The Impact of Technology on the Wilderness Experience: A Review of Common Themes and Approaches in Three Bodies of Literature

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Abstract—In the last decade, increasing concern has been expressed about the impact of new technologies—especially communication technologies—on the wilderness experience. Many authors have suggested a tipping point has been reached, with new technologies changing the very nature of the 'traditional' wilderness experience in various ways. The loss of direct experiences creating new perceptions of risk among wilderness users has been a common complaint. As very few wilderness researchers have conducted empirical studies on this issue, I review these anecdotal, deterministic concerns in this body of literature. Then I identify key debates and approaches in two other literatures that consider the complex relationship between technology and recreation: leisure studies and science and technology studies. Within the latter field, I concentrate on Albert Borgmann's discussion of focal practices, which shows promise as a conceptual foundation for this issue. Common themes within each of these three distinct literatures are identified, providing some indications of the key issues and topics that might be assessed by much-needed future research.

Introduction

In the beginning of the twenty-first century, at least two different conceptualizations of wilderness exist. The traditional view of wilderness, reflecting a realist epistemological perspective, is of a primordial, relatively untouched natural area where natural forces dominate, and human presence is limited to visitation by outdoor recreationists and the limited infrastructure (such as, trails and campsites) they require. This hegemonic conceptualization is buttressed by the Western separation of nature and culture—in existence from at least the Enlightenment Era—and other Western appurtenances (science, religion and capitalism).

The second view of nature is much more recent, reflecting postmodern perspectives and a relativist epistemological perspective. A social constructionist approach—a critical theory which sprung from a relatively small number of social scientists' discontent with the realist views of nature and science—is often embedded within this second model. In this view, wilderness only exists as a result of the sociocultural meanings generated by the continual construction and re-construction of individuals within society. While most social constructionists do not question the existence of external reality (for example, relatively untouched nature can still be said to exist around the world), they suggest that the constellation of meanings we provide to concepts like wilderness generate the only 'reality' that humans can understand: we live only through the imperfect mental representations provided through our cognition and language.

The rise of this new conceptualization of wilderness in the 1990s, beginning with Cronon's (1995) classic book chapter, generated a storm of protest, with many wilderness researchers suggesting that it was a dangerous challenge to wilderness preservation. These protestations (see Callicott and Nelson 1998; Nelson and Callicott 2008) should not have come as a surprise, as the 'cultural turn'—the rise of interpretive perspectives and qualitative research methods within science in the 1970s—caused similar offense in broad scientific circles, leading to what became known as the 'science wars' (for example, Ashman and Baringer 2001), a now almost forgotten battle between the hegemonic realists and the upstart relativists who seemed ready to uproot traditional views of science and established truths. The dust created by the battle between wilderness realists and relativists has also settled, perhaps in part because of the recent decline in wilderness-related research and publications.

Nonetheless, the tension between these two opposing conceptualizations of wilderness still exists, and as I document in this paper, is reflected in the study of the impact of technology on wilderness. Most of the very limited analysis of the potential impact of recreation technology on the wilderness experience follows a realist perspective of wilderness, and outlines a deterministic lens towards the potential impact of technology such as cell and satellite phones, GPS units and web-based applications on wilderness recreation. Further, the vast majority of wilderness scientists' consideration of the impact of technology of the wilderness experience typically ignores the considerable research on the broader social impacts of technology provided in other research areas.

The purpose of this paper is to review three distinct literatures assessing the impact of technology on society and wilderness

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recreation as a means of highlighting basic epistemological approaches and research findings and identifying potential directions for future research. The first research area, primarily written by wilderness researchers, directly addresses the issue of the impact of technology on the wilderness experience. A second literature, from the broader realm of leisure studies, considers the impact of technology on leisure more generally, and potentially useful findings from this research for wilderness researchers are reviewed. The third body of literature comes from science and technology studies (STS), which includes the social construction of technology (SCOT) literature (Cutcliffe 2000; Sismondo 2004), as some of this research relates to wilderness and the use of technology in wilderness recreation. In this third realm, Albert Borgmann's work will be highlighted, as his work seems to provide a commonly cited and potentially useful approach to future research assessing technology and its impact on the wilderness experience. Finally, after synthesizing these bodies of literature, I will provide recommendations for future research on this topic.

