Unimportant*); furthermore, among these four items, the mean values for each item was higher than 4.55. It should be noted, that the item with the highest mean (5.39) and the narrowest standard deviation (.736), has raised a few red flags. This item was taken from the Hammitt (1982) study and when considering the wording of the item: “To experience the tranquility and peacefulness of a remote environment,” one can see that the question is triple-barreled in structure, which is to say that the question is referencing three separate constructs, or conditions: tranquility; peacefulness; and remote. Babbie (2013) stresses that scale items should not ask respondents more than one question, and therefore scale items need to avoid being double-barreled (or in this case triple-barreled) in structure. Avoiding triple barreled questions is important because when multiple constructs are mentioned within a single item, researchers can never be sure which part of the item respondents are rating. Because this item had an overwhelming high mean value of importance, it will be monitored throughout the analysis process to determine if it is a good fit for the model going forward. In order to reduce these 23 variables into a smaller number of dimensions, principal components analysis was utilized to explore the underlying patterns within visitor preferences for conditions when relating to wilderness solitude.

Section 4.5 – Summary

In summary, throughout the nine trailheads sampled from July 28th to October 21st across the southern half of the BMWC, this study had a sample size of n=166 and a response rate of 88%. Of the sample, 78% of respondents had previously visited the BMWC, while 22% were first time visitors. The primary recreational uses within the sample population were 46% anglers, 43% hikers, and 11% horseback riders. The age range within the population sample spanned 67

years of age, as the youngest respondent was 18 years old, while the oldest respondent was 85 years old. The most common age range was 20-29 year old (27%), followed by 50-59 years old (21%), 30-39 years old (19%), 60 years and over (18%), under 20 years old (8%) and 40-49 years old (7%). When asked about length of stay in the wilderness, 69 respondents (41.6%) were day visitors, while 97 respondents (58.4%) were staying in the wilderness overnight. Education demographics revealed that 84.1% of respondents have completed at least some college level coursework. When asked about motivations toward various wilderness activities, respondents reported that “finding solitude” and “spending time with family and friends” were two of the most important activities, followed by “challenge and adventure,” and “being away from internet and cell phone service.” Based on the variation within this convenience sample, and the similarities it holds with representative samples of past BMWC studies, it appears this sample is appropriate to use for the purpose of testing the 23-item wilderness solitude scale.

Chapter V: Analysis

One of the primary goals of this study was to determine the underlying structure of the wilderness solitude scale. For this reason, exploratory factor analysis, through the technique of principal components analysis (PCA), was performed on the dataset. This will explore the dimensionality of the model. PCA works to statistically identify communalities among certain scale items so that a large numbers of variables can be reduced and explained through grouped items (Mertler and Vannatta, 2002). Once the components are established, further tests are performed to determine if the components truthfully measure what they suggest.

The Statistical Package for the Social Sciences (SPSS), version 25, was used to investigate the dataset. This chapter will explain the procedures taken within the principle components analysis of this study, and the interpretation of the results that followed. The first step within the analysis process was to determine if the dataset and sample population are well suited for exploratory factor analysis (Vaske, 2008). In order to make this determination, both the Kaiser-Meyer Olkin (KMO) and Bartlett's Test of Sphericity were conducted. The next step was to examine the eigenvalues and *scree test* results that were produced by the initial factor analysis to determine the suggested number of components within the model. Third, was to address the task of component retention and follow that with orthogonal rotation to help promote distinctions among the resulting dimensions. The fifth step was to search for validity of the resulting components, investigate internal consistency and the logical pairing of items. Last, was to interpret the resulting components, and explain the results.

Section 5.1 – Dimensionality

The first step in the process was to review the Kaiser-Meyer Olkin (KMO) and Bartlett's Test, seen in Table 5.1, which measure sampling adequacy. Both tests address the null hypothesis of no statically significant relationship between the variables in the 23-item scale. A KMO value of greater than 0.5 suggests that the sample is adequate, while a value between 0.8 and 0.9 are great (Kaiser, 1974). A Bartlett's Test of Sphericity with a significance greater than 95% (< 0.05) indicates that PCA is an appropriate technique for exploratory factor analysis (Mertler and Vannatta, 2002). In the below figure, the KMO statistic of 0.854 suggests that the sample is great candidate for PCA, as a value close to 1 indicates that patterns of correlations are relatively compact and should yield distinct and reliable components (Field, 2009). The approximate Chi-square of 2013.525 with 253 degrees of freedom, is significant beyond a 0.05 level, allows the model to reject the null claim of no association between variables with 95% certainty and move forward with PCA.

Table 5.1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.854
Bartlett's Test of Sphericity	Approx. Chi-Square	2013.525
	df	253
	Sig.	.000

Section 5.2 – Component Retention

The next step in analysis was to examine the eigenvalues that are produced when examining the total variance explained through PCA. When examining the degree of dimensionality suggested through PCA, Kaiser's rule was followed. Kaiser's rules suggests that only those components whose eigenvalues are greater than 1 should be kept, and those components with a variance less than 1 can be disregarded (Kaiser, 1960). Within each

component that meets this criteria, the percentage of variance represents the percent of total variance explained by each subsequent component; that is to say, each eigenvalue represents the amount of information captured by a component (DeVellis, 2017).

Also used to determine the retention of components was the graphical method called the *scree test*, which plots the magnitude of each eigenvalue against the ordinal numbers that are produced. The *scree test* criterion proposes that in order to determine the appropriate number of components to retain, one must examine the “knee,” or bend, in the line that is formed through the comparison of eigenvalue magnitudes with the graph (Mertler and Vannatta, 2002). The recommendation within the *scree test* is to retain all components with eigenvalues in the sharp descent of the line before the leveling effects of equal size eigenvalues occurs.

To further promote distinctions among the resulting components, and help determine which components to retain, orthogonal rotation was employed. Orthogonal rotation was used because this form of rotation keeps the underlying components within the dataset independent, rather than correlating them, which helps maintain distinct dimensions (Field, 2009). This was an appropriate method to use in this study because it helps address the research objective of investigating the dimensionality of the 23-item wilderness solitude scale. The specific method of orthogonal rotation conducted was varimax rotation, which attempts to maximize the dispersion of factor loadings within the given components (Field, 2009). By highlighting sharper distinctions between the components that are statistically independent of each other, varimax rotation helps to make the variable groupings within the components statistically more useful, and also clearer to interpret. In Table 5.2, the total variance explained across all 23 items can be seen.

Table 5.2: Total Variance of 23-item Scale Explained

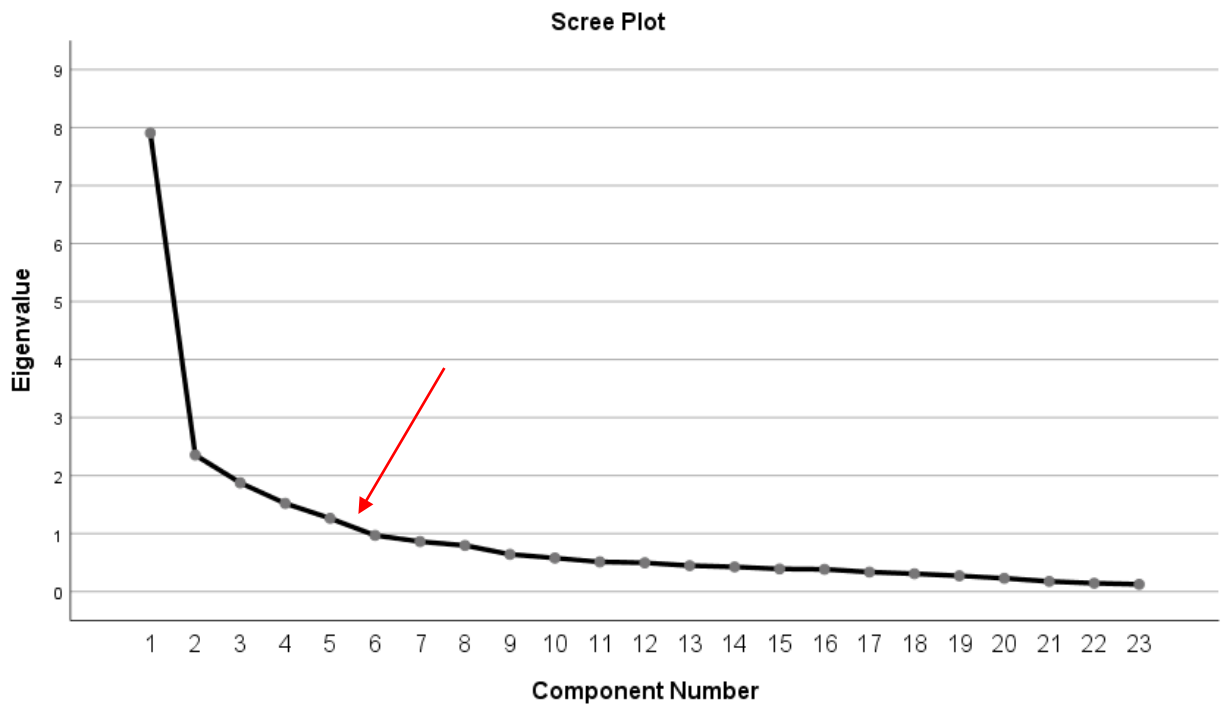
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of	Cumulative	Total	% of	Cumulative	Total	% of	Cumulative
		Variance	%		Variance	%		Variance	%
1	7.906	34.373	34.373	7.906	34.373	34.373	4.619	20.081	20.081
2	2.354	10.233	44.606	2.354	10.233	44.606	3.104	13.496	33.577
3	1.875	8.151	52.758	1.875	8.151	52.758	2.787	12.117	45.693
4	1.520	6.609	59.367	1.520	6.609	59.367	2.382	10.357	56.051
5	1.262	5.487	64.854	1.262	5.487	64.854	2.025	8.803	64.854
6	.968	4.207	69.061						
7	.862	3.750	72.811						
8	.795	3.457	76.268						
9	.641	2.789	79.057						
10	.578	2.512	81.569						
11	.512	2.227	83.796						
12	.496	2.158	85.954						
13	.448	1.946	87.900						
14	.424	1.845	89.744						
15	.390	1.697	91.441						
16	.383	1.664	93.106						
17	.335	1.458	94.564						
18	.307	1.334	95.898						
19	.271	1.180	97.078						
20	.228	.993	98.071						
21	.175	.761	98.832						
22	.144	.624	99.457						
23	.125	.543	100.000						

*Extraction Method: Principal Component Analysis.

Based on the output five components are identified with eigenvalues greater than 1. Furthermore, these five components explain 64.86% of the variability within the 23-item wilderness solitude scale.

Following the eigenvalue criteria, an examination of the scree plot produced through PCA was conducted. The *scree test* (Cattell, 1966) is also focused on eigenvalues, in Figure 5.3, the scree plot graphs the eigenvalue against each factor. From looking at the graph it becomes difficult to tell, but following factor five, there is a slight change in the curvature of the scree plot, the leveling out of the horizontal line shows that after this point total variance explained becomes smaller and less significant.

Figure 5.3: Scree Test of 23 items



Based on the resulting evidence from the KMO, Bartlett's Test, eigenvalues, and the *scree test* five factors have been extracted from the 23-item scale. Furthermore, these five factors explain 64.86% of the variability within the 23-item wilderness solitude model.

Section 5.3 – Component Interpretation

The next step in analysis is to determine what the five extracted components are working to represent. This is accomplished by examining the Rotated Component Matrix, which is the result of varimax rotation with Kaiser Normalization, to decipher how the variables have been grouped together. In Table 5.4, the Rotated Component Matrix shows the highest factor loading scores within each component highlighted in red. As a rule of thumb, only variables with loading scores of .3 and above were interpreted (Field, 2009). Furthermore, Stevens (2002) recommends that for a sample size of 100, a loading of .51 or greater should be considered significant, while a sample of 200, should consider a loading of .36 to be significant. Since the sample size of this study is 166, values over .40 will be considered significant. What guides these criteria of measurement is the consideration that the greater the loading score the more valid the variable is at measuring the component it is within (Tabachnick and Fidell, 2013). In Table 5.4, items with loading scores greater than .4 are highlighted in red.

Table 5.4: Rotated Component Matrix

Items	Component				
	1	2	3	4	5
Avoid	.177	.081	.119	.680	-.007
Values	.279	-.089	.754	.259	.005
Devices	.764	.104	.170	.222	.139
Mental Rest	.163	-.056	.383	.576	.241
Everyday Tech	.592	.073	.169	.438	.182
Intrusions	.152	.178	-.141	.475	.518
Relieved	.206	.369	.075	.640	-.146
Encounters	.055	.683	-.145	.197	.158
Self	.157	.120	.836	.243	-.058
Individual	-.072	.530	.632	-.063	.000
Observation	.223	.675	.180	.235	-.142
Disconnect	.816	.137	.090	.110	.051
Noise	.441	.277	.111	-.012	.514
Spiritual	.237	-.055	.749	-.020	.205
Tranquility	.164	.036	.194	.017	.823
Emails	.843	.098	.194	.078	.207
Alone	.256	.639	.347	-.206	.148
Crowds	.227	.523	-.076	-.048	.462
Demands	.449	.213	.052	.504	.170
Connections	.858	.220	.112	.171	.144
Isolated	.285	.588	-.012	.191	.105
Multitask	.774	.276	.159	.224	.048
Camp	.101	.615	-.016	.233	.498

*Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

In Table 5.5, the same varimax rotated component matrix can be seen with reorganized descending factor loading scores. When examining the component structure, the allocation of items across the five components is relatively clear. There are only four variables with loadings above .4 in multiple components. Those items are: Camp; Crowds; Demands; and Intrusions. In the case of these four, they will be interpreted in both components.

