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The effects of knowledge and integrative complexity on acceptance of federal wilderness designation

Sean McLaughlin

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THE EFFECTS OF KNOWLEDGE AND INTEGRATIVE COMPLEXITY ON
ACCEPTANCE OF FEDERAL WILDERNESS DESIGNATION

BY

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B.S., University of California, Chico, 1995

THESIS

Submitted to the University of New Hampshire
in Partial Fulfillment of
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in
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ABSTRACT
THE EFFECTS OF KNOWLEDGE AND INTEGRATIVE COMPLEXITY ON
ACCEPTANCE OF FEDERAL WILDERNESS DESIGNATION
by
Sean McLaughlin
University of New Hampshire, May, 2007
Advisor: Dr. Joshua Carroll

This study explores relationships between (1) knowledge and acceptance of federal wilderness designation and (2) increased knowledge and acceptability of federal wilderness designation with integrative complexity. Integrative complexity describes the structure of thoughts people have about an issue such as federal wilderness designation. Breaking traditional qualitative measurement techniques, a new scalar instrument was tested in this study to measure integrative complexity. Data were collected from undergraduate students at the University of New Hampshire (N=102), utilizing a pretest-posttest comparison group research design. As hypothesized, increased knowledge resulted in increased acceptance of federal wilderness designation. Conversely, integrative complexity scores decreased slightly as knowledge and acceptability increased. These findings support management efforts aimed at education, and imply that people may actually create stronger dichotomies about an issue when educated on that topic.
INTRODUCTION

The idea of wilderness has provided Americans with a unique sense of national identity since early in the 19th century (Nash, 2001; Stegner, 2004). The perception of wilderness, though, has changed dramatically over the course of American history. This can be reflected in early American literature, where wilderness was both celebrated and feared (Clough, 1964), and today in the attention directed towards obesity, climate change and rising fuel costs -- nature and wilderness are becoming ever more popular and influential topics in American politics and media.

Congressional approval of the 1964 Wilderness Act, which established federal wilderness areas as the highest level of land protection in the United States (Nelson & Turnage, 1984), has not only enhanced the early American wilderness identity, but has also created a land preservation system that, today, totals 107,436,642 acres (http://www.wilderness.net/index.cfm?fuse=NWPS&sec=fastFacts). Dichotomies often develop within the concept of federal wilderness designation. For instance, wilderness designation may be perceived as an ecological necessity, or as a waste of natural resources. The present study examines people's perceptions of federal wilderness designation.

In the past, wilderness perceptions have been measured in several ways. For example, impacts of user fees have been studied (Taylor, Vaske, Shelby, Donnelly, & Browne-Nunez, 2002), Wilderness Perception Mapping has been linked to the Recreation Opportunity Spectrum (Kliskey, 1998), and wilderness campers' perceptions and evaluations of vegetation and soil impacts have been investigated (Farrell, Hall, & White,
This study investigates the effects of knowledge, and a cognitive measurement tool known as integrative complexity, on acceptance of federally designated wilderness areas.

Integrative complexity is a protocol for measuring a way of thinking. It describes the structure of the thoughts people have about an issue such as wilderness designation. Integrative complexity is based on the number of aspects of a problem that people consider. The level of integrative complexity one has towards an issue is based on the structure of thought that a person has about that issue, as opposed to the specific content of their thoughts (Bright & Barro, 2000; Tetlock, 1985). Two factors that are measured within the context of integrative complexity are differentiation and integration. Differentiation focuses on whether a person acknowledges that there is more than one side (or dimension) to an issue or problem, while integration refers to the relative importance a person gives to perceived arguments for and against an issue (Bright & Barro, 2000; Tetlock, 1985, 1989).

In an outdoor recreation/natural resources context, integrative complexity has been utilized to look at how coursework in environmental education affected college students’ levels of integrative complexity regarding endangered species (Bright & Wyche, 1998), and attitudes toward plant and wildlife protection (Bright & Barro, 2000). In these studies, integrative complexity increased with increased knowledge about a subject when paired with moderate attitudes. More recently, in a study on wildfire management perceptions, it was implied (though not statistically significant) that increased integrative complexity results in higher levels of acceptance of management actions (Carroll & Bright, 2005). Building on these findings, this study explores the
relationship between increased knowledge about wilderness designation and integrative complexity, as well as their effects on acceptance of federal wilderness designation.

The guiding research questions for the present study are:

1. Does increased knowledge of federal wilderness designation result in increased integrative complexity about the topic?
2. Does increased integrative complexity of federal wilderness designation lead to increased acceptance of wilderness designation?
3. Does increased knowledge result in increased acceptance of federal wilderness designation?

A pretest-posttest comparison group research design incorporated two undergraduate classes (N=102) from the University of New Hampshire. To collect data, students completed the Wilderness Knowledge and Acceptance Survey (see Appendices B & C) and the Wilderness Perception Scale (see Appendix D), at the beginning and again towards the end of their respective semesters. One class, *Issues of Wilderness and Nature in American Society*, was the study group, while a second class, *Introduction to Tourism*, served as the comparison group.

As hypothesized, increased knowledge resulted in increased acceptance of federal wilderness designation. Conversely, integrative complexity scores decreased slightly (though not significantly) as knowledge and acceptability increased. These findings support management efforts aimed at education, but provide little evidence of integrative complexity’s relationship to knowledge or acceptance of federal wilderness designation.

Although more research is needed in this area, the results of the present study have the potential to further the understanding of integrative complexity’s role in outdoor...
recreation and natural resource management. More specifically, this research contributes important information to managers regarding the acceptability of management actions, which has been noted as a vital concern in the profession (Clute, 2000). Integrative complexity has many implications for outdoor recreation and natural resources management. Managers may use integrative complexity to better gauge their constituency in an effort to deliver more effective messages and implement more appropriate management decisions (Carroll & Bright, 2005). Moreover, using integrative complexity may encourage managers to incorporate proactive, versus reactive, management techniques. Finally, integrative complexity has the potential to provide managers with a social science construct to aid in their management practices.
CHAPTER I

AMERICAN WILDERNESS

A Unique Identity

Early American settlers quickly developed a bias towards nature. Initial perceptions of wilderness in America mainly revolved around the need to conquer it (Nash, 2001). The dense forests, rugged landscapes and primitive inhabitants shocked these early explorers, who had come from a developed and civilized European society. Many of these people had been rejected by their homelands, some were evading the law, and others simply wanted to pursue a better life (Blum, 2002). Feelings of anticipation, hope and promise dominated their mindsets (Oeschlager, 1991). Nevertheless, this newfound wild land presented many challenges to those who completed the courageous journey from abroad.

Soon after gaining independence from Great Britain in 1776, Americans were left with very little culture, and minimal history, to form a new national identity (Lee, 1904). Indeed, the Revolutionary War that raged from 1775-1783 was initially not fought for independence from Britain, but for equity from British tyranny (Lee, 1904). However, the transformation during the Revolutionary War from a battle of indemnity to one of independence meant that not only were Americans faced with many challenges in shaping their new culture, but they also felt somewhat compelled to contradict their British counterparts as they moved forward as a nation (Nash, 2001).
In this way, Americans desired, and needed, a unique national identity. This identity would come not from architecture, the arts or religion, but from the endless natural landscapes found in their new homeland (Nash, 2001). By the 1850’s, Transcendentalists such as Henry David Thoreau and Ralph Waldo Emerson emerged from the American culture to celebrate wilderness as the antidote to civilization through writing and literature (Nash, 2001). Lewis & Clark had long since explored the West, Congress passed the “Donation Land Law” in 1850, which gave every settler and his wife a half acre of land, and the trans continental railroad was completed in 1883, marking the beginning of the railroad age (Lee, 1904). Americans quickly flocked to the West, relishing in the abundance of open space, natural resources and homesteading opportunities the “frontier” provided, destroying everything in their path. By 1890, Frederick Jackson Turner noted an end to the American frontier, which represented a significant change in how Americans viewed their most precious resource, and the source of their new national identity – land (Nash, 2001). The frontier had represented inspiration, individualism, and confidence in the common man, and its end was a tragic reality for many Americans (Oeschlager, 1991).

It was during these critical years from 1850 through the early 1900’s that the most influential early American wilderness visionaries emerged. Characters such as John Muir, Teddy Roosevelt and Gifford Pinchot guided America as it faced the potential loss of its remaining wild lands into the 1900’s (Nash, 2001). Exaggerated by the Industrial Revolution and massive expansionism, the first American wilderness dichotomy developed during this time period, as two schools of land protection were born. Nash (2001) explains this dichotomy through its main characters, John Muir and Gifford
Pinchot. The preservation movement revolved around Muir’s biocentric ontology, while Gifford Pinchot, as America’s first occupational forester, held a more utilitarian view of our wild lands. Pinchot’s school of thought came to be known as the conservation movement. Both the preservation and conservation movements had significant impacts that are still very much felt today. Muir’s legacy was maintained through the Sierra Club, while Pinchot’s influence resulted in the creation of the United States Forest Service (Callicott, 1991; Cronon, 1995; Nash, 2001; Oeschlager, 1991; Rolston, 1991).