Wilderness Researcher Perspectives on the Impacts of Technology on Wilderness _____

Broad Findings from this Literature

As intimated above, the most immediate reflection on the limited literature attempting to assess the possible impacts of technology on the wilderness experience is the lack of empirical data on this subject. Martin and Pope (in press) provide an exploratory empirical examination of this topic. The vast majority of the literature summarized below reflects wilderness researchers' anecdotes and personal insights into these potential impacts. While this provides a useful foundation for future research, it is normally atheoretical, reflects the hegemonic realist conceptualization of wilderness, and tends to view the impact of technology in a primarily deterministic manner. Technological determinism suggests that social change is primarily led by technological development; indeed, technology is the most important variable affecting Western society, "an encompassing and irresistible force" (Borgmann 2006, p. 353; see also Smith and Marx 1994; Winner 2001). For example, a topic which is closely related to the impact of technology on wilderness is the potential impact of the computer on children's leisure and particularly outdoor recreation patterns. Richard Louv's (2005) and Pergams and Zaradic's (2006, 2008) very influential works reflect a negative deterministic perspective. The rise of the computer and various electronic media are seen to have directly led to social change, in this case altering children's relationship with nature and thus decreasing outdoor recreation and park visitation. Determinism, either positive or negative, is balanced by instrumentalism, which Borgmann (2006) suggests is the dominant view in contemporary society. Technology is portrayed as neither inherently good nor evil; it is what we decide to do (or not do) with technology that really matters. This is normally the perspective taken in the two bodies of literature reviewed below.

With regards to the wilderness and technology literature, the strongly deterministic lens seems to suggest that technology will automatically lead to significant and negative changes in the wilderness user and wilderness itself, and these changes are unlikely to be altered after the relevant technology becomes part of the wilderness experience. Although minor positive impacts of technology on wilderness recreation are often noted (such as easier access, increased safety and comfort), most of the literature focuses on the potentially negative impacts of technology. These are seen to overwhelm any positive effects. The concern is that too much technology in wilderness will impact the traditional wilderness experience, which has been linked to escaping the evils of civilization (including its technology), being able to become emotionally engaged with untouched nature, and adopting the 'simple' ways of life associated with our idealized ancestral past (see Ray 2009). Much as the crowding/carrying capacity literature focuses on use limits, the main option for controlling technology in wilderness seems to be limiting the type and amount of technology allowed in the wilderness. However, calls for such restrictions are rare, perhaps tempered by the increasing social concern over liability and safety issues in the wilderness; researchers are much more likely to highlight potential impacts without identifying any particular limitation to the use of technology in wilderness use.

Another common perspective in these works relates to the focus on only electronic forms of modern technology (such as, cell phones and GPS units) on the wilderness experience. That is, it seems that certain forms of 'traditional' technology (for example, automobiles, jet travel, synthetic materials) are rendered almost invisible, while concerns over the more recent electronic innovations are amplified. This amplification of attention on certain forms of technology seems to mirror research on the social amplification of risk (for example, Pidgeon and others 2003), which uses a social constructionist perspective to suggest that risks "interact with psychological, social, institutional, and cultural processes in ways that may amplify or attenuate public responses to the risk or risk event" (Kasperson and others 1988, p, 177). That is, certain risks can either be focused on or ignored, depending on a wide variety of social and cultural processes (such as, social norms, media engagement and current political ideology).

Also, much of the literature by wilderness researchers renders invisible the historical, complex relationship between technology and wilderness use. For example, the rise of the national park movement seems to have been closely associated with the social impacts related to the technology which enabled the Industrial Revolution. The Romantic and Transcendentalist movements' conceptualization of wild nature as a spiritual and moral force untainted by the negative aspects of civilization—perhaps best articulated by John Muir's body of work—was a necessary prerequisite for the preservation of wild nature. Also, the ability of well-heeled tourists to visit the monumental scenery in these areas via an expanding railway system (and the railroad companies' impetus to designate these protected areas) were critical to the popular and political support for national parks. Other technological innovations that had significant

impacts on the recreational use and creation of wilderness areas include the automobile, which led to the backcountry boom after World War II (Havlick 2002), and the introduction of synthetic fabrics and other materials in outdoor recreation equipment (nylon, Gore Tex) often initially developed for the military or the space program (Shultis 2001).