Table 5.5: Re-organized Rotated Component Matrix

Items	Component				
	1	2	3	4	5
Connections	.858	.220	.112	.171	.144
Emails	.843	.098	.194	.078	.207
Disconnect	.816	.137	.090	.110	.051
Multitask	.774	.276	.159	.224	.048
Devices	.764	.104	.170	.222	.139
Everyday Tech	.592	.073	.169	.438	.182
Encounters	.055	.683	-.145	.197	.158
Observation	.223	.675	.180	.235	-.142
Alone	.256	.639	.347	-.206	.148
Camp	.101	.615	-.016	.233	.498
Isolated	.285	.588	-.012	.191	.105
Crowds	.227	.523	-.076	-.048	.462
Self	.157	.120	.836	.243	-.058
Values	.279	-.089	.754	.259	.005
Spiritual	.237	-.055	.749	-.020	.205
Individual	-.072	.530	.632	-.063	.000
Avoid	.177	.081	.119	.680	-.007
Relieved	.206	.369	.075	.640	-.146
Mental Rest	.163	-.056	.383	.576	.241
Demands	.449	.213	.052	.504	.170
Tranquility	.164	.036	.194	.017	.823
Intrusions	.152	.178	-.141	.475	.518
Noise	.441	.277	.111	-.012	.514

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

PCA has thus identified five core components within the 23 item wilderness solitude scale. Based on how the items were grouped, component titles were developed to represent the common theme of inquiry among subscale item within each component. Those five titles are listed as follows:

- 1) De-tethered from Digital Connectivity
- 2) Physical Separation
- 3) Introspection
- 4) Societal Release
- 5) Remoteness

In Table 5.6, the exact wording of each item is provided, along with the item label that was used during analysis, as well the factor loading scores. Based on how the items matched up, the five components that have resulted from PCA now begin to paint a clearer picture of how preferences for conditions relating to wilderness solitude can be understood as multi-dimensional. In the pages that follow, a detailed examination of each component will follow. Component explanations will provide a concise interpretation of what the subscales are seeking to measure, an examination regarding how much of the variation within the dataset can be explained by the component, the internal consistency of the items, and the item to item correlations.

Table 5.6: Component Structure and Factor Loading Scores

<u>Component</u>	<u>Items Included</u>	<u>Item Label & Loading Score</u>	<u>Name of Component</u>
1	<ul style="list-style-type: none"> - To be away from internet connections - To be away from emails and instant messaging - To disconnect from social media - To not multitask with digital devices - To be away from cell phones and other digital devices - To experience life without everyday technologies 	[Connections] – .858 [Emails] – .843 [Disconnect] – .816 [Multitask] – .774 [Devices] – .764 [Everyday Tech] – .592	De-tether from Digital Connectivity
2	<ul style="list-style-type: none"> - To encounter low numbers of people on the trail - To be free from observation by all other people - To be alone - To camp free from the sights and sounds of others - To feel isolated - To be away from crowds of people 	[Encounters] – .683 [Observation] – .675 [Alone] – .639 [Camp] – .615 [Isolated] – .588 [Crowds] – .523	Physical Separation
3	<ul style="list-style-type: none"> - To think about who I am - To think about my personal values - To develop personal and spiritual values - To be on my own 	[Self] – .836 [Values] – .754 [Spiritual] – .749 [Individual] – .632	Introspection
4	<ul style="list-style-type: none"> - To avoid everyday responsibilities for a while - To be relieved from the rules and constraints of society - To give my mind a rest - To get away from the usual demands of life 	[Avoid] – .680 [Relieved] – .640 [Mental Rest] – .576 [Demands] – .504	Societal Release
5	<ul style="list-style-type: none"> - To experience the tranquility and peacefulness of a remote environment - To be in an environment mostly free of human-made intrusions - To get away from the noise back home 	[Tranquility] – .823 [Intrusions] – .518 [Noise] – .514	Remoteness

Component 1 – De-tether from Digital Connectivity

The De-tether component suggests that respondents find the opportunity to spent time away from internet connections and digital devices to be important conditions within their wilderness solitude experience. The six items within this component work to explain 34.37% of the variation within the dataset, while a Cronbach’s alpha of .921, seen in Table 5.7, suggests that the items are internally consistent and therefore the scale is reliable. Table 5.8 displays the item to item correlation matrix which also suggests the correlation between the six items are statistically significantly beyond the .01 level.

Table 5.7: Reliability Statistics – De-tether

Cronbach's Alpha	N of Items
.921	6

Table 5.8: Item-Item Correlations among De-tether

		Connections	Emails	Disconnect	Multitask	Devices	Everyday Tech
Connections	Pearson	1	.777**	.690**	.770**	.765**	.614**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	166	165	166	166	166	166
Emails	Pearson		1	.706**	.721**	.726**	.597**
	Sig. (2-tailed)			.000	.000	.000	.000
	N		165	165	165	165	165
Disconnect	Pearson			1	.668**	.591**	.504**
	Sig. (2-tailed)				.000	.000	.000
	N			166	166	166	166
Multitask	Pearson				1	.626**	.556**
	Sig. (2-tailed)					.000	.000
	N				166	166	166
Devices	Pearson					1	.623**
	Sig. (2-tailed)						.000
	N					166	166
Everyday Tech	Pearson						1
	Sig. (2-tailed)						
	N						166

** . Correlation is significant at the 0.01 level (2-tailed).

Component 2 – Physical Separation

The Physical Separation component suggests that respondents find avoiding crowds and encountering low numbers of people on the trail are important conditions within their wilderness solitude experience. The six items within this component work to explain 10.23% of the variation within the dataset, while a Cronbach's alpha of .785, seen in Table 5.9, suggests that the items are internally consistent and therefore the scale is reliable. Additionally, Table 5.10, displays the item to item correlation matrix which also suggests the correlation between the six items are statistically significantly beyond the .01 level.

Table 5.9: Reliability Statistics – Physical Separation

Cronbach's Alpha	N of Items
.785	6

Table 5.10: Item-Item Correlations among Physical Separation

		Encounters	Observation	Alone	Camp	Isolated	Crowds
Encounters	Pearson	1	.427**	.271**	.514**	.337**	.398**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	166	166	166	166	166	166
Observation	Pearson		1	.388**	.361**	.337**	.334**
	Sig. (2-tailed)			.000	.000	.000	.000
	N		166	166	166	166	166
Alone	Pearson			1	.381**	.454**	.381**
	Sig. (2-tailed)				.000	.000	.000
	N			166	166	166	166
Camp	Pearson				1	.484**	.482**
	Sig. (2-tailed)					.000	.000
	N				166	166	166
Isolated	Pearson					1	.273**
	Sig. (2-tailed)						.000
	N					166	166
Crowds	Pearson						1
	Sig. (2-tailed)						
	N						166

** . Correlation is significant at the 0.01 level (2-tailed).

Component 3 – Introspection

The Introspection component suggests that respondents find the opportunity to develop and think about one’s personal and spiritual values are important conditions within their wilderness solitude experience. The four items within this component work to explain 8.15% of the variation within the dataset, while a Cronbach’s alpha of .801, seen in Table 5.11, suggests that the items are internally consistent and therefore the scale is reliable. Additionally, Table 5.12, displays the item to item correlation matrix which also suggests the correlation between the four items is statistically significantly beyond the .01 level.

Table 5.11: Reliability Statistics – Introspection

Cronbach's Alpha	N of Items
.801	4

Table 5.12: Item-Item Correlations among Introspection

		Self	Values	Spiritual	Individual
Self	Pearson	1	.721**	.586**	.506**
	Sig. (2-tailed)		.000	.000	.000
	N	166	166	166	166
Values	Pearson		1	.580**	.297**
	Sig. (2-tailed)			.000	.000
	N		166	166	166
Spiritual	Pearson			1	.306**
	Sig. (2-tailed)				.000
	N			166	166
Individual	Pearson				1
	Sig. (2-tailed)				
	N				166

** . Correlation is significant at the 0.01 level (2-tailed).

Component 4 – Societal Release

The Societal Release component suggests that respondents find the opportunity to give one’s mind a rest and get away from the usual demand of life are important conditions within their wilderness solitude experience. The four items within this component work to explain 6.61% of the variation within the dataset, while a Cronbach’s alpha of .699, seen in Table 5.13, suggests that the items are internally consistent and therefore the scale is reliable. Additionally, Table 5.14, displays the item to item correlation matrix which also suggests the correlation between the four items are statistically significantly beyond the .01 level.

Table 5.13: Reliability Statistics – Societal Release

Cronbach's Alpha	N of Items
.699	4

Table 5.14: Item-Item Correlations among Societal Release

		Avoid	Relieved	Mental Rest	Demands
Avoid	Pearson	1	.326**	.330**	.487**
	Sig. (2-tailed)		.000	.000	.000
	N	166	166	166	166
Relieved	Pearson		1	.353**	.380**
	Sig. (2-tailed)			.000	.000
	N		166	166	166
Mental Rest	Pearson			1	.363**
	Sig. (2-tailed)				.000
	N			166	166
Demands	Pearson				1
	Sig. (2-tailed)				
	N				166

** Correlation is significant at the 0.01 level (2-tailed).

Component 5 – Remoteness

The Remoteness component suggests that respondents find the opportunity to exist within an environment mostly free of human-made intrusions is an important condition to wilderness visitor wishing to experience solitude. The three items within this component work to explain 5.49% of the variation within the dataset. However, a Cronbach’s alpha of .597, seen in Table 5.15, suggests that the items lack the desired degree of internal consistency that is needed in order to deem them reliable (Field, 2009). Additionally, Table 5.16, displays the item to item correlation matrix which shows a relatively weak pattern correlation among the three items; however, the three items are statistically significantly beyond the .01 level, which confirms a relationship between the three variables.

Table 5.15: Reliability Statistics – Remoteness

Cronbach's Alpha	N of Items
.597	3

Table 5.16: Item-Item Correlations among Remoteness

		Tranquility	Intrusions	Noise
Tranquility	Pearson	1	.313**	.433**
	Sig. (2-tailed)		.000	.000
	N	166	166	166
Intrusions	Pearson		1	.304**
	Sig. (2-tailed)			.000
	N		166	166
Noise	Pearson			1
	Sig. (2-tailed)			
	N			166

** . Correlation is significant at the 0.01 level (2-tailed).

Section 5.4 – Analysis 2.0

Although the five component PCA has revealed the underlying structure of the 23-item wilderness solitude scale, there are some issues with the analysis. The first issue is that the fifth component, Remoteness, is not reliable measure based on the lack of internal consistency within the items, which is to say, they are not all measuring the same thing. This inconsistency most likely stems from the triple-barreled item [Tranquility] which was highlighted in the previous chapter. Because the [Tranquility] item has proven to be an issue prior to analysis, when it raised a red flag based on its disproportionally high mean value and narrow standard deviation, the removal of this item from the scale might be warranted. Additional detections that the PCA of the 23-item scale was not ideal can be seen in the *Scree Test*, which failed to demonstrate a clear distinction at the curvature of the “knee” of the plotted eigenvalue scores. This issue was then traced to the Remoteness component in which the [Tranquility] item had the highest factor loading score by a considerable margin. When considering the initial suspicion around the composition of the [Tranquility] item, and the results of the five component PCA, a second PCA will be performed without the triple-barreled [Tranquility] item; thus, the analysis that follows will take place on a 22-item wilderness solitude scale.

In Table 5.17, the KMO value of 0.856 shows a very slight improvement and suggests that the sample remains a great candidate for PCA. The approximate Chi-square of 1931.417 with 231 degrees of freedom, which is significant beyond a 0.05 level, allows the model to once again reject the null claim of no association with 95% certainty and move forward with PCA.

Table 5.17: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.856
Bartlett's Test of Sphericity	Approx. Chi-Square	1931.417
	df	231
	Sig.	.000

The next step in the analysis process was to examine the eigenvalues produced when examining the total variance explained through PCA. When examining the degree of dimensionality suggested through PCA, Kaiser’s rule was followed, which suggests that only those components whose eigenvalues are great than 1 should be kept, and those components with a variance less than 1 can be disregarded (Kaiser, 1960). The output of the total variance explained can be seen in Table 5.18. From this output, there are four components with an eigenvalue greater than 1, which explain 60.88% of the variability within the 22-item wilderness solitude scale. This is a slight drop from the 64.86% that was explained in the 23-item scale.