A series of events in the early 1900’s exaggerated this dichotomy between preservation and conservation; however, according to Nash (2001), the Hetch-Hetchy controversy was the momentous battle that ultimately separated preservationists from conservationists, and hence, Muir from Pinchot (the two had been close friends prior to Hetch-Hetchy). In 1906, an enormous earthquake and fire devastated San Francisco. The mayor of the city, James D. Phelan, blamed much of the damage on the lack of adequate water resources available to the city. Phelan, with the support of Secretary James Garfield and others (including Gifford Pinchot) searched for, and found, an ideal source of water in the Hetch-Hetchy Valley, 150 miles to the east. The utilitarian-minded conservationists proposed damming the steep valley to satisfy the needs of the people of San Francisco. The problem revolved around the fact that Hetch-Hetchy was in the newly designated Yosemite National Park. The non-utilitarian precedent that had been assumed in the creation of our first national parks was at stake (Nash, 2001).

Accordingly, lines were drawn, and a political battle raged on the matter until 1913, when a dam was indeed built in the Hetch-Hetchy Valley. Fighting to save Hetch-Hetchy literally added years to Muir’s life, and created a void in the young American wilderness.
movement (Turner, 1985). But the famous controversy did more than just create a precedent for future actions in American national parks. Its significance lies more in the fact that the controversy happened at all:

One hundred and even fifty years earlier a similar proposal to dam a wilderness river would not have occasioned the slightest ripple of public protest. Traditional American assumptions about the use of undeveloped country did not include reserving it in national parks for its recreational, aesthetic, and inspirational values. The emphasis was all the other way – on civilizing it in the name of progress and prosperity. Older generations conceived of the thrust of civilization into the wilderness as the beneficent working out of divine intentions, but in the twentieth century a handful of preservationists generated widespread resistance against this very process. What had formerly been the subject of national celebration was made to appear a national tragedy (Nash, 2001, p. 181).

The dichotomy created between preservation and conservation expanded to a dichotomy between “beauty value” and “use value”, and has remained so ever since (Keith, Fawson, & Johnson, 1996; Oeschlager, 1991). The National Park Service Act was passed in 1916; the Appalachian Trail was conceived in 1921; and in 1924 President Coolidge called for a National Conference on Outdoor Recreation (Nash, 2001). And in 1924, the first wilderness preserve was created in Gila National Forest, thanks in large part to the famous visionary, Aldo Leopold (Meine, 1988).

Leopold made huge strides in the wilderness movement during his tenure with the U.S. Forest Service and the University of Wisconsin. He contributed to the birth of the field of ecology, and was one of the first scientists to see land as a whole community (Meine, 1988). Indeed, Aldo Leopold was most famous for his Land Ethic, which “simply enlarges the boundaries of the community to soils, water, plants, and animals, or collectively the land” (Leopold, 1949, p. 204). Leopold’s legacy bridged the gap between early pioneers in the conservation movement, such as John Muir and Gifford Pinchot, to modern characters such as David Brower and even Al Gore. Other figures
such as Robert Marshall (known as an independently wealthy primitivist who dedicated his short life to the wilderness movement, ultimately co-founding the Wilderness Society) and Brenton Mackaye (who conceived the Appalachian Trail) contributed much to the wilderness movement during the early to mid 1900’s as well (Nash, 2001).

However, it was Howard Zahniser, Director of the Wilderness Society, who, in 1951, officially proposed a national wilderness preservation system (Nash, 2001). Over the course of the next 13 years, Zahniser dedicated his life to the creation of a national wilderness document. Finally, after 66 drafts and countless hours, Congress passed the Wilderness Act on September 03, 1964, just four months after Zahniser’s death (Nash, 2001). Like John Muir before him, Zahniser literally worked himself to death.

The Wilderness Act, which began as a biocentric document, was reshaped throughout its evolution. In the end, the Act, as it stands today, is filled with anthropocentric language. For example, even in arguably the most famous (and most biocentric) quote from the Act, “A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain,” (“Wilderness Act”, 1964, section 2[c]) “man” is still the center of attention.

The 1964 Wilderness Act established the National Wilderness Preservation System that, unlike anywhere else in the world, “secured for the American people of present and future generations the benefits of an enduring resource of wilderness...an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvement or human habitation...generally appears to have been affected
primarily by the forces of nature, with the imprint of man's work substantially unnoticeable...has outstanding opportunities for solitude or a primitive and unconfined type of recreation..." ("Wilderness Act", 1964, section 2[c]). Federal wilderness areas, created exclusively by an Act of Congress, are the highest level of land protection in the United States, and for that matter, the world (Neslon & Turnage, 1984).

In addition to the passage of the Wilderness Act, American wilderness values during the 1960's were reflected in the counter culture. Nature-based popular music (e.g. Neil Young’s *After the Gold Rush*, 1970) and literature (e.g. Rachel Carson’s *Silent Spring*, 1963) emerged, and a new environmental movement had begun. Throughout all the transmutations in early American wilderness thought prior to 1964, the unique identity that early Americans established maintained much of its original validity. However, the modern wilderness movement, especially in the years after the passage of the Wilderness Act, has been filled with debate surrounding how to define wilderness. As the human population increases, development rises and technology progresses, America’s open spaces are rapidly becoming more valuable and controversial assets.

**Modern Wilderness Debates**

Building on the dichotomies that developed during the early wilderness movement (preservation versus conservation, beauty-value versus use-value), modern wilderness debates typically revolve around the idea of wilderness and how to define it (Callicott, 1991; Cronon, 1995; Rolston, 1991). Because the Wilderness Act is relatively outdated, many new issues have become apparent with regards to American land use. Notably, modern dichotomies place metropolis versus wilderness (Nash, 2001), nature versus wild (Snyder, 1990) and our role as humans in nature versus humans apart from
nature (Callicott, 1991; Rolston, 1991). The last of these dichotomies begs the question, how do Americans perceive wilderness today?

As citizens, Americans are well aware of the attention that current land preservation efforts draw. The controversy surrounding oil exploration in the Arctic National Wildlife Refuge (ANWR) is an example. Academics and scholars may recognize the merits of modern wilderness debates from a philosophical standpoint, and researchers may recognize the need to determine current wilderness perceptions for natural resource protection and management implications. Lastly, if land managers can begin to understand the scope of wilderness perceptions among the American people, their management decisions may be easier to make and more effective in the long run.

The essence of what has become known as the “great new wilderness debate” among scholars can be summarized in two words – wilderness management (Callicott, 1991; Cronon, 1995; Rolston, 1991). Semantically and philosophically, the phrase “wilderness management” can be viewed as a contradiction, or an oxymoron. William Cronon (1995) argues this point by viewing wilderness as a “profoundly human creation” (p. 471), and something that is potentially in direct conflict with that which we are trying to protect. He proposes that true wilderness must not be managed. Rather, humans should not even be allowed to enter such places (Cronon, 1995). Ultimately, Cronon (1995) proposes we live with nature, rather than apart from nature, and incorporate nature into our daily lives.

James Callicott (1991) offers a similar viewpoint to Cronon’s. Callicott asks, “Can we succeed as a global technological society in enriching the environment as we enrich ourselves?” and “Can we design ‘sustainable economies’ rather than zone the
planet into ever-expanding sectors of conventional, destructive development and ever-shrinking wilderness sanctuaries?” (p. 345). Callicott’s answer to both questions is that we can, and must, live sustainably. Moreover, wilderness valued without humans perpetuates a false dichotomy (Cronon, 1995). Callicott and Cronon represent a movement of environmental philosophers that support the notion of sustainable development. Setting land aside for wilderness represents an isolationism that, ultimately, has negative repercussions on our society because it discourages sustainability (Callicott, 1991; Cronon, 1995) – under this line of thinking, one might ask, “Why should I worry about preserving my local park and living with environmental responsibility if wilderness areas exist?” for example.

Conversely, Holmes Rolston III (1991) supports the notion of and necessity for managed wilderness areas, though he also supports sustainable living efforts. Rolston (1991) argues for places on Earth where humans are merely visitors who do not remain. Holmes Rolston, then, represents a group of environmental philosophers arguing for the necessity of wilderness.

Both sides of the preceding dichotomy have merit. And for the present purposes, it is important to note that this great new wilderness debate (Callicott, 1991) contributes to and represents, in part, American public perception about federal wilderness designation. Of course, other authors, philosophers and scholars figure into this debate. But generally, some variation of the preceding viewpoints emerges from modern wilderness debates. Monitoring these modern American wilderness perceptions can enhance outdoor recreation and natural resources management techniques and contribute to effective land preservation outcomes.
The present study begins to examine how people feel on the many continuums created by federal wilderness designation. Do people feel wilderness management is appropriate? Is wilderness an ecological necessity or a waste of natural resources? And, more generally, how is wilderness designation perceived?
CHAPTER II

STUDY BACKGROUND

Measuring Wilderness Acceptance

Federally wilderness, designated only by an Act of Congress, is the highest level of land protection in the United States (Neslon & Turnage, 1984). Though wilderness areas are regulated by the respective land agency in which they exist (United States Forest Service, Bureau of Land Management, etc.), the 1964 Wilderness Act clearly states the limitations and rules of federal wilderness areas ("Wilderness Act", 1964). Typically, there is no fee to enter federal wilderness areas, and, though highly regulated, wilderness areas are open to the public (Neslon & Turnage, 1984). The concept of federally designated wilderness is uniquely American, even today (Nash, 2001).