The rise of mass recreation provided by the automobile was also critical to the development of the Wilderness Society and thus the Wilderness Act itself. Much of the rhetoric emanating from wilderness leaders in the mid-twentieth century voiced concerns over the impact of technology, especially the automobile, on wilderness use. The preamble in the Wilderness Act specifically noted the growing mechanization of society as a rationale for protecting wilderness in the Unites States (Sutter 2002). As Stankey (2000, p. 17) notes, "However ironic it may appear, technology was, and continues to be, what gives meaning to the concept of wilderness"; technology has become conceptualized as the 'opposite' of wilderness despite clearly being a *sine qua non* of wilderness use. This paradoxical relationship between technology and wilderness—as both enabler and destroyer—continues in contemporary debates. Just as the central question of the carrying capacity of wilderness became framed as the 'limits of acceptable change', perhaps the question of how much or what type of technology is appropriate for 'proper' wilderness use is the central issue to be debated in the relationship between technology and wilderness.

Specific Findings from Wilderness Researchers

What are the specific issues identified by wilderness researchers assessing the impacts of technology on the wilderness experience? While some researchers suggested that increasing technology in recreation equipment would increase wilderness use (Ewert and Hollenhorst 1997; Roggenbuck 2000), other social trends and issues, including increased costs of wilderness use and decreasing costs of international travel, have meant that use levels in wilderness and many protected area have decreased from the 1990s in the United States, Canada and several other countries (Shultis and More 2011). Ewert and Shultis (1999) identified five aspects of the wilderness experience that are influenced by technology: access/transportation, comfort, safety, information and communication. These aspects work both independently and in an integrated fashion; that is, increased information on weather conditions could increase comfort, safety and the use of communication devices in the backcountry.

Wiley (1995) has suggested that four integrated tensions between wilderness and technology exist: risk versus security, solitude versus connectivity, mediation versus direct experience, and knowledge versus the unknown. Perhaps the greatest focus has been on the first and third of these tensions, the impact of technology on risk perception and risk taking and its relation to a lack of direct experience (for example, Dickson 2004). Borrie (2000, p. 88) suggests that "wilderness used to be its own certifier"; that is, direct experiences over time allowed wilderness recreationists to slowly and humbly gain

increasing levels of expertise in decision-making. Technology fast-forwards our abilities and cocoons us from these experiences, creating what Ewert and Hollenhorst term the "illusion of safety" (1997, p. 21; see also Hendee and Dawson 2001; Attarian 2002). As a result, when technology fails or accidents occur, some wilderness users will not be able to draw upon previous experiences.

Again, there is little empirical evidence that supports this idea, although the existence of this relationship seems to be a common discourse in the wilderness recreationist and researcher populations. For example, in a rare empirical study, one author noted in an unpublished thesis that the amount of wilderness experience was "positively correlated with the belief that technology creates a false sense of safety, with more experienced visitors (measured by number of overnight trips in the last 12 months) more likely to believe that technology makes visitors feel they have a safety net that in reality may or may not exist" (Pope 2010, p. 17, 19). Concern is also commonly expressed about the impact of communications technology (such as, cell and satellite phones and personal locator beacons). Many suggest that rescues of ill-prepared and inexperienced visitors have significantly increased (Hohlrieder and others 2005; Heggie and Heggie 2009; Heggie and Amundson 2009) due to the increasing use of these technologies in the wilderness.

The loss of solitude from technology is the second tension identified by Wiley (1995). If one can always be connected to the Internet, work, friends and family via electronic communication, can one ever truly be alone in wilderness? Finally, there is concern that technology will provide 'too much' knowledge and information about the wilderness. The wilderness experience has always contained a longing for primitive experiences and idealized the life of early explorers and settlers (Borrie and Freimund 1997; Borrie 2004). Technology may destroy this desire, even if we know it is an illusion. While Leopold complained, "Of what avail are forty freedoms without a black spot on the map?" (1949, p. 158), the use of GIS technology in wilderness ensures a lack of white areas on digital maps.

Ultimately, increased use of technology may change the very nature and meaning of the wilderness experience. Authors such as Rothenberg (1993) and Strong (1995) have eloquently written of the ability of technology to redefine wilderness. Rothenberg (1993, p. xiv) believes that "What we want to do is changed by what we can do—technology never simply does what we tell it to, but modifies our notions of what is possible and desirable". This warning seems to mirror philosopher Winner's suggestion that "technologies are not merely aids to human activity, but also powerful forces acting to reshape that activity and its meaning" (1986, p. 6). Each generation will have its own baseline of appropriate or acceptable technology (Dawson 2007), and the current generation's increasing use of technology in the wilderness could delineate a new relationship between humans, the natural world and protected areas, and change the meaning of the wilderness experience itself.