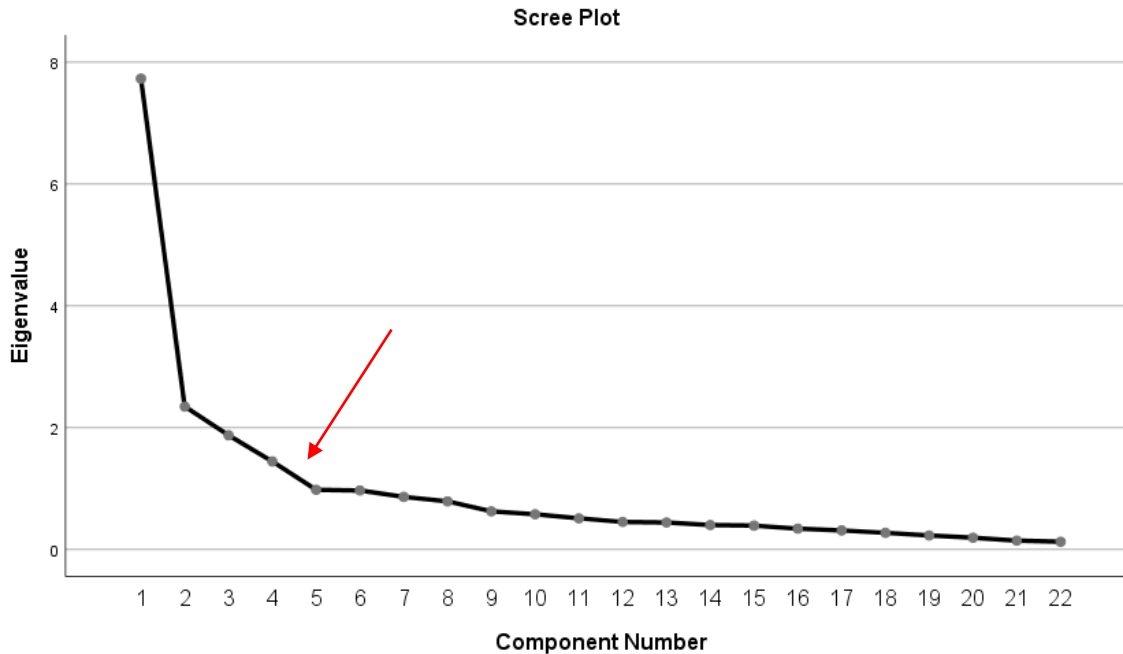
Table 5.18: Total Variance Explained of 22 Items

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.730	35.134	35.134	7.73	35.134	35.134	4.67	21.210	21.210
2	2.345	10.661	45.796	2.35	10.661	45.796	3.40	15.455	36.664
3	1.874	8.520	54.316	1.87	8.520	54.316	2.78	12.623	49.288
4	1.444	6.564	60.880	1.44	6.564	60.880	2.55	11.592	60.880
5	.978	4.447	65.327						
6	.967	4.397	69.724						
7	.862	3.918	73.642						
8	.789	3.585	77.227						
9	.624	2.838	80.065						
10	.578	2.625	82.691						
11	.511	2.321	85.012						
12	.451	2.048	87.060						
13	.442	2.010	89.070						
14	.400	1.818	90.888						
15	.390	1.774	92.662						
16	.340	1.548	94.210						
17	.311	1.415	95.625						
18	.273	1.239	96.864						
19	.229	1.039	97.903						
20	.192	.871	98.774						
21	.144	.656	99.430						
22	.125	.570	100.000						

Extraction Method: Principal Component Analysis.

The next procedure used to determine the retention of components was the *scree test*, which proposes that in order to determine the appropriate number of components to retain, one must examine the “knee,” or bend, in the line that is formed through the comparison of eigenvalue magnitudes with the graph (Mertler and Vannatta, 2002). Unlike the 23-item PCA, the results of this *scree test*, seen in Figure 5.19, demonstrates a much more distinct bend following component four, which helps aid in the justification of the 22-item PCA, resulting in four components.

Figure 5.19: Scree Test of 22 items



To further promote distinctions among the resulting components, orthogonal rotation was once again employed. Orthogonal rotation was used because this form of rotation keeps the underlying components within the dataset independent, rather than correlating them, which helps maintain distinct dimensions (Field, 2009). In Table 5.19, the total variance explained through orthogonal, varimax rotation can be seen, items with loading scores greater than .4 are highlighted in red.

Table 5.19: Rotated Component Matrix of 22 Items

	Component			
	1	2	3	4
Avoid	.150	.057	.106	.692
Values	.291	-.134	.731	.281
Devices	.762	.127	.166	.250
Mental rest	.215	-.012	.330	.580
Everyday tech	.607	.110	.148	.453
Intrusions	.254	.337	-.188	.445
Relieved	.116	.287	.106	.675
Encounters	.032	.704	-.096	.207
Self	.144	.040	.839	.272
Individual	-.098	.461	.680	-.031
Observation	.123	.579	.255	.279
Disconnect	.784	.135	.103	.149
Noise	.535	.417	.091	-.011
Spiritual	.301	-.036	.718	-.007
Emails	.863	.145	.189	.102
Alone	.245	.632	.403	-.174
Crowds	.293	.646	-.065	-.051
Demands	.451	.245	.044	.516
Connections	.848	.244	.123	.201
Isolated	.254	.591	.034	.209
Multitask	.735	.262	.182	.263
Camp	.166	.736	-.011	.230

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

In Table 5.20, the re-organized rotated component matrix can be seen, which highlights each item's highest factor loading score across the four components.

Table 5.20: Re-Organized Rotated Component Matrix of 22 Items

	Component			
	1	2	3	4
Emails	.863	.145	.189	.102
Connections	.848	.244	.123	.201
Disconnect	.784	.135	.103	.149
Devices	.762	.127	.166	.250
Multitask	.735	.262	.182	.263
Everyday Tech	.607	.110	.148	.453
Noise	.535	.417	.091	-.011
Camp	.166	.736	-.011	.230
Encounters	.032	.704	-.096	.207
Crowds	.293	.646	-.065	-.051
Alone	.245	.632	.403	-.174
Isolated	.254	.591	.034	.209
Observation	.123	.579	.255	.279
Self	.144	.040	.839	.272
Values	.291	-.134	.731	.281
Spiritual	.301	-.036	.718	-.007
Individual	-.098	.461	.680	-.031
Avoid	.150	.057	.106	.692
Relieved	.116	.287	.106	.675
Mental Rest	.215	-.012	.330	.580
Demands	.451	.245	.044	.516
Intrusions	.254	.337	-.188	.445

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

PCA has thus identified four core components within the 22-item wilderness solitude scale, they are categorized as follows:

- 1) De-tethered from Digital Connectivity
- 2) Physical Separation
- 3) Introspection
- 4) Societal Release

Table 5.21 provides list of each of the scale items within the four components. Since removing the [Tranquility] item, the other two items [Noise and Intrusions] that were apart of the now defunct Remoteness component have moved to De-tether and Societal Release, respectively.

Table 5.21: Item Variables within Four Named Components

<u>Component</u>	<u>Items Included</u>	<u>Item Label & Loading Score</u>	<u>Name of Component</u>
1	<ul style="list-style-type: none"> - To be away from emails and instant messaging - To be away from internet connections - To disconnect from social media - To be away from cell phones and other digital devices - To not multitask with digital devices - To experience life without everyday technologies - To get away from the noise back home 	[Emails] – .863 [Connections] – .848 [Disconnect] – .784 [Devices] – .762 [Multitask] – .735 [Everyday Tech] – .607 [Noise] – .535	De-tether from Digital Connectivity
2	<ul style="list-style-type: none"> - To camp free from the sights and sounds of others - To encounter low numbers of people on the trail - To be away from crowds of people - To be alone - To feel isolated - To be free from observation by all other people 	[Camp] – .736 [Encounters] – .704 [Crowds] – .646 [Alone] – .632 [Isolated] – .591 [Observation] – .579	Physical Separation
3	<ul style="list-style-type: none"> - To think about who I am - To think about my personal values - To develop personal and spiritual values - To be on my own 	[Self] – .839 [Values] – .731 [Spiritual] – .718 [Individual] – .680	Introspection
4	<ul style="list-style-type: none"> - To avoid everyday responsibilities for a while - To be relieved from the rules and constraints of society - To give my mind a rest - To get away from the usual demands of life - To be in an environment mostly free of human-made intrusions 	[Avoid] – .692 [Relieved] – .675 [Mental Rest] – .580 [Demands] – .516 [Intrusions] – .445	Societal Release

Component 1 – De-tethered from Digital Technology

The De-tether component now has seven items which work to explain 35.13% of the variation within the dataset. A Cronbach's alpha of .912, a slightly lower score than the .921 alpha of the previous De-tether component, suggests that the subscale is internally consistent and reliable; while the item to item correlation matrix shows statistically significant correlations beyond the .01 level.

Table 5.22: Reliability Statistics – De-tether

Cronbach's Alpha	N of Items
.912	7

Table 5.23: Item to Item Correlation Matrix De-Tether

		Emails	Connections	Disconnect	Devices	Multitask	Everyday Tech	Noise
Emails	Pearson	1	.777**	.706**	.726**	.721**	.597**	.466**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	165	165	165	165	165	165	165
Connections	Pearson		1	.690**	.765**	.770**	.614**	.498**
	Sig. (2-tailed)			.000	.000	.000	.000	.000
	N		166	166	166	166	166	166
Disconnect	Pearson			1	.591**	.668**	.504**	.464**
	Sig. (2-tailed)				.000	.000	.000	.000
	N			166	166	166	166	166
Devices	Pearson				1	.626**	.623**	.362**
	Sig. (2-tailed)					.000	.000	.000
	N				166	166	166	166
Multitask	Pearson					1	.556**	.407**
	Sig. (2-tailed)						.000	.000
	N					166	166	166
Everyday Tech	Pearson						1	.294**
	Sig. (2-tailed)							.000
	N						166	166
Noise	Pearson							1
	Sig. (2-tailed)							
	N							166

** . Correlation is significant at the 0.01 level (2-tailed).

Component 2 – Physical Separation

The Physical Separation component has maintained the same six items from the previous PCA which work to explain 10.66% of the variation within the dataset. A Cronbach's alpha of .785, which was the same as the previous analysis, suggests that the subscale is internally consistent and reliable, while the item to item correlation matrix shows statistically significant correlations beyond the .01 level. It is important to note that two correlation scores fall below the .30 level, which suggests a weak relationship between Encounters/Alone and Isolated/Crowds.

Table 5.24: Reliability Statistics – Physical Separation

Cronbach's Alpha	N of Items
.785	6

Table 5.25: Item to Item Correlation Matrix Physical Separation

		Camp	Encounters	Crowds	Alone	Isolated	Observation
Camp	Pearson	1	.514**	.482**	.381**	.484**	.361**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	166	166	166	166	166	166
Encounters	Pearson		1	.398**	.271**	.337**	.427**
	Sig. (2-tailed)			.000	.000	.000	.000
	N		166	166	166	166	166
Crowds	Pearson			1	.381**	.273**	.334**
	Sig. (2-tailed)				.000	.000	.000
	N			166	166	166	166
Alone	Pearson				1	.454**	.388**
	Sig. (2-tailed)					.000	.000
	N				166	166	166
Isolated	Pearson					1	.337**
	Sig. (2-tailed)						.000
	N					166	166
Observation	Pearson						1
	Sig. (2-tailed)						
	N						166

** . Correlation is significant at the 0.01 level (2-tailed).

Component 3 – Introspection

The Introspection component has maintained the same four items from the previous PCA which work to explain 8.52% of the variation within the dataset. A Cronbach’s alpha of .801 suggests that the subscale is internally consistent and reliable, while the item to item correlation matrix shows statistically significant correlations beyond the .01 level.

Table 5.26: Reliability Statistics – Introspection

Cronbach's Alpha	N of Items
.801	4

Table 5.27: Item to Item Correlation Matrix Introspection

		Self	Values	Spiritual	Individual
Self	Pearson	1	.721**	.586**	.506**
	Sig. (2-tailed)		.000	.000	.000
	N	166	166	166	166
Values	Pearson		1	.580**	.297**
	Sig. (2-tailed)			.000	.000
	N		166	166	166
Spiritual	Pearson			1	.306**
	Sig. (2-tailed)				.000
	N			166	166
Individual	Pearson				1
	Sig. (2-tailed)				
	N				166

** . Correlation is significant at the 0.01 level (2-tailed).

Component 4 – Societal Release

The Societal Release component now has five items which work to explain 6.56% of the variation within the dataset. A Cronbach’s alpha of .713 suggests that the subscale is internally consistent and reliable, while the item to item correlation matrix shows statistically significant correlations beyond the .01 level. It is important to note that three correlation scores fall below the .30 level, which suggests a weak relationship between Avoid/Intrusions, Relived/Intrusions, and Mental Rest/Intrusions.

Table 5.28: Reliability Statistics – Societal Release

Cronbach's Alpha	N of Items
.713	5

Table 5.29: Item to Item Correlation Matrix Societal Release

		Avoid	Relieved	Mental Rest	Demands	Intrusions
Avoid	Pearson	1	.326**	.330**	.487**	.233**
	Sig. (2-tailed)		.000	.000	.000	.002
	N	166	166	166	166	166
Relieved	Pearson		1	.353**	.380**	.298**
	Sig. (2-tailed)			.000	.000	.000
	N		166	166	166	166
Mental Rest	Pearson			1	.363**	.255**
	Sig. (2-tailed)				.000	.001
	N			166	166	166
Demands	Pearson				1	.307**
	Sig. (2-tailed)					.000
	N				166	166
Intrusions	Pearson					1
	Sig. (2-tailed)					
	N					166

** . Correlation is significant at the 0.01 level (2-tailed).

Section 5.5 – Comparison of Means

In this section, each of the four principle components of the 22-item scale will be explored further to determine how sub-groups within the sample population differ among preferences for conditions. This will be accomplished by conducting a one-way Analysis of Variance test (one-way ANOVA) in order to compare the means reported towards each of the four components across multiple sub-groups within the sample population. The hope is to find similarities and differences among subgroups within the population which might lead to a better understanding of the variation respondents have towards preferences for conditions; additionally, this will function as a way to check the overall validity and usefulness of the four components.