In the present study, federal wilderness designation acceptance may offer some indication of wilderness perceptions among the study group. Understanding perceptions of wilderness can help agencies recognize when policies may or may not be supported by the public. With public support, the respective agency may be able to manage more efficiently, spending time and money on the resource, as opposed to legal battles and failed policy adjustments (Carroll & Bright, 2005). Moreover, public perception about wilderness issues influences lawmakers and could lead to, for instance, future wilderness proposals.

Wilderness perceptions have been measured in several ways in the past. For example, impacts of wilderness user fees have been examined (Taylor, Vaske, Shelby,
Donnelly, & Browne-Nunez, 2002), Wilderness Perception Mapping has been linked to the Recreation Opportunity Spectrum (Kliskey, 1998), and wilderness campers’ perceptions and evaluations of vegetation and soil impacts have been investigated (Farrell, Hall, & White, 2001). The present study explores the effects of knowledge, and a cognitive measurement tool known as integrative complexity, on acceptance of federally designated wilderness areas. In theory, measuring acceptance of an issue or topic will offer a good synopsis of one’s perception about that issue or topic (Carroll & Bright, 2005).

Integrative complexity is new to the fields of outdoor recreation and natural resources. Hopefully, this study will offer a mold for future research in these fields by incorporating integrative complexity as a possible assessment technique. Outdoor recreation and natural resources managers can benefit from preventative management techniques, and understanding wilderness users from a social science perspective may enhance the ability to prescribe management decisions, rather than react to problems.

**Integrative Complexity**

Integrative complexity is a protocol for measuring a way of thinking that describes the structure of the thoughts people have about an issue such as federal wilderness designation. It is based on the number of aspects of a problem people consider. The level of integrative complexity one has toward an issue is based on the structure of thought that a person has about that issue, not the specific content of their thoughts (Bright & Barro, 2000; Tetlock, 1985).

Two factors are measured within the context of integrative complexity, differentiation and integration. Differentiation focuses on whether a person
acknowledges that there is more than one side or dimension to an issue (Bright & Barro, 2000; Tetlock, 1989). Someone who sees an issue as black or white (e.g., “Wilderness is a waste of natural resources”) exhibits low differentiation on that subject, whereas one who sees two or more dimensions to an issue (e.g., “Wilderness limits natural resource extraction, but it provides recreation benefits”) shows higher differentiation on that subject (Bright & Barro, 2000).

The second factor of integrative complexity is integration, which refers to the development of complex connections among the differentiated characteristics of an issue (Carroll & Bright, 2005). Integration is linked to the relative importance of perceived arguments for and against an issue (Bright & Barro, 2000; Tetlock, 1985). High levels of integration regarding an issue require that the individual has first exhibited an adequate amount of differentiation (Tetlock, 1989). Hence, integration represents the strength of one’s differentiation, and is not possible without differentiation. For example, a highly integrated person might propose that although wilderness limits natural resource extraction capacity, the compromise is worth it for the animals that live there, and we humans should be changing our lifestyles anyway.

**Integrative Complexity History**

Integrative complexity stems from past social psychological constructs, tracing back to conceptual differentiation, which is a concept that deals with an individual’s tendency to place reality within a structure that allows that individual to go through the act of perceiving more easily (Gardner, 1953). If someone tends to classify objects into a relatively large number of mutually exclusive categories (e.g. distinct lines drawn), they are said to show a high degree of conceptual differentiation; and when someone uses few
categories (e.g. vague boundaries in their thinking), they are exhibiting a low degree of conceptual differentiation (Carroll & Bright, 2005).

Kelly (1955) explored the idea of cognitive complexity when developing the Personal Construct Theory. Cognitive complexity is a measure of the number of dimensions that a person uses to come to a cognitive conclusion (Kelly, 1955). For example, a person who holds more dimensions in their viewpoint would be more cognitively complex than one who uses fewer dimensions. Cognitive complexity operates on the idea that individuals use past experiences to perceive reality (Suedfeld, de Vries, Bluck, Wallbaum, & Schmidt, 1996). Researchers have also found potential predictive characteristics of cognitive complexity (Bieri, 1955) and discovered that the level of cognitive complexity an individual displayed in one situation would most likely be the level displayed in another situation (Myyry, 2002). These predictive traits of cognitive complexity imply similar results from integrative complexity (Carroll & Bright, 2005).

A wide variety of information typically contributes to an individual’s complexity of thought (Whittaker, Vaske, & Manfredo, 2006). The level of complexity describes how individuals think about an issue, or the structure of their beliefs (Bright & Barro, 2000). Integrative complexity is based on this structure of beliefs, born out of the cognitive complexity work of the past (Tetlock, 1989).

Integrative complexity’s use in outdoor recreation and natural resources research has the potential to provide managers with additional information on how people think about issues such as federal wilderness designation. Furthermore, used as a predictive management tool, integrative complexity is potentially a powerful ally to managers.
interested in preventative management practices. This study applies integrative complexity to the outdoor recreation and natural resources fields in an effort to create a template for future research as well as a possible management tool.

**Integrative Complexity Applications**

Integrative complexity has been used in many cases where strong dichotomies exist (Bright & Barro, 2000). Recently, integrative complexity levels were examined in communications generated by face-to-face negotiations between the Chiapas guerillas and the Mexican government (Liht, Suedfeld, & Krawczyk, 2005). In their study, Liht et al. (2005) found that daily mean integrative complexity scores were positively related to negotiation progress, and government negotiators’ comments influenced the integrative complexity of other parties. Issues such as abortion, political affiliation, and United States versus Soviet Union foreign policy have been analyzed to measure individuals’ levels of integrative complexity (Dillon, 1993; Suedfeld, de Vries, Bluck, Wallbaum, & Schmidt, 1996; Tetlock, 1985). Integrative complexity was originally studied for political speeches (Tetlock, 1989), and integrative complexity levels of United States Congresspersons were examined to see if conservatives scored lower integrative complexity on political issues than their liberal counterparts (Tetlock, 1981, 1989). Tetlock (1984) also analyzed the reasoning of members of the British House of Commons, and American versus Soviet foreign policy-makers (Tetlock, 1985, 1988). Wallace & Suedfeld (1988) measured integrative complexity of international leaders, while Tetlock, Armor & Peterson (1994) looked at debates over slavery in antebellum America. Kristiansen & Matheson (1990) analyzed integrative complexity of public attitudes toward nuclear weapons, while Dillon (1993) compared integrative complexity...
of arguments on abortion between statements made by “pro-choice” and “pro-life” advocates. Typically, the following types of questions have been addressed in past integrative complexity studies (Carroll & Bright, 2005): To what extent are decision-makers aware of the complexity of its constituency? Can those levels of complexity be estimated and used to predict future behaviors? Is integrative complexity used to discover alternatives and/or solutions to existing problems? In short, do decision-makers possess their own theories about complexity?

Integrative complexity’s use in recreation and natural resources has been limited. The technique has been utilized to look at the effects of coursework in environmental education on college students’ levels of integrative complexity regarding endangered species (Bright & Wyche, 1998), and attitudes toward plant and wildlife protection (Bright & Barro, 2000). Higher integrative complexity has been associated with personal issues, versus professional or general issues (Myyry, 2002). Integrative complexity has also been used to assess public attitudes toward wildfire (Burtz, unpublished work). Carroll & Bright (2005) used integrative complexity to develop a scale to measure perception of wildfire management. Using integrative complexity to measure wilderness designation perception, however, has never been attempted.

Implications of the Present Study

The use of integrative complexity as a management tool has general implications for framing messages in appropriate contexts and levels of complexity. When an individual is exposed to information at a higher level of complexity than they typically function, they will often simplify the input and revert back to their acceptable level of integrative complexity (Hunsberger, Lea, Pancer, Pratt, & McKenzie, 1992). The
application of integrative complexity in outdoor recreation and natural resources “may
get beyond this stimulus blockage by first assessing at which levels of complexity
individuals, either collectively or individually, are functioning, and then by focusing on
information dissemination at or near these levels of complexity to match the respective
audience” (Carroll & Bright, 2005, p. 17).

In the context of the present study, integrative complexity may provide wilderness
managers with important information regarding how people think about wilderness and
wilderness management. Furthermore, knowledge of how individuals interpret
information may increase the efficiency of management practices in and near wilderness
areas. Integrative complexity encourages prescribed management techniques, which
focus on predicting behaviors and preventing issues that may arise in wilderness areas.
The present research investigates the effect that changes in integrative complexity levels
may have on federal wilderness designation perception. Moreover, increased knowledge
of wilderness is thought to increase the acceptability of federally designated wilderness.
Finally, all three factors (integrative complexity, knowledge, and acceptability) are
examined to determine any relationships that may exist between these variables.
CHAPTER III

THE EFFECTS OF KNOWLEDGE AND INTEGRATIVE COMPLEXITY ON
ACCEPTANCE OF FEDERAL WILDERNESS DESIGNATION

Conceptual Model

Several of the modern debates surrounding wilderness designation have been
highlighted in this thesis. There are many sides to such issues, but obvious dichotomies
have grown from these modern wilderness debates. In particular, the role of federal
wilderness designation itself has been questioned. Should wilderness be valued for its
beauty-value or its use-value? Should designated wilderness, which is the most protected
of U.S. federal lands (Neslon & Turnage, 1984), be preserved or conserved? Should
wilderness be managed or left alone? And, do we really need designated wilderness at all
in America?