Watson optimistically suggests that, as technology becomes the dominant force in Western society, "the primitive end becomes more valuable to society as a point from which to compare and understand the benefits and threats technology

offers to society" (2000, p. 57). More pessimistically, it may be that as technology surrounds us, our society will become increasingly distanced from naturalness, and the few wilderness areas left from an advancing population will become commodified images of an increasingly idealized past. Roggenbuck has highlighted the role of consumerism and self-identity in the wilderness-technology dichotomy, suggesting that future wilderness users will desire "quick, convenient, intense, scenic and sanitized experiences in wilderness" (2000, p. 16):

> "At superstores, 'gearheads' purchase expensive outdoor paraphernalia to smooth the bumps, soothe the inches, and light the darkness of wilderness. All they ask is that these products be convenient, comfortable and exciting and that the goods enhance their identity as nature lovers" (p. 15).

These different possibilities exemplify the disconcerting vagueness and incomprehensibility of technology: while seemingly restructuring our very lives and society before our eyes, it does not illuminate a single path forward, providing a range of possible futures for humanity and wilderness.

To deal with this lack of clarity, many wilderness researchers have called for a public debate over the role of technology in wilderness use (Borrie and Freimund 1997; Roggenbuck 2000; Stankey 2000; Van Horn 2007), but such a debate has not been forthcoming. There are many reasons for this. Perhaps most importantly, our society rarely seems inclined to question the impacts of technology (Shultis 2001); Winner called our seeming lack of concern about technology "technological somnambulism" (1986, p. 5), and believed that "the interesting puzzle in our times is that we so willingly sleepwalk through the process of reconstituting the conditions of human existence" (p. 10). In addition, wilderness managers and agencies face many other issues, including potentially decreasing use levels. Also, economic and political systems at the local, regional, federal and international levels all conspire to deflect any meaningful questioning of the hegemonic acceptance of 'progress' and the technology associated with this process (Winner 1986). Philosophers such as Winner and Borgmann also recommend such a dialogue, and we will consider Borgmann's philosophical orientations towards technology and wilderness after turning to the empirical evidence from leisure studies researchers who consider the impacts of technology on various leisure activities and experiences.

Leisure Studies Researcher Perspectives on the Impacts of Technology

The wilderness researchers noted above are based in the United States and assess the link between technology and wilderness using primarily anecdotal knowledge. A small number of leisure studies researchers, usually based outside the United States, have empirically assessed the impacts of technology on a wide variety of leisure pursuits. These researchers typically use a relativist epistemological stance and qualitative research methods, often with a social constructionist lens from which to view technology. This lens, which I believe is still viewed

suspiciously by many wilderness researchers, may be one reason why most of the wilderness research does not access this literature (and vice versa).

This is unfortunate, as many of the themes identified in the previous section are also discussed in this body of literature. For example, I will focus on the role of consumption in technological use, as this is a key intersection between technology and society for many leisure researchers. For example, Ryan's (2002) research suggests that the outdoor recreation media glamorizes the use of recreational technology, resulting in the emergence of three assumptions:

> "(1) that technology is unconditionally good, (2) that its benefits are so great one would have to be a fool to venture outside without them, and (3) that cultures or people with different access to or attitudes about technology are somehow less civilized than Euro-North American cultures that embrace technology (an ethnocentric bias)" (p. 271).

The attraction of technology, which has always seemed to enthrall Western society in a particularly spellbinding way, is enhanced by these discourses, with wilderness recreationists envisioning new technology as necessary to open up new recreational possibilities and experiences. As Haldrup and Larsen (2006) note, "Things and technologies can be understood as 'prostheses' that enhance the physicality of the body ands enable it to do things and sense realities that would otherwise be beyond its capability" (p. 278). Michael's (2000) discussion of the impact of boots on the mundane experience of walking is a particularly relevant one for wilderness researchers. He suggests walking boots "mediate the sublime relationship" between humans and the environment, intervening in four main ways:

> "first, there is the role of boots as mechanical technologies that can cause pain, dissolving identity and the relation between humans and nature'; second, there is the role of boots as signifying style and identity; third, there is the role of boots as embodiments of procedures of standardization and objectification; and finally there is the role of boots as technological means of physical and ecological damage to nature" (p. 115).