De-tethered from Digital Connectivity

When looking at length of stay, there was a significant difference ($p = .009$) between day visitors and overnight visitors when it came to de-tethering. Overnight visitors reported a mean of 4.63, while day visitors reported a mean of 4.20. This finding suggests that overnight visitors find the conditions within the De-tether component to be significantly more important than those who visit for the day.

Table 5.30: Respondent Length of Stay and Importance toward De-tether

Length of Stay	Mean	N	Std. Deviation
Day Visit	4.19	69	1.07
Overnight Visit	4.63	96	1.03
Total	4.45	165	1.06

Across sex, there was a significant difference ($p = .041$) between the mean importance for the conditions of de-tethering. Males reported a mean value of 4.36, while females reported a mean value of 4.76, which suggests female visitors are more inclined toward De-tethering than males.

Table 5.31: Respondent Sex and Importance toward De-tether

Sex	Mean	N	Std. Deviation
Male	4.36	128	1.07
Female	4.76	37	1.01
Total	4.45	165	1.06

Among the three recreational groups, there was no statically significant difference between importance of de-tethering; as horseback riders reported a mean importance of 4.62, hikers 4.57, and anglers 4.30. The low mean value of the anglers might be explained by the high percentage of anglers who were day visitors (65%), as opposed to overnight (35%).

Table 5.32: Respondent Recreational Use and Importance toward De-tether

Recreational Use	Mean	N	Std. Deviation
Hiker	4.57	71	1.03
Horseback Rider	4.62	18	1.07
Angler	4.30	76	1.09
Total	4.45	165	1.06

Respondents with no previous experience found de-tethering to be slightly more important than return visitors – 4.50 to 4.44 respectively. However, this was not a statistically significant difference.

Table 5.33: Respondent Previous Experience and Importance toward De-tether

Previous Experience	Mean	N	Std. Deviation
No Previous Experience	4.50	37	.97
Previous Experience	4.44	128	1.09
Total	4.45	165	1.06

Although there was not a significant difference of importance toward De-tethering across age ranges, Table 5.34 does presents some interesting variations among respondents. For all respondents 50 year and older, the mean values towards De-tethering was lower than than the

total mean of 4.46. While all respondents under 50 years old, the mean values towards De-tethering was above the total mean of 4.46. This finding suggests that there might be an age, or generational cut-off when it comes to the role of digital technology in lives of wilderness users. However, in order to determine if this is the case, more investigation is warranted. Another interesting finding is that respondents in the age range of 20-29 years old reported the highest mean value (4.73).

Table 5.34: Respondent Age Range and Importance toward De-tether

Age Range	Mean	N	Std. Deviation
Under 20 yrs old	4.52	13	.93
20-29 yrs old	4.73	43	.90
30-39 yrs old	4.52	32	1.00
40-49 yrs old	4.64	12	1.07
50-59 yrs old	4.14	35	1.11
60 yrs and over	4.29	29	1.25
Total	4.46	164	1.06

Among the eight wilderness motivations that were used to question respondents, there were no significant differences within the activities of quality hunting, quality fishing, revisiting a familiar area, and finding solitude when compared to the subscale of De-tether. Among the four other activities, however, there were noticeable trends that arose across the sample population.

The first motivation that saw a statistically significant difference across the sample population was “spending time with family and friends” ($p = .002$). For those who answered that “spending time with family and friends” was *most important*, a mean value of 4.90 was reported towards De-tethering. On the other hand, the three respondents who reported that “spending time with family and friends” was *not important*, reported a mean value towards De-tethering of 3.81, which is considerably lower than the sample mean of 4.46.

Table 5.35: Comparison of De-tether Scores between Importance of Family/Friends

Importance	Mean	N	Std. Deviation
Not Important	3.81	3	1.25
Somewhat Important	4.10	37	1.24
Very Important	4.35	72	.99
Most Important	4.90	51	.89
Total	4.46	163	1.07

There was a significant difference within the De-tether component among respondents who reported different levels of importance towards “testing outdoor skills” ($p = .000$). For the 17 respondents who reported “testing outdoor skills” was *not important* to their wilderness experience, De-tethering received a mean value of 3.55. While respondents who reported “testing outdoors skills” to be most important had a De-tether mean value of 4.93.

Table 5.36: Comparison of De-tether Scores between Importance of Testing Skills

Importance	Mean	N	Std. Deviation
Not Important	3.55	17	1.19
Somewhat Important	4.40	68	.91
Very Important	4.59	57	1.02
Most Important	4.93	23	1.14
Total	4.45	165	1.06

When looking at the motivation towards “being away from internet and cell phone service,” there was a significant difference between respondent’s reported levels of importance towards the De-tether component ($p = .000$). This finding works to validate the De-tether component, as respondents who reported “being away from internet and cell phone service” was *not important*, had a mean value of 3.06 within the De-tether component, while respondents who reported this motivation to be *most important* had a mean value of 5.27. The difference here is dramatic; and it suggests that respondents were consistent with their answers as they relate to

motivations towards de-tethering, and the scale items that measured their preference for such conditions. Seen in Table 5.37.

Table 5.37: Comparison of De-tether Scores between Importance of No Cell Service

Importance	Mean	N	Std. Deviation
Not Important	3.06	11	.89
Somewhat Important	3.62	35	.91
Very Important	4.54	72	.83
Most Important	5.27	47	.70
Total	4.45	165	1.06

An interesting finding that showed a significant difference among respondents ($p = .000$), was a comparison of De-tether means when associated with motivations towards “challenge and adventure.” For the seven respondents who reported “challenge and adventure” was *not important*, their mean value for De-tether was 3.59, which is considerably lower than the sample mean of 4.45.

Table 5.38: Comparison of De-tether Scores between Importance of Challenge

Importance	Mean	N	Std. Deviation
Not Important	3.59	7	1.43
Somewhat Important	3.99	31	1.15
Very Important	4.46	83	.98
Most Important	4.90	44	.89
Total	4.45	165	1.06

Physical Separation

Across many of the descriptive characteristics of the sample, reported importance towards Physical Separation was consistently similar across subgroups. Respondent's sex, length of stay, previous experience, education, and current residence did not result in significant differences across the sample population. Table 5.39 shows that horseback riders rated Physical Separation of higher importance to their wilderness solitude experience than both hikers and anglers; however, this was not a statistically significant difference, as horseback riders only represented 11% of the sample population.

Table 5.39: Respondent Recreational Use and Importance toward Physical Separation

Recreational Use	Mean	N	Std. Deviation
Hiker	4.49	71	.89
Horseback Rider	4.78	18	.59
Angler	4.45	77	.72
Total	4.50	166	.79

Age demographics did not result in any significant differences either. As seen in Table 5.40, only 40-49 year olds reported a mean value that was noticeably higher than the sample mean of 4.5.

Table 5.40: Respondent Age Range and Importance toward Physical Separation

Age Range	Mean	N	Std. Deviation
Under 20 yrs old	4.39	13	.73
20-29 yrs old	4.53	43	.84
30-39 yrs old	4.46	32	.65
40-49 yrs old	4.71	12	.66
50-59 yrs old	4.50	35	.69
60 yrs and over	4.48	29	1.05
Total	4.50	165	.79

Among the eight wilderness motivations that were used to question respondents, when compared to Physical Separation there were no significant differences within the activities of spending time with family and friends, quality hunting, quality fishing, revisiting a familiar area, testing outdoor skills and challenge and adventure. Only “finding solitude” and “being away from internet and cell phone service” were found to have significant differences when compared to the component of Physical Separation.

In Table 5.41, a statistically significant difference was found between respondents who reported “finding solitude” to be *not important*, and respondents who reported it was *most important* ($p = .001$). This finding suggests that Physical Separation is an important conditional experience for those respondents who were motivated towards finding solitude.

Table 5.41: Comparison of Physical Separation scores between Importance of Finding Solitude

Importance	Mean	N	Std. Deviation
Somewhat Important	4.13	20	.72
Very Important	4.37	78	.79
Most Important	4.76	67	.73
Total	4.50	165	.79

When looking at the motivation of “being away from internet and cell phone service,” a significant difference was found between those who reported it *not important*, and those who found it *most important* ($p = .002$), seen in Table 5.42.

Table 5.42: Comparison of Physical Separation scores between Importance of No Cell Service

Importance	Mean	N	Std. Deviation
Not Important	4.12	11	.56
Somewhat Important	4.27	36	.79
Very Important	4.46	72	.83
Most Important	4.84	47	.65
Total	4.50	166	.79

Introspection

Across many of the descriptive characteristics of the sample, reported importance towards Introspection was consistently similar among subgroups. Respondent's sex, length of stay, previous experience, age range, education, and current residence did not result in any significant differences across the sample population. Although there were not statistically significant differences, Table 5.43 shows that among respondents, females rated Introspection to be more important than males. While in Table 5.44, respondents in the age range of 20-29 years old are shown to have rated Introspection of higher importance than any other age range.

Table 5.43: Respondent Sex and Importance toward Introspection

Sex	Mean	N	Std. Deviation
Male	4.26	129	1.03
Female	3.95	37	1.13
Total	4.19	166	1.06

Table 5.44: Respondent Age Range and Importance toward Introspection

Age Range	Mean	N	Std. Deviation
Under 20 yrs old	4.29	13	.85
20-29 yrs old	4.48	43	.97
30-39 yrs old	4.08	32	.96
40-49 yrs old	4.27	12	.89
50-59 yrs old	3.85	35	1.17
60 yrs and over	4.30	29	1.13
Total	4.19	165	1.04

Among the eight wilderness motivations, there were no significant differences among respondent's ratings toward Introspection when compared with the activities of "spending time with family and friends," "quality hunting" and "quality fishing." However, when looking at the five other activities statically significant differences among respondents were detected. In Table

5.45, a significant difference among respondents was found when comparing importance toward “finding solitude” and the component of Introspection ($p = .016$).

Table 5.45: Comparison of Introspection scores between Importance of Finding Solitude

Importance	Mean	N	Std. Deviation
Somewhat Important	4.09	20	.83
Very Important	3.97	78	1.10
Most Important	4.47	67	1.02
Total	4.19	165	1.06

In Table 5.46, a significant difference towards Introspection is shown to exist between visitors who reported “testing outdoor skills” to be *not important* and those who reported it to be *most important* ($p = .000$).

Table 5.46: Comparison of Introspection scores between Importance of Testing Skills

Importance	Mean	N	Std. Deviation
Not Important	3.14	17	1.20
Somewhat Important	4.14	69	.95
Very Important	4.25	57	1.02
Most Important	4.95	23	.71
Total	4.19	166	1.06

In Table 5.47, a significant difference towards Introspection is shown to exist between visitors who reported “being away from internet and cell phone service” to be *not important* and those who reported it to be *most important* ($p = .022$).

Table 5.47: Comparison of Introspection scores between Importance of No Cell Service

Importance	Mean	N	Std. Deviation
Not Important	3.66	11	.96
Somewhat Important	4.12	36	.92
Very Important	4.07	72	1.08
Most Important	4.56	47	1.07
Total	4.19	166	1.06

In Table 5.48, a significant difference towards Introspection is shown to exist between visitors who reported “challenge and adventure” to be *not important* and those who reported it to be *most important* ($p = .000$).

Table 5.48: Comparison of Introspection scores between Importance of Challenge

Importance	Mean	N	Std. Deviation
Not Important	2.89	7	1.07
Somewhat Important	3.90	31	1.08
Very Important	4.13	84	1.02
Most Important	4.72	44	.85
Total	4.19	166	1.06

Societal Release

Across many of the descriptive characteristics of the sample, reported importance towards Societal Release was consistently similar among subgroups. Respondent's sex, length of stay, previous experience, age range, education, and current residence did not result in any significant differences across the sample population. Although there were not significant differences, Table 5.49 shows that among respondents, females rated Societal Release to be more important than males. While in Table 5.50, differences across age ranges can be seen.

Table 5.49: Respondent Sex and Importance toward Societal Release

Sex	Mean	N	Std. Deviation
Male	4.61	129	.83
Female	4.83	37	.73
Total	4.66	166	.81

Table 5.50: Respondent Age Range and Importance toward Societal Release

Age Range	Mean	N	Std. Deviation
Under 20 yrs old	4.74	13	.71
20-29 yrs old	4.76	43	.73
30-39 yrs old	4.53	32	.79
40-49 yrs old	4.82	12	.84
50-59 yrs old	4.70	35	.89
60 yrs and over	4.47	29	.88
Total	4.66	165	.81

Among the eight wilderness motivations, there were no significant differences among respondent's ratings toward Societal Release when compared with the activities of "quality hunting," "quality fishing" and "revisiting a familiar area." However, when looking at the five other activities statistically significant differences among respondents were detected. In Table

5.51, a significant difference among respondents was found when comparing importance toward “finding solitude” and the component of Societal Release – ($p = .018$).

Table 5.51: Comparison of Societal Release scores between Importance of Finding Solitude

Importance	Mean	N	Std. Deviation
Somewhat Important	4.37	20	.52
Very Important	4.58	78	.79
Most Important	4.87	67	.83
Total	4.66	165	.79

In Table 5.52, a significant difference towards Societal Release is shown to exist between visitors who reported “testing outdoor skills” to be *not important* and those who reported it to be *most important* ($p = .010$).