There are no simple answers to such questions; however, American perception of
federally designated wilderness may play an important role in management decisions
surrounding such dichotomies. Herein lies the focus of the present research study.
Conceptually, if people are educated about a topic, they will think with deeper
complexity about that topic (Bright & Wyche, 1998). Moreover, if people create a more
complex perception about a topic (in this case, federal wilderness designation), perhaps
their acceptance of that topic will increase. Managers may benefit from integrative
complexity's predictive characteristics. In particular, managers may use integrative
complexity to better gauge their constituency in an effort to deliver more effective
messages and implement more appropriate management decisions (Carroll & Bright, 2005). Furthermore, analyzing the effects of increased knowledge on acceptance of federal wilderness designation may have further implications for outdoor recreation and natural resource managers in areas other than federal wilderness designation.

Study Goals and Objectives

The overarching goal of the present study is the incorporation of a cognitive measurement tool, integrative complexity, into outdoor recreation and natural resources management. Specific objectives of the present study include the following:

- To determine if integrative complexity of federal wilderness designation significantly increases with education on the topic.
- To explore how integrative complexity scores correlate with acceptability of federal wilderness designation.
- To explore how integrative complexity scores correlate with knowledge of federal wilderness designation.
- To explore how knowledge scores correlate with acceptability of federal wilderness designation.

From these goals and objectives, three hypotheses were advanced:

$H_1$: Acceptance of federal wilderness designation will increase with increased knowledge on the topic.

$H_2$: Integrative complexity scores will increase with increased knowledge about federal wilderness designation.

$H_3$: Integrative complexity scores will increase with increased acceptance of federal wilderness designation.
Methodology

Data came from undergraduate students (N = 102, 18 years of age and older) at the University of New Hampshire during the Fall 2006 semester. The participant pool for this study was chosen out of convenience (versus randomly) and consisted of only those students who volunteered to participate. The study group included students from a class titled *Issues of Wilderness and Nature in American Society* (n = 68). This class is in the department of Recreation Management & Policy, and provides students with an overview of the evolving relationship between wilderness and nature in American society. Male students (n = 37, 54.4%) outnumbered female students (n = 31, 45.6%), with an average age of 20.04 years old and an age range from 18-27 years old. Two students reported their hometown as less than one mile from a designated natural area, 12 students (17.6%) lived 1-10 miles away, 13 students (19.1%) lived 11-20 miles away, 23 students (33.8%) lived 21-50 miles away, 15 students (22.1%) lived 51-100 miles away, and 3 students (4.4%) lived more than 100 miles from a natural area (see Table 1).

**Table 1: How far is your hometown from a designated natural area?**

<table>
<thead>
<tr>
<th>Study group</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 mile away</td>
<td>2</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td>1-10 miles away</td>
<td>12</td>
<td>17.6</td>
<td>20.6</td>
</tr>
<tr>
<td>11-20 miles away</td>
<td>13</td>
<td>19.1</td>
<td>39.7</td>
</tr>
<tr>
<td>21-50 miles away</td>
<td>23</td>
<td>33.8</td>
<td>73.5</td>
</tr>
<tr>
<td>51-100 miles away</td>
<td>15</td>
<td>22.1</td>
<td>95.6</td>
</tr>
<tr>
<td>More than 100 miles away</td>
<td>3</td>
<td>4.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comparison group</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 mile away</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1-10 miles away</td>
<td>6</td>
<td>17.6</td>
<td>17.6</td>
</tr>
<tr>
<td>11-20 miles away</td>
<td>15</td>
<td>44.1</td>
<td>61.8</td>
</tr>
<tr>
<td>21-50 miles away</td>
<td>5</td>
<td>14.7</td>
<td>76.5</td>
</tr>
<tr>
<td>51-100 miles away</td>
<td>7</td>
<td>20.6</td>
<td>97.1</td>
</tr>
<tr>
<td>More than 100 miles away</td>
<td>1</td>
<td>2.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 2: How would you describe the community in which you were raised?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A large city with 250,000 or more people</td>
<td>1</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>A city with 100,000 to 249,000 people</td>
<td>5</td>
<td>7.4</td>
<td>8.8</td>
</tr>
<tr>
<td>A small city with 50,000 to 99,999 people</td>
<td>9</td>
<td>13.2</td>
<td>22.1</td>
</tr>
<tr>
<td>A town with 10,000 to 49,999 people</td>
<td>31</td>
<td>45.6</td>
<td>67.6</td>
</tr>
<tr>
<td>A small town/village with less than 10,000 people</td>
<td>21</td>
<td>30.9</td>
<td>98.5</td>
</tr>
<tr>
<td>A farm or very rural area</td>
<td>1</td>
<td>1.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Comparison group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A large city with 250,000 or more people</td>
<td>3</td>
<td>8.8</td>
<td>8.8</td>
</tr>
<tr>
<td>A city with 100,000 to 249,000 people</td>
<td>3</td>
<td>8.8</td>
<td>17.6</td>
</tr>
<tr>
<td>A small city with 50,000 to 99,999 people</td>
<td>5</td>
<td>14.7</td>
<td>32.4</td>
</tr>
<tr>
<td>A town with 10,000 to 49,999 people</td>
<td>13</td>
<td>38.2</td>
<td>70.6</td>
</tr>
<tr>
<td>A small town/village with less than 10,000 people</td>
<td>8</td>
<td>23.5</td>
<td>94.1</td>
</tr>
<tr>
<td>A farm or very rural area</td>
<td>2</td>
<td>5.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

One student from the study group lived in a large city, 5 students (7.4%) lived in a city with 100,000-249,000 people, 9 students (13.2%) lived in a small city with 50,000-99,999 people, 31 students (45.6%) lived in a town with 10,000-49,999 people, 21 students (30.9%) lived in a small town/village with less than 10,000 people, and 1 student lived in a farm or very rural area (see Table 2).

The comparison group consisted of male (n = 13, 38.2%) and female (n = 21, 61.8%) students from a class titled *Introduction to Tourism* (n = 34), in the department of Natural Resources. This class provides an informational foundation in tourism and provides students with extensive knowledge of the tourism industry. Comparison group participant ages ranged from 18-24 years old (M = 20.32). Six students (17.6%) lived less than 1 mile from a natural area, 15 students (44.1%) lived between 1 and 10 miles away, 5 students (14.7%) lived 11-20 miles away, 7 students (20.6%) lived 21-50 away,
and only one student in the comparison group lived more than 100 miles from a natural area (see Table 1). Three students (8.8%) lived in a large city with more than 250,000 people, 3 students (8.8%) lived in a city with 100,000-249,000 people, 5 students (14.7%) lived in a small city with 10,000-49,999 people, 13 students (38.2%) lived in a small town/village with less than 10,000 people, and 2 students (5.9%) lived in a farm or rural area (see Table 2).

Independent samples t-tests were computed for age, knowledge, acceptability and integrative complexity between the study and comparison groups before intervention (see Table 3). While no significant differences were found for gender, acceptability or integrative complexity between groups, knowledge scores were significantly different for both groups (pretest).

<table>
<thead>
<tr>
<th></th>
<th>Study Group (n=68)</th>
<th>Comparison Group (n = 34)</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age of participant</td>
<td>20.04 (SD=1.5)</td>
<td>20.32 (SD=1.8)</td>
<td>-.78</td>
<td>54.66</td>
<td>.447</td>
</tr>
<tr>
<td>Mean knowledge scores</td>
<td>9.00 (SD=4.8)</td>
<td>6.62 (SD=4.0)</td>
<td>2.67</td>
<td>77.63</td>
<td>.009*</td>
</tr>
<tr>
<td>Mean knowledge scores</td>
<td>7.96 (SD=3.9)</td>
<td>5.94 (SD=3.9)</td>
<td>2.45</td>
<td>65.70</td>
<td>.017*</td>
</tr>
<tr>
<td>Mean acceptability score</td>
<td>5.91 (SD=4.3)</td>
<td>4.41 (SD=4.4)</td>
<td>1.65</td>
<td>100</td>
<td>.102</td>
</tr>
<tr>
<td>Mean integrative complex</td>
<td>.4525 (SD=0.2)</td>
<td>.4635 (SD=0.3)</td>
<td>-.17</td>
<td>48.96</td>
<td>.865</td>
</tr>
</tbody>
</table>

*p < .05

Chi-square analyses determined significantly higher knowledge scores for those participants that lived “less than 20 miles from a designated natural area” \( (X^2 = 8.82, df = 1, p = .003) \), while no significant differences were found in gender \( (X^2 = 2.37, df = 1, p = .123) \), or any other variables, between groups.

**Study Instruments**

All students were asked to read an informed letter of consent (see Appendix A). Participation in the study was strictly voluntary. Students from both classes were asked
to complete both the Wilderness Knowledge and Acceptance Survey (see Appendices B & C) and the Wilderness Perception Scale (see Appendix D), at the beginning and again towards the end of the semester.

The Wilderness Knowledge and Acceptance Survey consisted of three sections; wilderness knowledge questions, wilderness acceptance questions, and demographics. The first two sections were structured as 5 point Likert-type scales, ranging from (1) definitely false to (5) definitely true (for knowledge questions) and from (1) not at all acceptable to (5) extremely acceptable (for acceptance questions). Knowledge questions were re-coded (from 1, 2, 3, 4, 5 into -2, -1, 0, 1, 2 for “positive” or “true” questions, and from 1, 2, 3, 4, 5 into 2, 1, 0, -1, -2 for “negative” or “false” questions). Acceptability questions were also re-coded from 1 through 5 into -2 through 2 in a similar manner. However, acceptability questions offered no “right” or “wrong” answers, so were not adjusted.