The link between the consumption of recreation technology and self-identity is often noted. Consumers are seen to produce their identities through the processes embedded within consumption, including buying, using, and selling the product and through remembering and narrating their experiences with the product: "The 'objects' thus used and consumed construct, express and produce the personal identities and contribute to the life projects, themes and journeys of the participants involved" (Berger and Greenspan 2008 p. 91). Berger and Greenspan (2008) also link consumption of technology with Belk's concept of the 'extended self'. Belk (1988) suggested that technology can extend the self when it provides experiences or allows users to do activities and see places they could not normally access. Michael (2000) and Rossiter (2007, p. 303) similarly highlight the ability of technology to "afford possibilities for the reinvention of selves and the spaces within which they act and dwell". Berger and Greenspan's fascinating

study of a Mt. Everest expedition reveals "a kind of symbiotic bonding" between technology and climbers, where the tourists demonstrated emotional, psychological and physical relationships with the technology they brought to the mountain, and these relationships and bonding helped create and maintain their adventure tourist identities (2008). Unfortunately, the role of consumption in the wilderness experience has yet to be tackled, but the literature noted above suggests that wilderness recreation technology has the ability to shape (or re-shape) the meanings of wilderness activities and experiences, a concern also noted by wilderness researchers.

Finally, Foley and others (2007) add a gender analysis to the study of technology consumption and self-identity. Their research on women's use of cell phones in Britain highlights both the constructive and destructive aspects of leisure and technology; they suggest that while young women are drawn to cell phones for conspicuous consumption, this technology also provides the "self-confidence, sexuality and autonomy which defies the male gaze in public spaces and may allow adolescent women to reject traditional images of femininity" (p. 189). As wilderness still remains a largely male dominated public space, it would be interesting to assess if gender differences in communication technology use exist. For example, might women use cell phones in the wilderness at least in part to avoid this 'male gaze' and provide a refuge from possible unwanted male attention or possible danger?

Science and Technology Studies Researcher Perspectives on the Impacts of Technology _____

STS is a relatively new field of study, and like many recent interdisciplinary areas of research, was propelled into existence by a variety of social changes in the 1960s and 1970s. The 'cultural turn' in science in this era, partly a result of Thomas Kuhn's discussion of paradigm shifts within the philosophy of science, led social scientists to challenge the traditional realist epistemological stance used in social science research. The rise of the environmental movement and the increasing awareness of the impact of technology on ecological systems also influenced the birth of STS. But even more influential was the rise of interpretive perspectives in social research and the use of relativist perspectives in science. Of particular importance was the rise of social constructionism in the 1970s: this remains the primary stance taken by STS researchers (Sismondo 2004).

While earlier researchers espoused ideas that were eventually considered in STS (for example, Lewis Mumford), the key work that sparked researchers' interest in STS was *The Social Construction of Technical Systems* by Bijker, Hughes and Pinch (1987). As the title suggests, this was also a key work in championing the social constructionist approach to the study of technology, an area of study that came to be known as SCOT, housed within the broader STS literature (Clayton 2002). Researchers from sociology, history and philosophy—often using a fascinating combination of each discipline—are most commonly associated with STS and SCOT (Cutcliffe 2000).

Cutcliffe (2000) suggests there are three main approaches to STS. A systems theory approach suggests that a system or web of networks, composed of technology and the people and social institutions which create this technology, create a momentum which is hard to stop or even visualize. Social constructionists stress the impact of the negotiations between special interest groups and other public and private actors to create a 'technological frame', a "system of thought and practice in which the device is embedded" (p. 31). Finally, network theorists focus on the 'actor network' concept, a blend of animate and inanimate entities (political institutions, nature, technology, policies) that support the success or failure of specific technologies. Each of these entities must be viewed to assess how and why certain technologies are adopted. As noted above, a social constructionist approach is common to each of these approaches. While technological objects obviously exist, the use, meaning and functions of technology are continuously constructed and de-constructed by various actors or systems within society, at both the individual and collective level. Only humans can give technology meaning, and the constructed meanings are not inevitable or static. As one researcher succinctly stated, "Technology is neither good, nor bad; nor it is neutral" (cited in Cutcliffe 2000, p. 16).

Of course, like any scientific approach, STS and SCOT are not without their weaknesses. Winner (1993) has provided the most provocative criticism of STS generally and SCOT specifically, noting that SCOT is too formulaic, focuses too strongly on the design stage of technology and disregards the social consequences of technology; other complaints focus on the lack of discussion in SCOT about the power relationships that shape the development and consumption of technology (Clayton, 2002). STS also generally tends to provide various researchers' perspectives on one case study, but rarely provides any critical analysis of each of these studies, a characteristic that one philosopher termed the "paradox of continual beginning" (cited in Higgs, Light and Strong 2000a, p. 5).