Table 5.52: Comparison of Societal Release scores between Importance of Testing Skills

Importance	Mean	N	Std. Deviation
Not Important	4.15	17	.85
Somewhat Important	4.59	69	.69
Very Important	4.78	57	.78
Most Important	4.94	23	1.02
Total	4.66	166	.81

In Table 5.53, a significant difference towards Societal Release is shown to exist between visitors who reported “being away from internet and cell phone service” to be *not important* and those who reported it to be *most important* ($p = .000$).

Table 5.53: Comparison of Societal Release scores between Importance of No Cell Service

Importance	Mean	N	Std. Deviation
Not Important	4.43	11	.58
Somewhat Important	4.24	36	.91
Very Important	4.68	72	.76
Most Important	5.00	47	.70
Total	4.66	166	.81

In Table 5.54, a significant difference towards Societal Release is shown to exist between visitors who reported “challenge and adventure” to be *not important* and those who reported it to be *most important* – ($p = .028$).

Table 5.54: Comparison of Societal Release scores between Importance of Challenge

Importance	Mean	N	Std. Deviation
Not Important	4.11	7	1.15
Somewhat Important	4.41	31	.86
Very Important	4.69	84	.73
Most Important	4.86	44	.80
Total	4.66	166	.81

Section 5.6 – Hypotheses Testing

In this section, the study hypotheses that were established in chapter two will be addressed based on the results and data analysis.

H₀: *High levels of importance will be reported towards experiencing solitude.*

Accept: Of the 144 respondents (87%) who reported that “finding solitude” was either *very* or *most important* to their wilderness experience.

H₀: *High motivation toward experiencing solitude will be positively related to disconnecting from internet and cell phone service.*

Accept: Out of the 144 respondents who reported high importance towards solitude, 105 respondent reported that “being away from internet and cell phone service” was also very or most important to their wilderness experience. Of the 39 respondents who reported “being away from internet and cell phone service” was either *somewhat* or *not important*, 60% were 50 years old or over, 33% were 18-29 years old, and 7% were 30-49 years old.

H₀: *Low motivation towards experiencing solitude will be negatively related to disconnecting from internet and cell phone service.*

Reject: Of the 20 respondents (12%) who reported “finding solitude” was *somewhat important* to their wilderness experience, 13 respondents (65%) reported that “being away from internet and cell phone service” was either very or most important to their wilderness experience.

H₀: *Preferences for conditions relating to wilderness solitude will differ among recreational users.*

Reject: There were no significant difference among recreational uses and rating of the four wilderness solitude components. The only noticeable difference was the horseback riders rated Introspection lower than hikers and anglers.

H₀: *Preferences for conditions relating to wilderness solitude will differ among length of stay in wilderness.*

Accept: Among the four wilderness solitude components, there was not statistically significant difference between day visitors and overnight visitors in the components of Physical Separation, Introspection, and Societal Release. There was a statistically significant difference between day and overnight visitors toward the component of De-tether ($p = .009$).

H₀: *Preferences for conditions relating to wilderness solitude will differ among age demographics.*

Accept: Among the four wilderness solitude components, there was not statistically significant difference between age ranges towards the components of Physical Separation, Introspection, and Societal Release. There was a statistically significant difference between age ranges towards the component of De-tether ($p = .018$), as respondents 50 years old and over reported significantly lower ratings towards its importance.

Chapter VI: Discussion

There were two fundamental research objectives within this study. The first objective was to develop a comprehensive research model of wilderness solitude. The second was to develop a baseline understanding of how important it is for wilderness visitors to spend time away from internet and cell phone service. Chapter one of this study presented the problem of how the current conditions of digital culture make it extremely difficult for individuals to experience basic moments of alone-time within everyday life. Chapter two covered the past research approaches that have been used to study wilderness solitude, which established the problem that the internal conditions of solitude have not received sufficient investigation because of the heavy reliance on the social-spatial perspective. Chapter three demonstrated how the study was designed and carried out, detailing the study location, sampling plan and data analysis. Chapter four worked to describe the characteristics of the sample population and began to investigate the 23-item wilderness solitude scale. Chapter five presented the Principle Components Analysis that revealed the underlying structure of the wilderness solitude scale which resulted in the four components: De-tether, Physical Separation, Introspection, and Societal Release.

Within this chapter, the first section will address the research questions that were used to help guide this study. The next section will cover each of the four components of wilderness solitude separately, first introducing the component, then relating it to past research on the topic, addressing the management implications, and finishing with suggestions regarding future research on the topic. The final section will cover the limitations of this study, explaining how they might have impacted the results, which is followed by a summary conclusion of the research.

Section 6.1 – Research Questions

Research Question 1: *What is the meaning of wilderness solitude in the 21st century?*

There were an incredible amount of unknowns that led up to the development, design and implementation of this study. This research question stems from the overall inspiration for conducting this research thesis, but the question cannot be fully answered based on the results. When considering how the meaning of wilderness solitude relates to wilderness users in the 21st century, the results of this research suggest that visitors are highly motivated to experience solitude, as 87% of respondents reported that “finding solitude” was either *very* or *most important* to their overall wilderness experience. What is further suggested by the establishment of the four components of wilderness solitude is that the meaning of the experience might be found in the unique opportunity to temporarily release from the physical and social structures of daily life in order to encounter a slower pace of living for the purpose of personal restoration and contemplative thought.

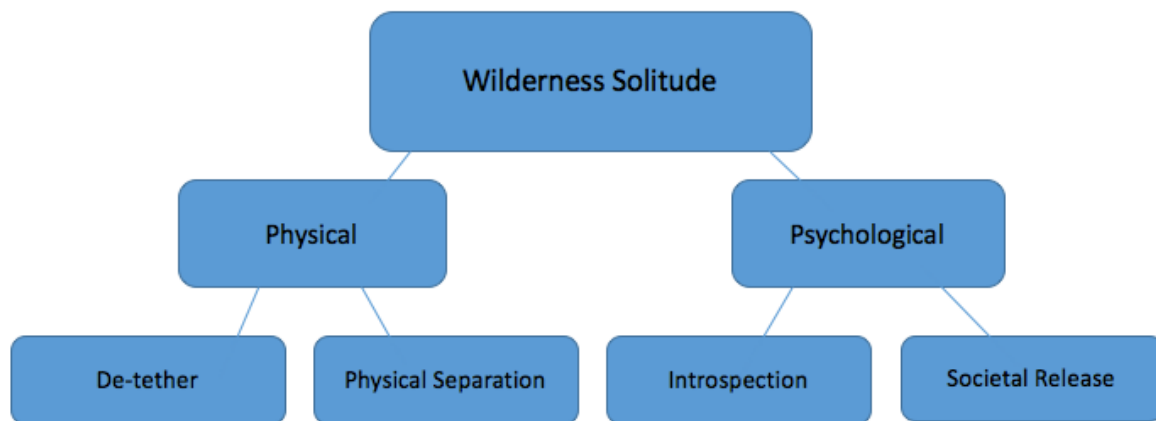
However, there are many aspects of this study that do not address the larger principles regarding the value of wilderness solitude in the 21st century. In order to address these gaps, future research in outdoor recreation might look at how non-wilderness users value solitude, and examine what difference exist between reported importance and the setting in which respondents are recreating. Such research should be conducted at National Parks, U.S. Forest Service Recreation Areas, State Parks, and City Parks around the country. By researching the value of solitude at various outdoor recreation locations, a clearer understanding of visitor motivations towards solitude might be developed based on the differences across locations.

Research Question 2: *Can the importance of wilderness solitude be described through a two-dimensional model consisting of a physical and a psychological component?*

When examining the four components that resulted from the PCA, a justification for the

hypothesized two-dimensional model still holds; however, the distribution of subcomponents is different. Instead of a total of eight subcomponents, we see now a total of four subcomponents. The two primary dimensions remain, however the subcomponents within those dimensions have now adjusted to represent the outcomes of the PCA. Therefore, the components of De-tether and Physical Separation represent the Physical dimension; while in Introspection and Societal Release represent the Psychological dimension. The refined model representing these changes can be seen in Figure 6.1.

Figure 6.1: Two Dimensional Model of Wilderness Solitude



Based on the results, some overlap between the dimensions most likely exists, and future model development and research would help provide more insight.

Research Question 3: *Do wilderness visitors value the opportunity to disconnect from internet connections and cell phone service?*

Yes, within the sample population 72% of respondents reported that “being away from internet and cell phone service” was either *very* or *most important* to their wilderness experience. A surprising finding within the dataset showed that respondents who were 50 years old and over reported that being away from internet and cell phone service was considerably less important than those who were 49 years old and younger. Out of the 11 respondents who reported “being away from internet and cell phone service” was *not important*, eight were over the age of 50 years

old, while the three other respondents were in the age range of 20-29 years old. This finding suggests that there is a generation gap when it comes to the importance of digital technology. Older generations, who found de-tethering to be unimportant, most likely responded this way because these technologies have come into their life at a later stage, and they have lived a considerable amount of time without the utility of digital devices. The younger generations of today are probably seeking a sense of escape from the ubiquity of media and communication requests within their lives.

Research Question 4: *Do visitors who highly value solitude report sensitivities toward the social settings of wilderness?*

Yes, respondents who reported that solitude was important to their wilderness experience rated the components of Physical Separation and Societal Release of high importance. This finding validates past research which sought to highlight sensitivities toward the social conditions of wilderness. However, the heavy reliance on the concept of privacy, which guided a large portion of past research, has not only been proven to be conceptually different from solitude, but survey responses to this subcomponent within the original 23-item scale show that respondents found many of the privacy items to be unimportant. For example, the privacy items: “to be free from observation by all other people” and “to be alone,” received the lowest and third lowest mean values respectively – 3.74 and 4.05. With these items ranking so low, the argument that privacy is an entirely different concept from solitude grows even stronger.

Research Question 5: *Does age, mode of travel, or wilderness experience play a factor in visitor preferences for conditions as they relate to wilderness solitude?*

It does, in terms of age, there seems to be a consistent divide at the 50 year old mark, as respondents who were 50 years and older rated the components of De-tether and Introspection much lower than respondents who were 49 years old and younger. A possible explanation for this

difference might have to do with the stage of life the older wilderness visitors are in, as they have had plenty of time throughout the years for introspection, and the importance of digital connectivity is less relevant to their daily lives.

In respect to mode of travel, horseback riders differed greatly from hikers and anglers, as they rated the component Introspection much lower than the other groups, however, horseback riders had the highest rating on De-tether, Physical Separation and Societal Release. A possible explanation for this can be found in the average age of horseback riders, which was 56.1 years old; an average which is considerably higher than hikers, which was 39.9 years old, and anglers, which was 40.1 years old.

Length of previous wilderness experience does not seem to play a huge role in predicting differences among visitor preferences for conditions. One interesting find is that respondents with no previous experience in the BMWC reported slightly higher ratings on all four of the components, which suggests a degree of anticipation and positive motivation toward those conditions.

Section 6.2 – Component Discussion

In order to set the stage for this discussion section, the four principle components that have been identified will be unpacked. This section will address each component separately, providing an interpretation of the findings, an assessment of how these findings relate to past research of wilderness solitude, a description of the management implications based on the findings, and a consideration of future research that would help address some of the remaining unknowns regarding each component.

Implications of De-tether

The De-tether component of wilderness solitude suggests that a lack of digital connectivity is a significant experiential condition for wilderness visitors who are motivated to experience solitude. The establishment of this component provides support to the notion of a digitally unconnected self being an aspect of the modern wilderness experience. By spending time away from digital connectivity, wilderness users are granted the opportunity to be fully immersed in their environment, as the potential for digital disruptions are lessened. This addresses the issue of hyper-connectivity in contemporary society because it shows that there is a population of individuals who find it important to spend time away from internet and cell phone service; and they travel into wilderness in order to meet that motivation. Now that a baseline understanding regarding wilderness users and De-tether has been established, future research can dive further into the topic and begin to increase the knowledge base surrounding this novel finding.

Within the resulting two dimensional model of wilderness solitude, the De-tether component rests in the physical dimension. The justification for De-tether being placed in the physical dimension is based on the understanding that the digital devices and transmitting towers that provide network service are both hard physical objects, and in order to De-tether from them, a change in physical conditions are required. Nevertheless, there are aspects of the De-tether component that raise questions about how it might relate to the other three components. For example, how does De-tether relate to Physical Separation? Furthermore, how does it relate to Introspection and Societal Release? Because there seems to be an overlap between how one component leads into the others, the possible correlations among these components is strong. What does seem to be clear, is that wilderness users who are motivated towards experiencing solitude, have a preference towards the conditions of the De-tether component, which is a novel

contribution not only to research on wilderness solitude, but outdoor recreation research as a discipline.

Past Research Relating to De-tether

When working to compare how the component of De-tether relates to past research on wilderness solitude, it is difficult to locate sources that share a common thread. However, there are some past works that examine the role of technology in wilderness at large. Most notably, McAvoy and Dustin (1981) discuss the possibilities of “no technology,” or “low-technology” zones within wilderness in their article, *The Right to Risk in Wilderness*. McAvoy and Dustin suggest that wilderness visitors ought to have the choice to adopt greater amounts of personal responsibility for their own welfare by entering particular wilderness areas where rescue services are not provided. Thus, individuals who choose to travel in these wilderness zones take on greater amounts of self-sufficiency and self-reliance; the authors propose that technologies such as satellite phones and spot tracking devices reduce the opportunity to experience some of the traditional risks and conditions of wilderness travel.