Both knowledge and acceptance questions were tested for reliability, and several ambiguous knowledge questions were pulled from the knowledge data before analysis. For instance, one question that asked participants to rank their knowledge regarding wilderness and the local economy (“Designated wilderness benefits the local economy”) was thrown out because there is no definitive answer. A total of 19 (from 23) knowledge questions and 8 acceptability questions were included in the initial analysis. A secondary data analysis, completed after internal consistency testing, looked at 10 (from 19) knowledge questions and 8 acceptability questions. Results from these two analyses differed significantly, which will be explained in the results section of this paper.
The Wilderness Perception Scale was modified from an earlier integrative complexity measurement instrument, which was created by Carroll & Bright (2005) as an alternative to the standard qualitative integrative complexity measurement techniques of the past (Schroder, Driver, & Streufert, 1967). Though integrative complexity allows researchers to gather insightful data, it is time consuming because of its qualitative nature, in which respondents are typically asked to complete written or typed essays (Carroll & Bright, 2005).

Traditionally, integrative complexity has been scored by trained coders on a range from 1 to 7, with a score of 7 representing the highest level of integrative complexity (Bright & Barro, 2000). However, because of its qualitative measurement characteristics, the use of integrative complexity is not convenient for large survey research, and often results in low response rates and poor quality responses. Moreover, scoring can be time consuming and labor intensive (Carroll & Bright, 2005).

Still, using integrative complexity in natural resources or outdoor recreation management applications has many attractive possibilities. According to Carroll & Bright (2005), “Information about the integrative complexity with which a public views an issue can be used to inform managers about how people think about natural resource issues...results will help managers understand how their actions will be received by the public” (pp. 42-43).

Carroll & Bright (2005) developed an alternative and functional method to measure integrative complexity. The resulting scalar construct was applied to measure public perceptions about prescribed burning and mechanical thinning practices, in a wildfire context. The simple, fixed-item scale allowed for a larger sample size, increased
generalizability and easier scoring. Carroll & Bright (2005) pre-tested their integrative complexity scale, and correlated their findings with traditional methods of integrative complexity measurement. Significant correlations of .79 and .81 were found and the scale was considered a successful alternative method for measuring integrative complexity, implying that the scale has potential use in other adaptations to natural resources and outdoor recreation.

The scale used to measure integrative complexity in this study is the second application of the scalar integrative complexity instrument developed by Carroll & Bright (2005). The instrument designs are very similar, but the context has been modified to measure wilderness designation perception, as opposed to public perceptions of mechanical thinning and prescribed burning. The Wilderness Perception Scale (see Appendix D) begins with a short heading that offers a brief synopsis and definition of federally designated wilderness, followed by examples of what arguments “for” or “against” wilderness may look like. The scale consists of two parts. Part 1 asks each participant to list arguments FOR wilderness designation. Six blanks are provided, followed by a 7-point Likert scale asking students how WEAK or STRONG they feel about their argument. Options range from (1) extremely weak to (7) extremely strong. In a similar fashion, part 2 asks participants to list arguments AGAINST wilderness designation. Again, 6 blanks are provided followed by the identical 7 points Likert scale.

Scoring for the Wilderness Perception Scale recognizes both components of integrative complexity, differentiation and integration. Modifying the SPSS syntax of the Carroll & Bright (2005) study (Appendix E) to fit the present study (Appendix F) was a matter of altering the variable names accordingly, while the actual content of the
responses was irrelevant. Ultimately, an integrative complexity score between 0 and 1 was determined by multiplying differentiation and integration scores.

Differentiation (when an individual considers more than one side to an issue) was computed from the number of responses an individual listed (on lines 1 through 6, FOR and lines 1 through 6, AGAINST). The lesser of the total arguments FOR versus AGAINST was divided by the greater of the two arguments to establish a differentiation value between 0 and 1. For instance, if an individual listed 3 arguments FOR and 2 arguments AGAINST wilderness designation, they would receive a score of .67 (2/3).

Integration (the strength or complexity of differentiated thoughts) was computed by analyzing the strength of the reason each individual listed FOR and AGAINST wilderness. For an integration score, the smaller mean was divided by the larger mean. Following the above example, if a respondent who lists 3 arguments “for” wilderness values the strength of each argument as 4 (Neutral), 5 (Slightly strong), and 6 (Moderately strong), their mean strength would be 5 (4+5+6/3=5). Likewise, if the same respondent rated their 2 arguments “against” wilderness designation as 1 (Extremely weak) and 7 (extremely strong), their strength would be 4 (1+7/2=4). The integration score for this participant, then, would be .8 (the smaller mean, 4, divided by the larger mean, 5).

Finally, an integrative complexity score is formulated by multiplying the differentiation and integration scores. This calculation again yields a value between 0 and 1. Completing the above example, multiplying the differentiation score of .67 by the integration score of .8 results in an integrative complexity score of .536 (or .54). This
person has average integrative complexity, as they sit nearly halfway between 0 (low integrative complexity) and 1 (high integrative complexity).

**Results**

A series of data analyses were performed to test this study’s hypotheses. Each hypothesis will be listed, followed by the appropriate analysis and findings.

**Data Analysis**

1. **H$_1$: Acceptance of federal wilderness designation will increase with increased knowledge on the topic.**

   Scores were generated from the Wilderness Knowledge and Acceptability Survey in the following manner. Knowledge and acceptability scores ranged from -2 to 2 after re-coding, for each item on the survey. Scores were computed for each question resulting in a point value. Summing the scores from each question and dividing by the total number of questions then established knowledge and acceptability scores. This mean number was then used to perform further analysis.

   Because the Wilderness Knowledge and Acceptance Survey is a new instrument, both knowledge and acceptability questions were tested for internal consistency. While the acceptance questions exhibited acceptable consistency (Cronbach’s Alpha = .731), knowledge questions scored very low reliability (Chronbach’s Alpha = .170). After strategically removing 9 knowledge questions, a higher knowledge score of was achieved (Chronbach’s Alpha = .473). A total of 10 knowledge questions remained after completion of this process. Data from both scenarios (before knowledge question reduction and after knowledge question reduction) were analyzed to determine any differences in means scores between pre-post groups.
Two analyses, then, were executed to test the relationship between knowledge and acceptance of federal wilderness designation. The first analysis involved paired samples t-tests to determine any significant differences in mean knowledge and acceptability scores between pre-test to post-test groups, before knowledge question reduction (see Table 4). Significant differences were found between pre-post knowledge ($t = -6.18, p < .001, df = 67$) and acceptability ($t = -4.28, p < .001, df = 67$) scores in the study group in the first analysis. In the comparison group, no significant differences were found between either pre-post knowledge scores ($t = 1.61, p = .12, df = 33$) or pre-post acceptability scores ($t = -1.24, p = .22, df = 33$). Because the knowledge base was increased in the study group, but not in the comparison group, this supports the hypothesis ($H_1$) that increased knowledge results in increased acceptability of wilderness designation.

For the second analysis, paired samples t-tests were performed after knowledge question reduction (to improve internal consistency) between pre-post groups (see Table 4). Although approaching significance in the study group, no significant results were found for the relationship between knowledge and acceptability in either the study group ($t = -1.98, p = .05, df = 67$) or the comparison group ($t = 1.94, p = .06, df = 33$). These results do not support the hypothesis that with increased knowledge, acceptance of federal wilderness designation will increase.

The hypothesis that increased knowledge of federal wilderness designation will increase the acceptance of federal wilderness designation ($H_1$) was supported by the first scenario, and not supported by the second scenario, in which the strength of internal consistency of the knowledge instrument was improved.
Table 4: Paired Samples Scores for All Groups (before and after Knowledge internal consistency)

<table>
<thead>
<tr>
<th>Study group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>N</th>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>9.00</td>
<td>4.754</td>
<td>14.47</td>
<td>5.718</td>
<td>68</td>
<td>-6.18</td>
</tr>
<tr>
<td>Knowledge after reduction</td>
<td>7.96</td>
<td>3.896</td>
<td>9.26</td>
<td>3.854</td>
<td>68</td>
<td>-1.978</td>
</tr>
<tr>
<td>Acceptability</td>
<td>5.91</td>
<td>4.298</td>
<td>8.93</td>
<td>4.130</td>
<td>68</td>
<td>-4.28</td>
</tr>
<tr>
<td>Integrative complexity</td>
<td>.4695</td>
<td>.23721</td>
<td>.4379</td>
<td>.24530</td>
<td>58</td>
<td>.691</td>
</tr>
<tr>
<td>Comparison group</td>
<td>Knowledge</td>
<td>6.62</td>
<td>3.970</td>
<td>4.91</td>
<td>4.667</td>
<td>34</td>
</tr>
<tr>
<td>Knowledge after reduction</td>
<td>5.94</td>
<td>3.923</td>
<td>4.18</td>
<td>4.034</td>
<td>34</td>
<td>1.942</td>
</tr>
<tr>
<td>Acceptability</td>
<td>4.41</td>
<td>4.377</td>
<td>5.94</td>
<td>5.488</td>
<td>34</td>
<td>-1.24</td>
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<tr>
<td>Integrative complexity</td>
<td>.4682</td>
<td>.33782</td>
<td>.4389</td>
<td>.30877</td>
<td>29</td>
<td>.350</td>
</tr>
</tbody>
</table>

*p < .001

2. H₂: Integrative complexity scores will increase with increased knowledge about federal wilderness designation.

Using syntax modified from the Carroll & Bright (2005) study on wildfire perception discussed earlier (see Appendices E & F), integrative complexity scores were generated for 4 groups – pre-post study and pre-post comparison. Paired samples t-tests were used to compare differences in mean integrative complexity scores between these groups (see Table 4). There were no significant differences between pre-post study group integrative complexity scores ($t = .69, p = .49, df = 57$) or pre-post comparison group integrative complexity scores ($t = .35, p = .73, df = 28$). In fact, integrative complexity scores actually decreased in both groups (though not significantly); the study group’s mean integrative complexity score dropped from .4695 to .4379 from the pretest to posttest phases, while mean integrative complexity scores for the comparison group dropped from .4682 to .4389 (see Table 4). The hypothesis that integrative complexity
would increase with increased knowledge of federal wilderness designation was not supported by these results. Conversely, an inverse relationship may be implied between integrative complexity levels and increased knowledge of wilderness designation.