Philosopher Albert Borgmann's work in STS is very influential. He is one of the few STS researchers to have generated any critical exchange (Higgs, Light and Strong 2000b). His work is particularly relevant to the study of the connections between technology and wilderness, as Borgmann himself uses the example of wilderness use—although not in as detailed a manner as wilderness researchers might like—as an exemplar of what he termed 'focal practices'. Borgmann begins by agreeing with many of the main points noted in the previous sections: he believes that technology has become "the decisive current in the stream of modern history" (1984, p. 35), providing a foundational but nearly invisible pattern in our lives. Borgmann also links consumerism with technology, suggesting that "Universal consumption of commodities is the fulfillment of the promise of technology" (1984, p. 52).

Borgmann's most significant contribution deals with his conceptualization of focal things and practices. He compares the traditional hearth or fireplace (a thing) with modern central heating (a device) to illuminate how technology changes the very meaning of human lives and behavior. He suggests 'things' create their own worlds and generate a contextual engagement

with the world. For example, a hearth used to serve as a focal point in daily existence:

> "a fireplace provides warmth, but inevitably provides those many other elements that compose the world of the fireplace [e.g., assigning various family members specific tasks]. We are inclined to think of these additional elements as burdensome, and they were undoubtedly often so experienced. A device such as a central heating plant procures mere warmth and disburdens us of all other elements. These are taken over by the machinery of the device. *The machinery makes no demands on our skill, strength, or attention*, and it is less demanding the less it makes its presence felt. In the progress of technology, the machinery of a device has therefore the tendency to become concealed or to shrink" (1984, p. 42; emphasis added).

Borgmann's belief that technology makes no demands on us seems to reflect one of the central concerns of wilderness researchers, that our use of cell phones, personal locator beacons, GPS units, and so on in the wilderness will strip away the skills and experiences delivered through direct wilderness experience. Similar to maintaining the hearth, experiencing the discomforts and dangers in the wilderness can be a great burden, but Borgmann's analysis supports the concern by wilderness researchers that recreation technology will erase the wisdom learned by mistakes in the wilderness. Borgmann also seems to echo wilderness researchers' expressed concerns with the loss of direct experience:

> "Physical engagement is not simply physical contact but the experience of the world through the manifold sensibility of the body. That sensibility is sharpened and strengthened in skill. Skill is intensive and refined world engagement. Skill, in turn, is bound up with social engagement. It molds the person and gives the person character" (1984, p. 42).

Moreover, Borgmann seems to speak to the mixture of guilty excitement many feel in adopting new forms of recreation technology, suggesting that despite the "persistent glamour of the promise of technology" (1984, p. 105), and our relief from lifting burdens from ourselves and others,

> "these sentiments are tinged, especially in retrospect, with feelings of loss, sorrow, and of betrayal, both in the sense that one has betrayed a thing or a tradition to which one owes an essential debt, and in the sense that one has been betrayed in one's aspirations. Implication in technology then receives an admixture of uneasiness which results in what may be called complicity" (p. 105).

The resulting complicit emptiness is often filled with even more consumption, creating a never ending cycle which tends to create leisure experiences based on "instantaneity, ubiquity, safety, and ease" (p. 130): we consume comfort. In our rush to commodify consumption of technology, "We have constructed a large and complex machine that delivers effortless experiences" (Borgmann 2010, p. 9). But this comfort and effortlessness also come with a price:

> "it is an entirely parasitic feeling that feeds off the disappearance of toil; it is not animated by the full-bodied exercise of skill, gained through discipline and renewed

through intimate commerce with the world. On the contrary, our contact with reality has been attenuated to the pushing of buttons and the turning of handles. The results are guaranteed by a machinery that is not of our design and often beyond our understanding. Hence the feelings of liberation and enrichment quickly fade; the new devices lose their glamour and lead into the inconspicuous periphery of normalcy; boredom replaces exhilaration" (2010, p. 140; see also Borgmann 2006).