Although much of McAvoy and Dustin’s argument fails to address how these technologies affect the experience of solitude, their concerns about the comforts and security that these technologies provided is an important discussion to expand on. When investigating the role of specific technologies in wilderness, one of the first considerations to be addressed is the current role that such technologies play outside of wilderness, in mainstream society. In the case of McAvoy and Dustin, the technologies that they oppose are somewhat exclusive, as the role of satellite phones in everyday life was reserved for only the select few who could afford them back in the 1980’s and 1990’s. Therefore, the function and purpose of such technologies make them uniquely designed to combat the challenging conditions that wilderness can provide.

On the other hand, within this study, the mobile communication technologies that become limited while in wilderness are conditions that directly contrast the typical role of these technologies within daily life. The notion of a “no technology,” or “low technology” wilderness is already the case when considering the most common technologies of contemporary life are fundamentally limited in wilderness. Where this research begins to draw parallels with McAvoy and Dustin’s notion of “the right to risk,” exists within the emphasis of self-sufficiency and personal independence. Although McAvoy and Dustin are referring to a literal “safety net,” as the technologies they speak of help facilitate rescue operations in wilderness. The “safety net” provided by the technologies detailed in this study take on more of a metaphorical example, as they provide access to social “safety nets,” that work reinforce communal membership and public acceptance. By experiencing opportunities to De-tether, wilderness visitors are left to examine their life without the reassurance of others; they are given a chance to separate from the herd, and think independently. Regardless of the different inspirations for proposing boundaries towards technologies in wilderness, this study, along with McAvoy and Dustin’s notion of no rescue wilderness, both share a view that promotes wilderness as a place that ought to maintain the opportunity for individuals to assume sole responsibility for their personal welfare.

Management Implications Regarding De-tether

Some of the management implications that come up based on the De-tether component have to do with the infrastructure surrounding wilderness areas. The findings of this study suggest that wilderness visitors value the opportunity to exist without network connections and internet access; therefore, these conditions ought to be maintained in wilderness. Furthermore, attempts to provide cell phone service in wilderness would directly contradict many of the primary conditions that the Wilderness Act sought to establish. For example, outfitting wilderness areas with cell towers would directly go against the definition of wilderness provided by the act:

“undeveloped Federal land retaining its primeval character and influence, without permanent improvements... [and which] generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable” (Wilderness Act. Of 1964, Sec. 2 (c)). Not only would towers defy the notion of “undeveloped federal land,” but it would also contradict the appeal to maintain the land’s “primeval character,” by making the imprint of humankind’s work physically noticeable. Moreover, Howard Zahniser once stated: “we must not only protect the wilderness from commercial exploitation, [but] we must also see that we do not ourselves destroy its wilderness character in our own management programs. We must remember always that the essential quality of the wilderness is its wildness” (Zahniser, 1953).

By providing cell towers and network service, wilderness not only becomes just like any other environment on Earth, it would open the wilderness up to commercial exploitation, as those towers would serve as the inroads which would allow commercial interests to enter and exploit the “experiential commodity” of wilderness. But most importantly, what cell service would take from wilderness would be its wildness – its essential character. Without the opportunity to De-tether, not only would solitude be limited, but the overall wilderness experience would be fundamentally changed.

Furthermore, implications surrounding the De-tether component also circle around management decisions to use digital technology in wilderness when completing administration tasks. For example, if a wilderness ranger were to bring a tablet device with them into wilderness in order to collect monitoring data, or to navigate through sections of the wilderness they are not familiar with, how might the wilderness be negatively affected? Firstly, the ranger themselves would no longer be relying on the traditional skills of orienteering and way-finding, and instead would be dependent on the technology they brought in with them in order to complete their tasks. Secondly, a risk comes in having wilderness visitors seeing agency representatives using the

very technology that wilderness landscapes are meant to contrast. For those who wish to De-tether, seeing a ranger with digital technology might not only hinder their experience of being away from everyday technologies, it might also influence their view of management actions, and negatively impact their overall wilderness experience.

Future Research on De-tether

There are endless possibilities when considering future research on the De-tether component. First of all, because the items within the De-tether subscale were never previously tested, the testing of the subscale ought to be replicated with a random sample, so that higher degrees of validity and reliability may be associated with the component. Also, I believe it is important to conduct research on the De-tether component at various wilderness areas around the country. Identifying differences across populations would provide a better understanding of how wilderness users as a whole value the De-tether component. Furthermore, I believe that a qualitative study should be conducted; placing specific focus on investigating the aspects of De-tether that wilderness visitors find most important. Such a study would not only give wilderness users the opportunity to articulate what it is about de-tethering that they find important, but it could also address some of the unknowns that exist regarding how De-tether correlates to the other three components of wilderness solitude.

Another consideration in future research is the importance of De-tethering outside of wilderness, for populations that are not so unique. Adam Alter's book, *Irresistible: The Rise of Addictive Technology and The Business of Keeping Us Hooked*, suggests that we are behaviorally addicted to our devices and the applications within them by design. We currently live in a time when the "attention economy" is not only budding, but is also booming. As more people realize that their attention-span is now a commodity, I believe a reevaluation towards these technologies will take place on a large scale. The opportunity to filter media and social interests by simply getting away

from one's phone could become extremely appealing to people. Future research should look into how these technologies affect us emotionally, socially, physically and behaviorally, and then determine how de-tethering works to affect those same individuals. The current word used to describe unhealthy amounts of time on our devices is *addiction*, therefore, we need to consider rehabilitation measures which will help people deal with their symptoms. Wilderness will most definitely be an option, but future research should also consider other settings and approaches that might accommodate vast numbers of people in the long run.

Implications of Physical Separation

The Physical Separation component of wilderness solitude suggests that avoiding crowds and having the opportunity to camp free from the sights and sounds of others are a significant experiential condition for wilderness visitors who are motivated to experience solitude. The establishment of this component provides support for much of the past research on wilderness solitude within the social-spatial perspective. The items within the Physical Separation scale suggest that a large aspect of this component centers around the notion of isolation potential, which falls in line with past findings. What is important to note, however, is that Physical Separation is only one element within the entire phenomenon of wilderness solitude, and in order to gain a complete understanding of the experiential conditions, additional components must be considered.

Within the resulting two dimensional model of wilderness solitude, the Physical Separation component rests firmly in the physical dimension. The component itself suggests that when respondents consider the social settings of wilderness, they prefer low levels of interaction with outside groups. Unfortunately, this component does not provide many details as to what particular aspects of encounters or crowding respondents prefer to avoid, and therefore, more

research is warranted. Furthermore, an understanding for how Physical Separation relates to the other three components of wilderness solitude will also require more investigation.

Past Research Relating to Physical Separation

In chapter two, an in-depth analysis of the past research on wilderness solitude was explained. Within that chapter, the themes of encounters, crowding, carrying capacity and privacy were all shown to have a rich history within the research lineage of wilderness solitude. Also within chapter two, it was expressed that there were opponents to the research frameworks that employed these concepts to measure how solitude was threatened by certain experiences. In particular, Hollenhorst and Jones (2001) argued that the operationalization of solitude through the lens of encounters and crowding was an overly simplistic view of an extremely complex concept. The findings of this study support, as it has been revealed that the social-spatial conditions are only one component of a much larger concept.

When working to explain why encounter norms and perceptions of crowding have provided so many contradicting results, Patterson and Hammitt (1990) suggest that one possible explanation is that wilderness users might not have a clear conception of what a tolerable number of encounters on the trail is, which leads to highly varied results. Additionally, Hall and Shelby (1996) provide more support to this notion of inconsistent conceptions as over 50% of the respondents they contacted in the Eagle Cap Wilderness either reported being unaffected by encounters, or could not report a particular threshold where encounters became detrimental to their wilderness experience.

Hall (2001) suggests that the total number of visitor encounters experienced throughout a wilderness trip has little consequence on overall solitude achievement, and instead, patterns of encounters were reported to have a greater effect on opportunities for solitude. This helps provide some direction when working to understand the effect of encounters and crowding;

based on Hall's conclusion, the pertinent question surrounding encounter norms should be "when," rather than "how much." Unfortunately, the findings from this study do little to answer the question of "when." The only possible answer to that question would be that respondents consistently reported that camping free from the sights and sounds of others was an important condition to their experience of solitude. What complicates this topic is the information that the federal interagency approach for conducting wilderness character monitoring, titled *Keeping It Wild 2*, states, "seeing or hearing other people inside a wilderness directly affects opportunities for solitude" (Landres et al., 2015, p.53). This is a strong claim, and based on past research, and the findings of this study, I find it difficult to support such an approach. In fact, it seems to go against a great deal of research that suggests encounters and crowding are a much more complicated issue. Cole and Hammitt (2000), do a nice job of articulating the matter: "Solitude is an important aspect of wilderness management, use encounters have to be involved, and it is the responsibility of wilderness scientists to develop more sophisticated research in order to validly support managing for solitude in wilderness ecosystems" (p. 62). A call for more sophisticated research is the key. However, that research has yet to be developed. Cole and Hammit are correct in saying that encounters and crowding effect solitude, this is supported by the establishment of the Physical Separation component; nevertheless, what we still don't know are the specific preferences that wilderness visitors possess regarding the inopportuneness of encounters and crowding.

Management Implications regarding Physical Separation

When considering the findings of the Physical Separation component, an enlarged interpretation is warranted when addressing the "opportunities for solitude" clause within the Wilderness Act. Traditionally, the difficulty in interpreting this aspect of the Act is what led to the prevalence of the social-spatial perspective in solitude research. Instead of examining what these

“opportunities” might entail, the social-spatial perspective examined the conditions that threaten such opportunities, which was how encounters and crowding assumed their position of dominance within the research tradition. However, the results of this research show that “opportunities for solitude” can also be found within the experience of societal release, as well as the internal conditions visitors bring with them into the wilderness. Therefore, one of the greatest implications from this study is for wilderness managers to start exploring alternative indicators that address “opportunities for solitude.” Despite the relatively straightforward nature of tallying the number of encounters visitors experience, or documenting the number of occupied campsites in a particular location, the experience of wilderness solitude has proven to be much more complex, and therefore new management approaches are necessary.

Future Research on Physical Separation

Future research on Physical Separation should look to develop a qualitative understanding of the elements within the component that wilderness visitors find the most and least important towards their achievement of wilderness solitude. Such investigation should address the question of “when” rather than “how much,” and should zero in on the themes of encounters and crowding, isolation potential, as well as sights and sounds of others.

The issue of sights and sounds is a theme that could expand the research understanding of how outside influences, such as airplanes over head, or light pollution in urban proximate wilderness areas, affect visitor experiences. By expanding the conditions that are involved in the Physical Separation component, efforts to expand the criterion in this component beyond encounters and crowding might prove to be successful.

Implications of Introspection

The Introspection component of wilderness solitude suggests that wilderness visitors who are motivated to experience solitude find opportunities to examine their personal values and

develop a stronger sense of self to be important conditions within their wilderness experience. The establishment of this component helps to expand the bank of potential indicators for monitoring wilderness solitude, and provides support to past research that theorized this concept's existence within the wilderness solitude experience. What has been discovered through this component is that a visitor's internal conditions must be considered when determining if "opportunities for solitude" exist. These findings support the notion that a more comprehensive understanding of wilderness solitude is warranted, and puts the pieces in place for future research to dive deeper into all of the potential conditions relating to Introspection.

Within the resulting two dimensional model of wilderness solitude, the Introspection component rests firmly in the psychological dimension. The component itself suggests that respondents bring with them a set of mental conditions that serve to contribute to opportunities for solitude. What remains unclear, however, is how the other three components of wilderness solitude relate to Introspection. Part of the challenge presented by the Introspection component is the difficulty of measuring an individual's subjective experience; therefore, qualitative research should be used to identify major themes and build a stronger understanding of the conditions relating to Introspection.

Past Research Relating to Introspection

Although there is a fair amount of philosophical literature on how episodes of solitude lead to experiences of introspection and self-reflective thought, there is a limited amount of research on the role of introspection within wilderness solitude. This is most likely the case because of the extreme difficulty that is associated with researching deeply personal experiences. However, a few decades back, multiple studies that were investigating wilderness privacy concluded that a number of cognitive benefits can be experienced throughout an individual's time in wilderness, these benefits include: cognitive freedom, self-evaluation, personal autonomy,

self-identity, emotional release, and reflective thought (Hammitt and Brown, 1984; Hammitt, 1982). Although introspection itself was not referenced, many of these reported benefits fall under the umbrella of introspection, which is the concept of examining one's own mental and emotional processes. The findings of this study work to highlight those potential benefits, and opens the door for future investigation.

In a study titled, *The Dynamic, Emergent, and Multi-phasic Nature of On-site Wilderness Experiences*, Borrie and Roggenbuck (2001), found that “focus on self/introspection, while low throughout [the wilderness experience], gradually increased [over time] to reach a [statistically] significant level of gain by the exit phase [of wilderness travel].” The authors went on to express surprise at this finding, as they believed high levels of introspection would follow the immersion phase of the wilderness experience, and continue to increase throughout one's trip. This finding, though not related specifically to wilderness solitude, provides the closest understanding towards wilderness visitors experiences of introspection that exists within the discipline. It demonstrates the unpredictability and variability over time that exists around the concept, as well as the difficulty involved in producing empirical data from during the experience.