3. **H₃: Integrative complexity scores will increase with increased acceptance of federal wilderness designation.**

Paired samples t-tests were utilized to test the third hypothesis; that acceptance scores would increase with increased levels of integrative complexity (see Table 4). Because integrative complexity scores actually decreased between both the study and comparison groups in this study, H₃ was also not supported in the present study.

**Additional Analyses**

Although integrative complexity levels did not increase significantly in either the study or the comparison group in this study, correlation analyses were performed to explore any possible relationships between knowledge, integrative complexity and acceptability. Significant correlations were found for posttest knowledge scores between knowledge and integrative complexity for the study group \( (p = .04, r = .23) \) but not for the comparison group \( (p = .44, r = -.03) \), but only in the previously discussed scenario involving low strength internal consistency of knowledge questions (see Table 5).

Results for correlations between the study and comparison groups after changes to knowledge questions due to internal consistency (using posttest data) can be found in Table 6. Notable results include a nearly significant correlation between knowledge and integrative complexity among study group participants \( (p = .06, r = .21) \). Meanwhile, the comparison group showed little correlation \( (p = .45, r = -.02) \) between integrative complexity and knowledge.
Study and comparison group pretest data were also tested for any correlations between integrative complexity, knowledge and acceptability of federal wilderness designation. Utilizing knowledge questions before and after reduction to improve internal consistency, no significant correlations were found between variables (see Tables 7 & 8). The correlation between knowledge and acceptability in the initial analysis (see Table 5) is the only statistically significant relationship found in the present study.

### Table 5: Correlation Matrix for Both Groups (Posttest data before Knowledge internal consistency)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Acceptability</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Integrative complexity</td>
<td>-.094</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>(3) Knowledge</td>
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<td>.231*</td>
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<tr>
<td>Comparison group</td>
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<tr>
<td>(1) Acceptability</td>
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<td>(2) Integrative complexity</td>
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<tr>
<td>(3) Knowledge</td>
<td>.067</td>
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<td>1.00</td>
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</table>

* *p < .05 (p = .04)*

### Table 6: Correlation Matrix for Both Groups (Posttest data after Knowledge internal consistency)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
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</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>(1) Acceptability</td>
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<td></td>
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<tr>
<td>(2) Integrative complexity</td>
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<td>(3) Knowledge</td>
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<td>(1) Acceptability</td>
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</tr>
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<td>(2) Integrative complexity</td>
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<tr>
<td>(3) Knowledge</td>
<td>.228</td>
<td>-.022</td>
<td>1.00</td>
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</table>

### Table 7: Correlation Matrix for Both Groups (Pretest data before Knowledge internal consistency)

<table>
<thead>
<tr>
<th></th>
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<th>(2)</th>
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</thead>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>(1) Acceptability</td>
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<td></td>
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<tr>
<td>(2) Integrative complexity</td>
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<td></td>
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<tr>
<td>(3) Knowledge</td>
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<td>-.103</td>
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<tr>
<td>Comparison group</td>
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</tr>
<tr>
<td>(1) Acceptability</td>
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<td></td>
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<tr>
<td>(2) Integrative complexity</td>
<td>-.311</td>
<td>1.00</td>
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<tr>
<td>(3) Knowledge</td>
<td>.013</td>
<td>.072</td>
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</table>
Table 8: Correlation Matrix for Both Groups (Pretest data after Knowledge internal consistency)

<table>
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<th>(2)</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Study group</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(1) Acceptability</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Integrative complexity</td>
<td>.188</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>(3) Knowledge</td>
<td>.078</td>
<td>-.206</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Comparison group</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(1) Acceptability</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Integrative complexity</td>
<td>-.311</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>(3) Knowledge</td>
<td>.130</td>
<td>.015</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Discussion**

In this research study, only the study group received education on the topic of federal wilderness designation. Because the comparison group received no education on the topic, this study hypothesized that knowledge would increase acceptability in the study group, but not in the comparison group. Paired samples tests resulted in significance (prior to knowledge question reduction) and near significance (after knowledge question reduction) in both knowledge and acceptance when comparing the study group to the comparison group. Hence, it may be implied that knowledge of federal wilderness designation increases acceptability of federal wilderness designation in this study.

A significant correlation was also found between knowledge and integrative complexity in the posttest study group, but only when using knowledge questions before internal consistency reduction. While this finding begins to imply a connection between integrative complexity and knowledge of federal wilderness designation, the strength of the correlation was fairly weak ($r = .231$) and the correlation was not significant when using knowledge questions after internal consistency.

Although the present study generally focused on the changes in integrative complexity and acceptance of federal wilderness designation with increased knowledge,
it is interesting to note that significant differences were found in baseline knowledge of federal wilderness designation between pretest study and comparison groups. Future research may benefit from more comparable baseline knowledge levels among participants. Randomizing the entire sample, for instance, may alleviate this predicament. Nevertheless, there were no other significant differences between pretest groups in the present study.

A basic component of this study was to determine any significant relationships between knowledge and acceptability of federal wilderness designation. While the hypothesis that increased knowledge about a topic increases one’s acceptability of that topic may be rather deductive and logical, the basic tenant of increasing one’s knowledge of federal wilderness designation may prove helpful to wilderness managers in the simplest way – it may generate more objective viewpoints by wilderness users and non-users, advocates, proponents and opponents on the issue. This factor alone supports the development of education protocol as an effective management and policy-making tool. The results of this study support this viewpoint. Future research may further explore this most basic rationale in an outdoor recreation and natural resources context.

Conceptually, if people are educated about a topic, they will think more deeply about that topic (Bright & Wyche, 1998). Moreover, if people create a more complex perception about a topic (in this case, federal wilderness designation), perhaps their acceptance of that topic will increase. In the present study, integrative complexity was proposed and tested as a cognitive measurement tool to help gauge how people think about federal wilderness designation. Moreover, integrative complexity was thought to increase with increased acceptance of federal wilderness designation.
Theoretical Implications

Although integrative complexity did not increase with acceptance in the present study, theoretically, integrative complexity has many implications for outdoor recreation and natural resources management. Managers may use integrative complexity to better gauge their constituency in an effort to deliver more effective messages and implement more appropriate management decisions (Carroll & Bright, 2005). Moreover, using integrative complexity may encourage managers to incorporate proactive, versus reactive, management techniques. Finally, integrative complexity has the potential to provide managers with a social science construct to aid in their management practices.

For example: On the issue of allowing mountain biking in federally designated wilderness areas, many opinions may be generated. Mountain bikers may argue that because they exhibit less resource damage than certain other wilderness users, travel in small groups and typically participate in day trips only, they should be allowed to enter wilderness areas, despite the fact no mechanized uses are permitted in federal wilderness areas ("Wilderness Act", 1964). On the other hand, to hikers, who have always been allowed in federal wilderness areas, mountain bikers may represent a threat to their wilderness experience. Hikers may argue that mountain bikes travel at relatively high speeds, cause extensive damage to the trails and have no respect for trail etiquette. Federal wilderness, a hiker may argue, is for primitive travel, and bicycles are far from primitive.

Both sides may have strong feelings about their respective beliefs or philosophies toward wilderness, and individuals in both user groups may generate different levels of integrative complexity reflecting their beliefs. If the land manager of said wilderness
area had general knowledge of the integrative complexity level of mountain bikers and hikers, as groups and/or as individuals, he or she may be able to prevent conflict, increase stewardship and create a positive recreation environment by, for instance, educating both sides on the realities of the given situation according to their integrative complexity levels.

Perhaps mountain bikers, who may exhibit low levels of integrative complexity, need a direct and explicit message at the trailhead stating other opportunities to ride in the vicinity. Their low integrative complexity would result in a very dichotomized viewpoint on bicycles in wilderness areas, and messages directed at mountain bikers in generally could be structured to address this; perhaps a quote from the local bicycle advocacy organization or a local professional mountain bike racer directing the rider to other areas, and supporting the need and rationale for federal wilderness. A powerful, moving, simple message may quickly change the low integrative complexity user’s opinion, and prevent problems down the trail.