Borgmann highlights the need to hang on to focal things and practices, as only 'things' (rather than devices) are embedded within the "rich, experiential context discovered through engagement" (Fandozzi 2000, 155). Indeed, it is only by (re) discovering these focal things and practices that we can reform our technological fixation to move towards a 'good life'. More specifically, focal reality

> "is simply a placeholder for the encounters each of us has with things that of themselves have engaged body and mind and centered our lives. Commanding presence, continuity with the world, and centering power are signs of focal things. They are not warrants, however. Focal things warrant themselves" (Borgmann 1992, p. 119-120).

Like the hearth, focal things interweave means and ends, require effort, concentration and skill, and both invigorate and center us (Strong and Higgs 2000).

For Borgmann (1992, p. 120), "the wilderness has the clearest voice among eloquent things", allowing us to engage with the land in a meaningful way despite—and in part because of—the technological world that surrounds it. Indeed, "wildness attains new and positive significance within the technological setting" (1984, p. 182). It restores non-technological time and space to us. In the wilderness, "we let things be in the fullness of their dimensions, and so they are more profoundly alive and eloquent" (p. 192). We can, for a time, escape our consumptive and destructive selves and understand that wilderness stands apart from our technological society. Finally, wilderness can teach us respect, humility and the need to control our normally unquestioned adoption of technology:

> "Technology kills the wilderness when it develops it with roads, lifts, motels and camping areas. It keeps the wilderness at bay when, without affecting untouched areas permanently, it insulates us from the engagement with the many dimensions and features of the land, as it does through rides in jet boats or helicopters. Here we can see that technology with its seemingly infinite resourcefulness in procuring anything and everything does have a clear limit. It can procure something that engages us fully and in its own right only at the price of gutting or removing it. Thus the wilderness teaches us not only to accept technology but also to limit it" (p. 195).

The above quote demonstrates some of the limitations of Borgmann's discussion of how wilderness links to the technological society. The dangers of interdisciplinary work are perhaps also reflected in his somewhat Romantic and simplistic conceptualization of wilderness. To be fair, at the time his main work was published in 1984, the rise of recent communication technology was still far away, although more recent works

(Borgmann 1992; 1999; 2006; 2010) do not update these positions. If wilderness can teach us to limit technology, it certainly has not done so yet, as any limits to technology in protected areas—beyond the traditional restriction of mechanized recreation—are exceedingly rare. For example, on the contrary, the Parks Canada Agency, in a bid to attract more visitors, has recently introduced a new technology in national parks. "Using a program called Explora and handheld computers with Global Positioning System (GPS) capabilities, Parks Canada plans to deliver location-specific content to hikers. As visitors hike with Explora, they are able to see their location on a map and interact with location-related text, images, sounds, video and quizzes" (Lunn 2011, unpaginated). Certainly, we have long hoped that protected areas can teach us humility and help forge a new relationship with nature, but this new respectful relationship has yet to appear outside of an individual level despite decades of wilderness use. Perhaps the forcefulness of the technological allure is an important barrier to these changes in social values and attitudes.

Yet these concerns do not completely bury the possible utility of many of Borgmann's ideas. The example of wilderness use as a focal practice—one that binds wilderness visitors with things rather than devices, creating a rich, centering experience not yet mediated by the loss of meaning created by devices—still holds promise for future research opportunities. Unless, of course, the new forms and increasing use of technology exemplified by communication technologies have not put the focus of the wilderness experiences on the devices rather than the experience itself: this seems to be the concern of many wilderness researchers, but has yet to be directly assessed.

Discussion and Conclusion

What can we learn from this brief review and comparison of these three distinct literatures? Several patterns have emerged. The most self-evident pattern is the lack of empirical research on this topic. Wilderness recreation research is almost entirely anecdotal, primarily deterministic, and has not proven successful at engaging managers or administrators to meaningfully debate the issue. The dispersed leisure studies research contains the greatest amount of data, but relatively few studies are focused directly on the wilderness experience, although their discussion of the impact of technology in society provides many potentially useful insights. The limited STS and SCOT research relating to wilderness and outdoor recreation tends to be philosophical in approach, rarely critically examined in any detail and only occasionally used by wilderness researchers. While it is more than trite to simply call for more research on this (or any) topic—is there a more clichéd expression in academia?—the lack of any empirical results to support or reject the possible issues identified in previous sections of this paper restricts our ability to gain a deep understanding of this topic. While I hesitate to privilege empirical forms of knowledge, adding this dimension would help triangulate existing findings; empirical evidence also tends to have greater public and political influence. But the existing literature provides a valuable roadmap for future research, suggesting potential topics and

conceptual frameworks which can serve as potential launching points for wilderness researchers.