Future Research Regarding Introspection

Future research on Introspection should look to develop a qualitative understanding of the conditions involved with the experience. Such investigations should examine how time spent in a wilderness environment effects the trajectory of their thoughts, and how it differs compared to time spent in a different setting, like a city park, the car, or at home. Such research could address the question of whether there is something about a wilderness environment that helps promote an internal dialog. In particular, I think it is important to investigate whether the physical conditions of wilderness allow individuals to fold their attention inward, leading to increased amounts of internal awareness and understanding – which would be best approached

through qualitative research. Additionally, future research should examine how introspection is viewed and considered by recreational users in areas that are not designated wilderness, this might provide a greater understanding of the role of natural environments play towards introspection in contemporary life.

Future research beyond the field of outdoor recreation should investigate the effect that digital connectivity and social media has on introspection. In particular, research should address high school students and young adults – as Storr (1989) and Larson (1990) suggest that those years are instrumental for developing patterns of reflective thought and internal dialogs. Such research would also help address how digital devices serve to diminish opportunities for introspection. It might also be interesting to investigate the relationship between introspection and self-esteem, as those who do not regularly practice introspection rely on others to validate their worldview. There is also research to be had when considering the role that introspection plays towards spiritual exploration and personal well being.

Implications of Societal Release

The Societal Release component suggests that wilderness visitors who are motivated to experience solitude find that opportunities to give their mind a rest and spend time away from the usual demands of life to be important. The establishment of this component also helps to expand the bank of potential indicators for monitoring wilderness solitude, and provides support to interpretations of the Wilderness Act that suggests wilderness can function as a contrast to mainstream society. What has been discovered through this component is that the resulting conditions of wilderness not only provide visitors with an opportunity to immerse themselves within a natural environment, but they are also given the chance to experience life without all the norms and regulations of a civilized environment. These findings support the notion that a more

comprehensive understanding of wilderness solitude is warranted, and opens the door for more research on Societal Release to be conducted.

Within the resulting two dimensional model of wilderness solitude, the Societal Release component exists within the psychological dimension. This decision was based on the assembly of the Societal Release subscale that was established through PCA. Among the five items in the subscale, four of the items were referring to societal conditions that have no physical properties, instead, they are mostly social constructions like rules, roles, and responsibilities. Furthermore, when considering how the conditions of society have expanded through digital means, where once again they lack a physical representation, societal release appears to be a response to the alternative conditions wilderness provides.

Past Research Relating to Societal Release

Much of the past research that has worked to address the themes of Societal Release have done so through the terms of “societal detachment” or “withdrawal”. For example, Hollenhorst and Jones (2001) provide this definition of wilderness solitude:

Solitude is psychological detachment from society for the purpose of cultivating the inner world of the self. It is the act of emotionally isolating oneself for self-discovery, self-realization, meaning, wholeness, and heightened awareness of one’s deepest feelings, and impulses. It implies a morality that values the self, at least on occasion, as above the common good (p. 56).

This definition, which helps shed some light on Introspection as well, provides a clear view at the foundation of the humanistic perspective within wilderness solitude research. The humanistic perspective is strongly supported by the findings of this study. When considering the definition, both the Societal Release and Introspection components work to validate Hollenhorst and Jones’ account of solitude. Furthermore, their interpretation of solitude suggests that Societal Release leads to Introspection, as it is the “psychological detachment from society” which allows the experience to take place.

When looking at Section 2(a) of the Wilderness Act, the component of Societal Release begins to take on more weight. Section 2(a) states:

In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.

The wording of the Wilderness Act suggests that the resource of wilderness be preserved so that future generations have an experience that releases them from conditions of crowding, over-settlement and mechanization. With this in mind, Societal Release might not only be a significant element within wilderness solitude, but it may be one of the defining elements of wilderness in general. Unfortunately, there is little research that explores this notion. Therefore, among the four components of wilderness solitude, it appears Societal Release is the most important when considering how it might help our understanding of the Wilderness Act. Future research should take these findings into account and begin exploring the underlying dimensions of Societal Release.

Management Implications Regarding Societal Release

The management implications surrounding Societal Release are closely related to the wording and description of the Wilderness Act. As the previous quote of Section 2(a) suggests, conditions of crowding, settlement (human edifice), and mechanization should be avoided at all costs. In order to avoid the conditions of crowding, managers should work to disperse visitors across the landscape, which could best be accomplished by increasing the number of trails and campsites. Human edifice should be limited to the trailhead, and even there, measures should be taken to keep the infrastructure minimal – this way, visitors might obtain a sense of Societal Release before they even get on the trail. In wilderness, signage should remain simple, and should be made from wooden materials, rather than metal or plastics. The issue of

mechanization is of immediate concern, HR 1349 (2017), known as the “wheels over wilderness” bill, seeks to “amend the Wilderness Act to ensure that the use of bicycles, wheelchairs, strollers and game carts is not prohibited in Wilderness Areas.” Managers should consider what these “wheels” stand to take out of wilderness, which is an element of wildness. The notion of encountering mountain bikes on a trail deep within a wilderness removes the primitive element of the experience, and would most likely negatively effect opportunities for solitude. Overall, the management implications of Societal Release span much farther than wilderness solitude, this component rests at the heart of what makes wilderness so unique.

Future Research on Societal Release

Future research on Societal Release ought to tackle the concept in a holistic sense – by investigating all of the possible conditions that it entails. This can be approached through both qualitative and quantitative research. It is important to note, that I feel the topic of Societal Release is separate concept from solitude. I believe that Societal Release plays a big role in one’s experience of wilderness solitude, but I also think that there are elements of this concept that warrant investigation on a large scale. When considering the small amount of research that has been done on this topic, I make these suggestions with a considerable amount of urgency. Furthermore, I think it is important to consider that the current conditions of digital culture, which has placed aspect of society in the palm of one’s hand, have increased the number of conditions involved with Societal Release. Therefore, future research should investigate the link between De-tether and Societal Release; as well as the components of Introspection and Physical Separation.

Section 6.3 – Summary and Conclusion

The implications of this study revolve around the significance of the four components of wilderness solitude which can now function as indicators of solitude in future wilderness research. These findings promote a clearer understanding of wilderness solitude that is inclusive of past research approaches, while also addressing the changes that have taken place in contemporary society since much of that research was conducted. This was accomplished through the comprehensive perspective that was brought to the research, which called on writings from the disciplines of environmental philosophy and psychology to aid in the development of the research model. Additionally, a deep consideration of the underlying meanings within the wording of the Wilderness Act served as a underpinning of this research. Nevertheless, it is important to remember that the components discovered through this research only tell a part of the story surrounding wilderness solitude, and these findings should be seen as a conceptual expansion that works to promote future investigation.

Limitations

There were a number of limitations encountered throughout the course of this study that may have influenced the results. The first limitation relates to a sample size that was considerably smaller than expected. Limiting factors within this study's sample size have a great deal to do with the historic fire season that was experienced in Montana during the summer of 2017, in particular, the southern half of the BMWC had four separate fires (Rice Ridge, Monahan, Arrastra Creek, Alice Creek) that burned over 200,000 acres. Not only did these fires present closures at certain trailheads that were in the original sampling plan, but the smoke and danger posed by the fires most likely led to a marked decrease in visitation to the BMWC.

Another limitation surrounding the sample population is that this study used a convenience sample, rather than a representative random sample. The limitation encountered

with a convenience sample can be seen in the 64% of respondents who were contacted at the North Fork of the Blackfoot River Trailhead. This also explains the high percentage of anglers (46%), as well as the relatively high percentage of day visitors (41%). The danger that a convenience sample presents is one of sampling error, which is the extent to which a sample is limited in its ability to accurately describe a specific population because some, rather than all, of the elements in the population are sampled (Vaske, 2008). Thankfully, a high degree of sampling error was not encountered in this study, furthermore, the KMO and Bartlett's Test within the PCA worked to validate the sample.

Conclusion

The goals of this research were twofold, to create a comprehensive model of wilderness solitude, and investigate the importance wilderness visitors place on de-tethering from digital connectivity. The former was met by synthesizing past research findings to develop a quantitative research instrument that was both valid and reliable; and the latter was met by relating much of the current literature and research on mobile technology with wilderness travel. By identifying four components of wilderness solitude the results of this study worked to create an enlarged definition of wilderness solitude, which helps strengthen interpretations of the Wilderness Act. It is my hope that the work presented in this study will generate additional interest and research not only towards the phenomenon of wilderness solitude, but also to the intricacies of the Wilderness Act as a whole.

Appendix A – Survey Instrument

Group Summary

Trailhead: _____

Date: _____

Time on Contact: _____

Direction of Travel:

Entering

Leaving

Length of stay:

Day use only →

½ Day ____

Full Day ____

Overnight →

Number of nights: ____

Outfitted:

Yes

No

Gender:

Male

Female

Type of group:

Hikers

Horseback riders

Hikers w/ pack animals

Paddlers

Number of non-sampled group members: _____

Reason for non-sampling: Under 18 Outfitter Other: _____

Comments:



1) Have you visited this wilderness before?

No

Yes If yes, about how many times? _____

2) How important are each of the following activities to your wilderness experience?

	Not Important	Somewhat Important	Very Important	Most Important (Choose one)
Spending time with family and friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality Hunting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality Fishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Finding solitude	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Testing outdoor skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Revisiting a familiar area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Being away from internet and cell phone service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Challenge and Adventure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



3) In what year were you born? _____

4) What is the highest year of school you have completed? (circle one)

<u>Elementary</u>	<u>High School</u>	<u>College</u>	<u>Gradate School</u>
1 2 3 4 5 6 7 8	9 10 11 12	13 14 15 16	17 18 19 or more

5) Where do you live? And where did you live most of your life before the age of 18? (Check one box in each column. If you live or used to live in a suburb, answer in terms of the whole metropolitan area)

	Where do you now live?	Where did you live most of your life before age 18?
On a farm	[]	[]
Rural or small town (under 1,000 population)	[]	[]
Town (1,000 – 5,000 population)	[]	[]
Small City (5,001- 50,000 population)	[]	[]
Medium City (50,001 – 1 million population)	[]	[]
Large City (Over 1 million population)	[]	[]

How important are the following items to your wilderness solitude experience?	Extremely Unimportant		Somewhat Unimportant		Somewhat Important		Extremely Important	
	Unimportant	Important	Unimportant	Important	Unimportant	Important	Unimportant	Important
1) To avoid everyday responsibilities for a while.....	[]	[]	[]	[]	[]	[]	[]	[]
2) To think about my personal values.....	[]	[]	[]	[]	[]	[]	[]	[]
3) To be away from cell phones and other digital devices.....	[]	[]	[]	[]	[]	[]	[]	[]
4) To give my mind a rest.....	[]	[]	[]	[]	[]	[]	[]	[]
5) To experience life without everyday technologies.....	[]	[]	[]	[]	[]	[]	[]	[]
6) To be in an environment mostly free of human-made intrusions.....	[]	[]	[]	[]	[]	[]	[]	[]
7) To be relieved from the rules and constraints of society.....	[]	[]	[]	[]	[]	[]	[]	[]
8) To encounter low numbers of people on the trail.....	[]	[]	[]	[]	[]	[]	[]	[]
9) To think about who I am.....	[]	[]	[]	[]	[]	[]	[]	[]
10) To be on my own.....	[]	[]	[]	[]	[]	[]	[]	[]
11) To be free from observation by all other people.....	[]	[]	[]	[]	[]	[]	[]	[]
12) To disconnect from social media.....	[]	[]	[]	[]	[]	[]	[]	[]
13) To get away from the noise back home.....	[]	[]	[]	[]	[]	[]	[]	[]
14) To develop personal and spiritual values.....	[]	[]	[]	[]	[]	[]	[]	[]
15) To experience the tranquility and peacefulness of a remote environment	[]	[]	[]	[]	[]	[]	[]	[]
16) To be away from emails and instant messaging.....	[]	[]	[]	[]	[]	[]	[]	[]
17) To be alone.....	[]	[]	[]	[]	[]	[]	[]	[]
18) To be away from crowds of people.....	[]	[]	[]	[]	[]	[]	[]	[]
19) To get away from the usual demands of life.....	[]	[]	[]	[]	[]	[]	[]	[]
20) To be away from internet connections.....	[]	[]	[]	[]	[]	[]	[]	[]
21) To feel isolated.....	[]	[]	[]	[]	[]	[]	[]	[]
22) To not multitask with digital devices.....	[]	[]	[]	[]	[]	[]	[]	[]
23) To camp free from the sights and sounds of others.....	[]	[]	[]	[]	[]	[]	[]	[]

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- Alter, A. (2017). *Irresistible: The rise of addictive technology and the business of keeping us hooked*. Penguin Press.
- Atchley, R., Strayer, D., & Atchley, P. (2012). Creativity in the wild: Improving creative reasoning through immersion in natural settings. *PLoS one*, 7(12), e51474.
- Babbie, E. R. (1989). *The practice of social research*. Wadsworth Publishing Company.
- Baud-Bovy, M. (1977). *Tourism and recreational development (183-186)*. The Architectural Press.
- Borrie, W. T., & Roggenbuck, J. W. (2001). The dynamic, emergent, and multi-phasic nature of on-site wilderness experiences. *Journal of leisure research*, 33(2), 202-228.
- Carver, S., Tricker, J., & Landres, P. (2013). Keeping it wild: Mapping wilderness character in the United States. *Journal of environmental management*, 131, 239-255.
- Cole, D. N., Watson, A. E., & Roggenbuck, J. W. (1995). *Trends in wilderness visitors and visits: Boundary Waters Canoe Area, Shining Rock, and Desolation Wildernesses* (Vol. 483). Ogden, UT: US Forest Service, Intermountain Research Station.
- Cole, D. N. (2000). Soul of the Wilderness. *International Journal of Wilderness*, 6(2), 5.
- Cole, D. N., & Hammitt, W. E. (2000). Wilderness management dilemmas: Fertile ground for wilderness management research. *USDA Forest Service Proceedings RMRS-P-15-VOL-1*. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Cole, D. N., & Hall, T. E. (2009). Perceived effects of setting attributes on visitor experiences in wilderness: variation with situational context and visitor characteristics. *Environmental Management*, 44(1), 24.
- Cole, D. N., & Hall, T. E. (2010). Privacy functions and wilderness recreation: Use density and length of stay effects on experience. *Ecopsychology*, 2(2), 67-75.
- Dawson, C. P., Newman, P., & Watson, A. (1998). Cognitive dimensions of recreational user experiences in wilderness: an exploratory study in Adirondack wilderness areas.