Likewise, suppose hikers are found to exhibit high integrative complexity levels. If this were the case, a given hiker may have a laundry list of reasons why bicycles should be banned from wilderness areas, and why hikers should be allowed. A high integrative complexity level hiker may need a detailed, descriptive message at the trailhead reminding them of the controversy surrounding bicycles and wilderness, and the potential conflict that may occur if the two parties meet in said wilderness area. However, they would also be encouraged to respect the intentions of mountain bikers, and offer them the benefit of the doubt. In other words, the hiker would be challenged to think more deeply about the situation.
Another example may look at regional integrative complexity levels of wilderness users. For instance, it may be discovered that New England wilderness visitors have a high level of integrative complexity, versus a low level of integrative complexity in Far West wilderness visitors. Managers, then, would have the ability to adjust their messages and management decisions to reflect these differences.

The present study, however, showed little support for such implications of integrative complexity. There may be several reasons for this: First of all, the entire study group was composed of young, university students mostly from New England. Also, both the study group (Issues of Wilderness and Nature in American Society) and the comparison group (Introduction to Tourism) may have been too closely related in course content. Finally, the internal consistency of the knowledge questions on the Wilderness Knowledge and Acceptance Survey was less than ideal (Chronbach’s Alpha = .173, .473 after reduction).

The participants. The mean age of the participants in the present study was approximately 21 years old; combined with the fact that the entire sample was composed entirely of university students, the sample was immediately biased. This combination of age (young) and location (university) may account for the lack of change in integrative complexity scores over time for any of the groups in this study. Perhaps the scalar method of measuring integrative complexity was too complicated for these groups. Perhaps the students didn’t care to spend the time completing the integrative complexity instrument (15 respondents did not complete the Wilderness Perception Scale). Perhaps the scale itself was inappropriate for university students. Future research would benefit
from a more representative sample of the general population and (debatably) wilderness users.

Sample groups. Replicating this study using more distinctly different courses may produce more significant results. Were the study group (Issues of Wilderness and Nature in American Society) compared with an unassociated line of education (e.g. Algebra), perhaps more distinct differences would have occurred between groups. While such a scenario most likely would not have affected the integrative complexity scores in the present study, it may have further supported the role of knowledge in acceptance of federal wilderness designation.

The study and comparison groups were asked to volunteer for this study. While it is a strictly confidential and appropriate manner of acquiring study participants, had the sample been taken randomly it may have had more credibility. Furthermore, a random sample, rather than the convenience sample used in this study, would have most likely produced more generalizable results. Ideally, future research would build on the present template, albeit incorporating a random, more representative sample.

The instruments. This study was the first application of both the Wilderness Perception Scale and the Wilderness Knowledge and Acceptance Survey. Although a version of the Wilderness Perception Scale was tested in research on wildfires (Carroll & Bright, 2005), the present scalar measurement of integrative complexity should be tested in a wilderness context against traditional, qualitative methods of measuring integrative complexity.

The Wilderness Knowledge and Acceptance Survey, on the other hand, was developed without any prior testing; this was the instrument’s trial run. Future research
may benefit from improving the internal reliability of this survey’s knowledge questions, and testing both knowledge and acceptability questions against some other measure.

Other factors. Despite the lack of significance between integrative complexity and acceptance of federally designated wilderness in the present study, past research has shown a connection between integrative complexity and attitudes (Bright & Barro, 2000) in a natural resources context. Bright & Barro (2000) found that individuals with moderate attitudes exhibited higher levels of integrative complexity than those individuals with extreme attitudes toward plant and wildlife species protection. The present study failed to account for attitudes, which may have altered the results.

Moreover, value orientations have been shown to influence acceptability of urban wildlife management actions (Whittaker, Vaske, & Manfredo, 2006), and emotional apathy has been related to integrative complexity levels (Myyry, 2002). The present study took neither values nor emotions into account. Future integrative complexity research in outdoor recreation and natural resources may consider examining the effects of such factors.

Tri-part Integrative Complexity Theory

The lack of change (and slight decrease) in integrative complexity scores in both the study and comparison groups over time in the present study was curious. Deductively, one may assume that with increased knowledge about a topic, one’s level of thinking about that topic will increase (i.e. increased integrative complexity). While there may be a plethora of reasons for the relatively constant integrative complexity scores throughout this study, one possibility is proposed here (see Figure 1). Quite possibly, the “baseline” knowledge of individuals may have a dramatic influence on their
integrative complexity scores. Although baseline knowledge scores were significantly
different among participants from both pretest groups in the present study, mean scores
for both groups were relatively low on the Knowledge questions, indicating a lack of
knowledge on the topic.

In the present study, assuming the majority of the participants were from New
England, their baseline knowledge of federal wilderness may have been lower than, say,
participants from the Rocky Mountains, where federal wilderness is in close proximity
(and hotly debated). In this way, the participants in this study may have been starting
with a blank slate, and with (comparably) very little knowledge of federal wilderness
designation. Although the present study assumed that such a blank slate would produce
low levels of integrative complexity (due to the lack of knowledge on the topic),
participants from both courses reported near average levels of integrative complexity.
More interesting, though, the integrative complexity levels of the study group actually
decreased slightly with education on federal wilderness. While it was a minor decrease,
this may imply that, when starting with a blank slate (in which average or higher than
average integrative complexity levels may be reported), a certain level of knowledge may
create more dichotomized views on a topic, and a more “black and white” perception of
that topic, and hence, lower integrative complexity scores than one may expect (the
second part of the theory). Following this line of thinking, the third part of the Tri-Part
Integrative Complexity Theory proposes that after a higher level of education is achieved
(beyond the initial education) on a topic (in this case, federal wilderness designation),
integrative complexity levels may then begin to rise, resulting in more complex thinking
about the topic (see Figure 1).
Consider the following example: An individual is asked questions about federal wilderness designation, as the participants in this study were. This individual, seeing the words "federal wilderness designation" together for the first time in their adult life, may analyze the phrase in an attempt to try to make sense of it. This student would appear to be displaying high integrative complexity, as they have put much thought into their answers (part 1). However, after becoming educated on the topic of federal wilderness designation, this student begins to form very concrete, dichotomized views about the topic; wilderness is not good because I can't ride my bike there, for instance (part 2). Finally, after the student has gained a higher level of knowledge about federal wilderness designation, they may begin to challenge the same viewpoint; "though I may not be able to ride my bike in wilderness areas, there are plenty of other places to ride and maybe I should write my Congressperson to let them know how I feel on the topic" (part 3). This student would then be exhibiting high levels of integrative complexity, reflecting their deeper interest in the topic.
Conclusion

In the present study, the relationship between integrative complexity and one’s acceptance of a controversial issue (in this case, federal wilderness designation) remains a question. Future research, modifying the present study design to incorporate a more representative sample and an improved Wilderness Knowledge and Acceptance Survey, may discover such a relationship between integrative complexity and acceptance of federal wilderness designation. Furthermore, the Tri-part Integrative Complexity Theory proposed in this study should be tested for validity, and may provide some insight into the lack of integrative complexity changes in the present study.

Nevertheless, a significant relationship was discovered between knowledge and acceptance of federal wilderness designation in the present study. The most obvious benefit of this study, then, is the support for education protocol among wilderness managers. The implications of this finding may be transferred effectively to other areas of outdoor recreation and natural resource management. Finally, more research to support this seemingly obvious relationship between knowledge and acceptance of federal wilderness designation should be performed to support future management decisions aimed at educating
LIST OF REFERENCES


Burtz, R. (unpublished work). Department of Natural Resources Recreation and Tourism, Colorado State University.


Wilderness Act, 16 88th Congress (1964).
APPENDICES
APPENDIX A

INFORMED LETTER OF CONSENT

Dear student:

I am conducting a research project to measure Wilderness Designation Perception. I would like to invite you to participate in this project. I plan to work with approximately 120 students in this study.

I am asking you to complete a Wilderness Knowledge and Acceptance questionnaire, and a Wilderness Perception survey, for use in our research project. Participation is strictly voluntary; refusal to participate will involve no prejudice, penalty, or loss of benefits to which you would otherwise be entitled. If you agree to participate and then change your mind, you may withdraw at any time during the study without penalty.

There are no risks associated with this study. You will remain anonymous throughout the study. While you will not receive any compensation to participate in this project, the results may improve Recreation and Natural Resource management techniques.

The investigator seeks to maintain the confidentiality of all data and records associated with your participation in this research. You should understand, however, there are rare instances when the investigator is required to share personally-identifiable information (e.g., according to policy, contract, regulation). For example, in response to a complaint about the research, officials at the University of New Hampshire, designees of the sponsor(s), and/or regulatory and oversight government agencies may access research data. You also should understand that the investigator is required by law to report certain information to government and/or law enforcement officials (e.g., child abuse, threatened violence against self or others, communicable diseases). Data will be kept in a locked file cabinet in my office; only my research assistant (Sean McLaughlin) and I will have access to the data.

As a faculty member in the Recreation Management and Policy department at UNH, I will be conducted this study with Sean McLaughlin (RMP graduate student). If you have any questions about this research project or would like more information before, during, or after the study, you may contact Sean McLaughlin (sme6@unh.edu) or Dr. Joshua Carroll (josh.carroll@unh.edu). If you have questions about your rights as a research subject, you may contact Julie Simpson in the UNH Office of Sponsored Research at 603-862-2003 to discuss them.