Given the lack of direct observations, both realist (quantitative) and relativist (qualitative) perspectives and approaches are needed. Quantitative research—normally on or off site user surveys—can provide an indication of how many wilderness users use which technologies and their basic attitudes towards technology in wilderness and potential management strategies. Wilderness managers' attitudes and approaches could also be assessed, and content analysis of media reports on technology in wilderness areas could be analyzed. Qualitative research would probably use interviews or focus groups of users and non-users of wilderness technology, and could provide a deeper analysis of the meanings and contexts that link wilderness users, technology and society. For example, these approaches could assess how users negotiate the complicities that Borgmann (1984) spoke of: do wilderness technology users experience this complicity and if so, how is it manifested? Wiley's four tensions between technology and wilderness use could also be assessed: do users of technology describe these or other tensions in their narratives/discourses?

The second pattern relates to the common topics embedded within each of the literatures. While each literature is broader than that represented in this brief review, a key finding was the common concern with the link between technology, consumption and self-identity. In our consumer society, there seems to be a discord between the discourses which portray recreation technology as wholly positive, necessary accoutrements to the modern wilderness experience, enabling recreationists to pursue activities, settings and experiences beyond the current reach of visitors in greater safety, comfort and ease; at the same time, the love-hate relationship between society and technology is brought into the wilderness, and the wilderness becomes both a refuge from technology and an experience activated and maintained by increasing amounts of technology. The loss of direct experiences from the use of what Borgmann (1984) terms 'devices' and its potential impact on the perception and experience of risk is also a shared concern in each literature. The lack of direct experience, especially those not 'tainted' by new technology, is thought to have significant effects on perceived risk and decision-making. This potential link between risk, technology and the wilderness experience is a fascinating one, but has not received sustained examination.

The invisibility of technology—at least, some forms of technology—is another common theme. Why are only certain pieces of wilderness technology (such as GPS) imbued with the power to transform the 'traditional' wilderness experience (whatever that is), while others (such as boots) are not considered to be transformative? What is and isn't 'technology' to wilderness users? Finally, Borgmann's concept of focal things and practices, and his inclusion of wilderness use in this short list of focal realities, seemed to reflect the purity and centering power of the wilderness experience expressed (or at least implicitly assumed) by wilderness and leisure researchers. Could this concept be used, despite the somewhat frustrating lack of specificity of this concept in Borgmann's work, to explain the significance of this experience for individuals and Western

society? Can focal practices like wilderness use—if not already too 'uncentered' by communication technologies—provide a way forward to the 'good life' highlighted by Borgmann? Could wilderness experiences provide us a means by which we could resist the siren call of technology?

A third pattern is the disconnect and tension between the three literatures' epistemological stances and methodologies. The wilderness research almost exclusively follows a realist perspective, and thus uses quantitative methods and statistical analysis to describe reality. Researchers in the other two areas primarily use a relativist stance, and use qualitative methods and interpretive analysis (especially social constructionism) to describe contextual realities. As noted above, each approach has its own strengths and weaknesses, and both are needed equally, but the difference in approach is possibly a challenge for integrating the widespread research on the impacts of technology on wilderness recreation. Certainly, up to the present, few wilderness researchers studying technology issues incorporate findings from the other literatures in a significant way. Perhaps it also demonstrates the need for an increased emphasis on interdisciplinary and/or mixed method approaches to research the impact of technology on the wilderness experience.

Technology both enables and disables wilderness. For almost a century—from Model Ts to iPads—technology has simultaneously led to successful rallying cries to protect the wilderness (for example, the passing of the Wilderness Act) and concern that its use will diminish or even destroy the wilderness experience itself. At present, the debate over the role and impact of technology seems to be focused at the individual level: wilderness users have an internal debate over what they consider to be appropriate levels and types of technology on each wilderness trip. A wider debate seems limited at one level by the capacity and willingness of land management agencies: other concerns (declining visitation and climate change, for example) have taken center stage, and budget cuts in a strongly neoliberal political environment have diluted the agencies' enthusiasm for wilderness and wilderness research in general. The unwillingness of Western society to question the use of new technology or consider its impacts, the commodification of leisure experiences in our consumer society, and the public desire for safety, comfort and ease also provide challenging roadblocks to such a public debate. A champion is needed to maintain the focal experiences provided by wilderness: research that addresses these and other issues may help us cut through these barriers to engage this debate.

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