- Dawson, C. P., & Watson, A. E. (2000). Measures of wilderness trip satisfaction and user perceptions of crowding. *USDA Forest Service Proceedings RMRS-P-15-VOL-4*. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Dawson, C. (2004). Monitoring outstanding opportunities for solitude. *International Journal of Wilderness*, 10(3), 12-14.
- Deresiewicz, W. (2009). The End of Solitude. *The Chronicle of Higher Education*, 55(21), 6.
- DeVellis, R. F. (2016). *Scale development: Theory and applications* (Vol. 26). Sage publications.
- Driver, B. L., Tinsley, H. E. A., & Manfredi, M. J. (1991). The paragraphs about leisure and recreation experience preference scales: Results from two inventories designed to assess the breadth of the perceived psychological benefits of leisure. *Benefits of leisure*, 263-286.
- Driver, B. L. (1983). Master list of items for Recreation Experience Preference scales and domains. USDA For. Serv. Rocky Mountain Forest and Range Experiment Station, Ft. Collins, Colo. *Unpublished doc.*
- Dustin, D. L., & McAvoy, L. H. (2000). Of what avail are forty freedoms: the significance of wilderness in the 21st century. *International Journal of Wilderness*, 6(2), 25-26.
- Ewert, A. (1988). Reduction of trait anxiety through participation in Outward Bound. *Leisure Sciences*. 10(2): 107-117.
- Feinstein, B. A., Hershenberg, R., Bhatia, V., Latack, J. A., Meuwly, N., & Davila, J. (2013). Negative social comparison on Facebook and depressive symptoms: Rumination as a mechanism. *Psychology of Popular Media Culture*, 2(3), 161-170.
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). Sage publications.
- Freimund, W. A., & Cole, D. N. (2001). Use density, visitor experience, and limiting recreational use in wilderness: Progress to date and research needs. *USDA Forest Service Proceedings RMRS-P-20*.
- Frissell, S. S., & Stankey, G. H. (1972, October). Wilderness environmental quality: Search for social and ecological harmony. Society of American Foresters.
- Gao, T., Li, J., Zhang, H., Gao, J., Kong, Y., Hu, Y., & Mei, S. (2018). The influence of alexithymia on mobile phone addiction: The role of depression, anxiety and stress. *Journal of affective disorders*, 225, 761-766.
- Hall, T., & Shelby, B. (1996). Who cares about encounters? Differences between those with and without norms. *Leisure Sciences*, 18(1), 7-22.

- Hall, T. E. (2001). Hikers' perspectives on solitude and wilderness. *International Journal of Wilderness*, 7(2), 20-24.
- Hall, T. E., Seekamp, E., & Cole, D. (2010). Do recreation motivations and wilderness involvement relate to support for wilderness management? A segmentation analysis. *Leisure sciences*, 32(2), 109-124.
- Hall, T., & Davidson, A. (2013). Changes in Bridger Wilderness Visitors Experiences of Crowding and Attitudes toward Management from 1969 to 2010. *Journal of Park and Recreation Administration*, 31(4).
- Hammitt, W. E. (1982). Cognitive dimensions of wilderness solitude. *Environment and Behavior*, 14(4), 478-493.
- Hammitt, W. E., & Brown Jr, G. F. (1984). Functions of privacy in wilderness environments. *Leisure Sciences*, 6(2), 151-166.
- Hammitt, W. E., & Madden, M. A. (1989). Cognitive dimensions of wilderness privacy: A field test and further explanation. *Leisure Sciences*, 11(4), 293-301.
- Hammitt, W. E., & Rutlin, W. M. (1995). Use encounter standards and curves for achieved privacy in wilderness. *Leisure Sciences*, 17, 245-262.
- Harris, M. J. (2014). *The End of Absence: Reclaiming What We've Lost in a World of Constant Connection*. Penguin.
- Hollenhorst, S., Frank III, E., & Watson, A. (1994). The capacity to be alone: Wilderness solitude and growth of the self. *International Wilderness Allocation, Management and Research, Boulder, USA, WILD Foundation*, 234-239.
- Hollenhorst, S. J., & Jones, C. D. (2001). Wilderness solitude: Beyond the social-spatial perspective. *USDA Forest Service Proceedings RMRS-P-20*. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and psychological measurement*, 20(1), 141-151.
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31-36.
- Kaplan, R.; Kaplan, S. (1989). *The experience of nature: A psychological perspective*. Cambridge: Cambridge University Press.
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of environmental psychology*, 15(3), 169-182.

- Kawachi, I., & Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban health*, 78(3), 458-467.
- Landres, P., Barns, C., Boutcher, S., Devine, T., Dratch, P., Lindholm, A., & Simpson, E. (2015). Keeping it wild 2: An updated interagency strategy to monitor trends in wilderness character across the National Wilderness Preservation System. *Gen. Tech. Rep. RMRS-GTR-340*. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station. 114 p., 340.
- Landres, P., Vagias, W. M., & Stutzman, S. (2012). Using wilderness character to improve wilderness stewardship. *Park Science*, 28(3), 44-48.
- Larson, R., & Lee, M. (1996). The capacity to be alone as a stress buffer. *The Journal of social psychology*, 136(1), 5-16.
- Larson, R. W. (1990). The Solitary Side of Life: An Examination of the Time People Spend Alone from Childhood to Old Age. *Developmental Review*, 10(2), 155-183.
- Larson, R., & Johnson, C. (1985). Bulimia: Disturbed patterns of solitude. *Addictive Behaviors*, 10(3), 281-290.
- Lee, G. C. (1945). George Herbert Mead: Philosopher of the social individual. *King's Crown Press*.
- Lee, R. G. (1977). Alone with others: The paradox of privacy in wilderness. *Leisure Sciences*, 1(1), 3-19.
- Lieberman, M. D. (2013). *Social: Why our brains are wired to connect*. Oxford University Press, Oxford, UK.
- Long, C. R., & Averill, J. R. (2003). Solitude: An exploration of benefits of being alone. *Journal for the Theory of Social Behaviour*, 33(1), 21-44.
- Long, C., More, T. A., & Averill, J. R. (2007). The subjective experience of solitude. *Proceedings of the 2006 Northeastern Recreation Research Symposium GTR-NRS-P-14*.
- Lucas, R. C. (1985). Visitor characteristics, attitudes, and use patterns in the Bob Marshall Wilderness complex, 1970-82. (INT-345).
- Manfredo, M. J., Driver, B. L., & Tarrant, M. A. (1996). Measuring leisure motivation: A meta-analysis of the recreation experience preference scales. *Journal of Leisure Research*, 28(3), 188.
- Manning, R. E. (2003). What to do about crowding and solitude in parks and wilderness? A reply to Stewart and Cole. *Journal of Leisure Research*, 35(1), 107-118.
- Manning, R. E., Valliere, W. A., & Wang, B. (1999). Crowding norms: Alternative measurement approaches. *Leisure Sciences*, 21(2), 97-115.

- Manning, R. E. (1985). Crowding norms in backcountry settings: a review and synthesis. *Journal of Leisure Research*, 17(2), 75.
- Marshall, R. (1930). The Problem of the Wilderness. *Scientific Monthly*, 30(2), 141-148.
- Mathieson, A., & Wall, G. (1982). *Tourism: Economic, physical and social impacts*. New York: Longman.
- McAvoy, L. H., & Dustin, D. L. (1981). The right to risk in wilderness. *Journal of Forestry*, 79(3), 150-152.
- Mead, G. H. (1934). *Mind, Self and Society* (Vol. 111). University of Chicago Press.: Chicago.
- Mendleson, E. (2016). In the Depths of the Digital Age. [Review of the book *Pressed for Time*, by Judy Wacjman]. *The New York Review of Books*, Vol. 63 (11).
- Mertler, C. A., & Vannatta, R. A. (2002). *Advanced and multivariate statistical methods: Practical application and interpretation* (2nd ed.). Los Angeles: Pyrczak.
- Mish, F. 2003 Merriam -Webster's Collegiate Dictionary. Merriam-Webster Incorporated. New York, New York.
- Misra, S., Cheng, L., Genevie, J., & Yuan, M. (2016). The iPhone effect: the quality of in-person social interactions in the presence of mobile devices. *Environment and Behavior*, 48(2), 275-298.
- Noss, R. F. (1991). Sustainability and wilderness. *Conservation Biology*, 5(1), 120-122.
- O'Keeffe, G. S., & Clarke-Pearson, K. (2011). The impact of social media on children, adolescents, and families. *Pediatrics*, 127(4), 800-804.
- Patterson, M. E., & Hammitt, W. E. (1990). Backcountry encounter norms, actual reported encounters, and their relationship to wilderness solitude. *Journal of leisure research*, 22(3), 259.
- Roberts, J., Yaya, L., & Manolis, C. (2014). The invisible addiction: Cell-phone activities and addiction among male and female college students. *Journal of behavioral addictions*, 3(4), 254-265.
- Roggenbuck, J. W., Williams, D. R., & Watson, A. E. (1993). Defining acceptable conditions in wilderness. *Environmental Management*, 17(2), 187-197.
- Rolston, H. (1975). *Lake Solitude: The Individual in Wildness*. Main Currents Vol. 31, No.4.
- Shelby, B., T. Heberlein. (1986). *Carrying capacity in recreation settings*. Corvallis, OR: Oregon State University Press.

- Sproull, N. (2003). *Handbook of Research Methods: A Guide for Practitioners and Students in the Social Sciences* (2nd ed.). Lanham, MD: Scarecrow Press.
- Stewart, W. P., & Cole, D. N. (2001). Number of encounters and experience quality in Grand Canyon backcountry: Consistently negative and weak relationships. *Journal of Leisure Research, 33*(1), 106.
- Steiner, J. F. (1933). *Americans at play: Recent trends in recreation and leisure time activities*. McGraw-Hill.
- Stevens, J. P. (2002). *Applied multivariate statistics for the social sciences*. Lawrence Erlbaum Association. New Jersey.
- Storr, A. (1989). *Solitude: A return to the self*. New York: Ballantine.
- Sutter, P. S. (2002). *Driven wild: How the fight against automobiles launched the modern wilderness movement*. University of Washington Press.
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics*. Allyn & Bacon/Pearson Education.
- Turkle, S. (2008). Always-On/Always-On-You: The Tethered Self. *Handbook of Mobile Communication Studies, 121*.
- Turkle, S. (2012). *Alone together: Why we expect more from technology and less from ourselves*. Basic Books, NY.
- Twight, B. W., Smith, K. L., & Wissinger, G. H. (1981). Privacy and camping: Closeness to the self vs. closeness to others. *Leisure Sciences, 4*(4), 427-441.
- Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. Venture Publications.
- Wagar, J. A. (1964). The carrying capacity of wild lands for recreation. *Forest Science, 10*(3).
- Wajcman, J. (2014). *Pressed for time: The Acceleration of Life in Digital Capitalism*. University of Chicago Press.
- Watson, A. E. (1995). Opportunities for solitude in the Boundary Waters Canoe Area wilderness. *Northern Journal of Applied Forestry, 12*(1), 12-18.
- Watson, A. E., Hunger, D., Christensen, N., Spildie, N., Becker, K., & Comstock, J. (1997, October). Wilderness boaters: Protecting unique opportunities in the Frank Church-River of No Return Wilderness, Idaho, USA. In *Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management, and allocation* (Vol. 1, pp. 151-158).
- Watson, M. (1908). A Draught of Solitude. *The Irish Monthly, 36*(421), 416-420.

- Westin, A. F. (1968) Privacy and Freedom, 25 Wash. & Lee L. Rev. 166.
<http://scholarlycommons.law.wlu.edu/wlulr/vol25/iss1/20>
- Winnicott, D. W. (1958). The Capacity to be Alone. *The International Journal of Psycho-analysis*, 39, 416.
- White, D., & Hendee, J. (1999). Primal hypotheses: The relationship between naturalness, solitude and the wilderness experience benefits of development of self (DOS), development of community (DOC), and spiritual development (SD). *Proceedings: Wilderness Science in a Time of Change*. Proc. RMRS-P-000.
- Young, R. A., & Crandall, R. (1984). Wilderness use and self-actualization. *Journal of Leisure Research*, 16(2), 149.
- Zahniser, H., Zahniser, E., Davis, G. D., Schaefer, P., & Scott, D. W. (1992). *Where Wilderness Preservation Began: Adirondack Writings of Howard Zahniser*. North Country Books Incorporated.