Sincerely,

Dr. Joshua Carroll
APPENDIX B

WILDERNESS KNOWLEDGE AND ACCEPTANCE SURVEY (PART 1)

<table>
<thead>
<tr>
<th>Wilderness Knowledge Questions*</th>
<th>Definitely false</th>
<th>Probably false</th>
<th>Don’t know</th>
<th>Probably true</th>
<th>Definitely true</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Wilderness Act was passed in 1964</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Wilderness Act defines wilderness as: an area of undeveloped federal land retaining its primeval character and influence</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Users have to pay fees to use wilderness areas</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Users have to wait for permits to use wilderness areas</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilderness can only be designated by an Act of Congress</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilderness designation closes access to public lands</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire suppression is not allowed in wilderness areas</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock grazing is prohibited in wilderness</td>
<td>1 2 3 4 5</td>
<td></td>
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<td></td>
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<tr>
<td>Mining is prohibited in wilderness</td>
<td>1 2 3 4 5</td>
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<td>Timber harvesting is prohibited in wilderness</td>
<td>1 2 3 4 5</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilderness helps protect against the spread of noxious weeds</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilderness excludes the physically unfit</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilderness designation takes property rights away from those who now hold rights to oil, gas, development, or water, within the proposed areas</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hunting/fishing are allowed in wilderness areas</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damaging insects can be controlled in wilderness areas so they don't spread to surrounding lands</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilderness designation affects existing water rights</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilderness benefits the local economy</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>About 2.5% of the land in the lower 48 states is federally designated wilderness</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilderness areas are managed by federal land management agencies</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue equipment, including motor vehicles, is allowed in emergencies involving the health and safety of persons within a wilderness area</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilderness prohibits mechanized equipment</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilderness excludes the use of wheelchairs</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The managing agency is permitted to construct and maintain trails in wilderness areas</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Original knowledge questions are provided for future research implications
APPENDIX C

WILDERNESS KNOWLEDGE AND ACCEPTANCE SURVEY (PART 2)

Wilderness Acceptability Questions: Please circle the number that most closely reflects your answer.

How acceptable would you be of federal Wilderness designation if it resulted in the following?

<table>
<thead>
<tr>
<th>Question</th>
<th>Not at all acceptable</th>
<th>Slightly acceptable</th>
<th>Neutral</th>
<th>Moderately acceptable</th>
<th>Extremely acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Trail closures for mechanized user groups</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>2. Limitations on natural resource extraction</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. Preservation of the natural ecosystem</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Protection of native plant and wildlife species</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Limitations on grazing rights</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. Regulations on group size</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Possible new fees for recreation in the area</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Opportunities for solitude</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

We would like to know a little about you. This information will remain completely confidential.

1. Are you? (V) __________________________ Male  __________________________ Female

2. How old are you? ________________________ Years

3. How far is your hometown from a designated natural area (e.g., State or National Forest; State or National Park, etc.)? (V)
   __________________________ Less than 1 mile away  __________________________ 11 – 20 miles away  __________________________ 51 – 100 miles away
   __________________________ 1 – 10 miles away  __________________________ 21 – 50 miles away  __________________________ More than 100 miles away

4. How would you describe the community in which you were raised? (V)
   __________________________ a large city with 250,000 or more people  __________________________ a town with 10,000 to 49,999 people
   __________________________ a city with 100,000 to 249,999 people  __________________________ a small town/village with less than 10,000 people
   __________________________ a small city with 50,000 to 99,999 people  __________________________ a farm or very rural area

Thank you very much for participating in this study!
We would like to know what you think about designating natural areas as "wilderness" and the potential arguments FOR and AGAINST doing so.

Wilderness designation is the congressional process of creating a wilderness area that is managed federally in accordance with the Wilderness Act of 1964, often with input from state agencies. When an area is designated as "wilderness", it is set aside and limits are placed on what can be done in this area. A wilderness area is granted the highest level of natural resource protection in the country.

* In column A please list any arguments for (Part 1) or against (Part 2) wilderness designation. Please list as many as you can.
* In column B, indicate how WEAK or STRONG you think each argument you listed is. Circle the number that represents your response.

<table>
<thead>
<tr>
<th>COLUMN A</th>
<th>COLUMN B</th>
</tr>
</thead>
<tbody>
<tr>
<td>List Arguments FOR and AGAINST Wilderness Designation.</td>
<td>How WEAK or STRONG do you think this argument is?</td>
</tr>
<tr>
<td>Part 1: Arguments FOR wilderness designation</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
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<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>Part 2: Arguments AGAINST wilderness designation</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX E

SPSS INTEGRATIVE COMPLEXITY SYNTAX MECHANICAL THINNING

*Computing differentiation for Mechanical Thinning
COUNT
  MTposnbr = var00002 var00004 var00006 var00008 var00010 var00012 var00014
  var00016 (1 thru 7).
EXECUTE.

COUNT
  MTnegnbr = var00018 var00020 var00022 var00024 var00026 var00028 var00030
  var00032 (1 thru 7).
EXECUTE.

IF (MTposnbr <= MTnegnbr) MTlow = MTposnbr.
EXECUTE.

IF (MTposnbr > MTnegnbr) MTlow = MTnegnbr.
EXECUTE.

IF (MTposnbr <= MTnegnbr) MThigh = MTnegnbr.
EXECUTE.

IF (MTposnbr > MTnegnbr) MThigh = MTposnbr.
EXECUTE.

COMPUTE MTdiff = MTlow / MThigh.
EXECUTE.

*Computing integration for Mechanical Thinning
COMPUTE MTposstr = MEAN(var00002,var00004,var00006,var00008,var00010,var00012
  ,var00014,var00016).
EXECUTE.

COMPUTE MTnegstr = MEAN(var00018,var00020,var00022,var00024,var00026,var00028
  ,var00030,var00032).
EXECUTE.

*No response on neg OR pos - make 0, or no integration
RECODE
  MTposstr (SYSMIS=0) .
EXECUTE.

RECODE
  MTnegstr (SYSMIS=0) .
EXECUTE.

IF (MTposstr <= MTnegstr) MTIntlow = MTposstr.
EXECUTE.

IF (MTposstr > MTnegstr) MTIntlow = MTnegstr.
EXECUTE.

IF (MTposstr <= MTnegstr) MTInthi = MTnegstr.
EXECUTE.

IF (MTposstr > MTnegstr) MTInthi = MTposstr.
EXECUTE.

COMPUTE MTInt = MTIntlow / MTInthi.
EXECUTE.

COMPUTE MTIntCom = MTdiff * MTInt.
EXECUTE.
APPENDIX F

SPSS INTEGRATIVE COMPLEXITY SYNTAX FOR PRESENT STUDY

*Computing differentiation for Wilderness Designation
COUNT
  WDposnbr = var00002 var00004 var00006 var00008 var00010 var00012 (1 thru 7).
EXECUTE.

COUNT
  WDnegnbr = var00018 var00020 var00022 var00024 var00026 var00028 (1 thru 7).
EXECUTE.

IF (WDposnbr <= WDnegnbr) WDlow = WDposnbr.
EXECUTE.

IF (WDposnbr > WDnegnbr) W Dlow = WDnegnbr.
EXECUTE.

IF (WDposnbr <= WDnegnbr) WDhigh = WDnegnbr.
EXECUTE.

IF (WDposnbr > WDnegnbr) WDhigh = WDposnbr.
EXECUTE.

COMPUTE WDdiff = WDlow / WDhigh.
EXECUTE.

*Computing integration for Wilderness Designation
COMPUTE WDposstr = MEAN(var00002, var00004, var00006, var00008, var00010, var00012).
EXECUTE.

COMPUTE WDnegstr = MEAN(var00018, var00020, var00022, var00024, var00026, var00028).
EXECUTE.

*No response on neg OR pos - make 0, or no integration
RECODE
  WDposstr (SYSMIS=0).
EXECUTE.

RECODE
  WDnegstr (SYSMIS=0).
EXECUTE.

IF (WDposstr <= WDnegstr) WDIntlow = WDposstr.
EXECUTE.

IF (WDposstr > WDnegstr) WDIntlow = WDnegstr.
EXECUTE.

IF (WDposstr <= WDnegstr) WDInthi = WDnegstr.
EXECUTE.

IF (WDposstr > WDnegstr) WDInthi = WDposstr.
EXECUTE.

COMPUTE WDInt = WDIntlow / WDInthi.
EXECUTE.

COMPUTE WDIntCom = WDdiff * WDInt.
EXECUTE.
APPENDIX G

IRB LETTER OF APPROVAL

University of New Hampshire

Research Conduct and Compliance Services, Office of Sponsored Research
Service Building, 51 College Road, Durham, NH 03824-3585
Fax: 603-862-3564

10/6/2006

Carroll, Joshua
RMP, Hewitt Hall
Durham, NH 03824

IRB #: 3801
Study: The Effects of Knowledge and Integrative Complexity on Acceptance of Wilderness Designation
Approval Date: 10/3/2006

The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved the protocol for your study as Exempt as described in Title 45, Code of Federal Regulations (CFR), Part 46, Subsection 101(b). Approval is granted to conduct your study as described in your protocol.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the attached document, Responsibilities of Directors of Research Studies Involving Human Subjects. (This document is also available at http://www.unh.edu/osr/compliance/irb.html.) Please read this document carefully before commencing your work involving human subjects.

Upon completion of your study, please complete the enclosed pink Exempt Study Final Report form and return it to this office along with a report of your findings.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or Julie.simpson@unh.edu. Please refer to the IRB # above in all correspondence related to this study. The IRB wishes you success with your research.

For the IRB,

Julie F. Simpson
Manager

cc: File
McLaughlin, Sean

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