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DISSERTATION

**INTEGRATIVE COMPLEXITY OF PUBLIC PERCEPTIONS ABOUT
WILDFIRE MANAGEMENT**

Submitted by

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In partial fulfillment of the requirements

for the degree of Doctor of Philosophy

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Fall 2002

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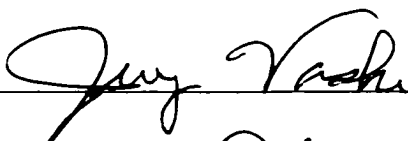
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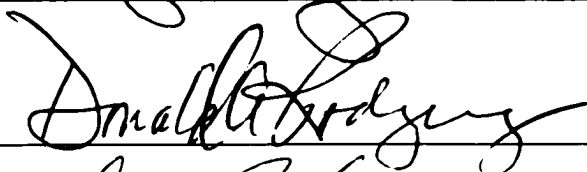
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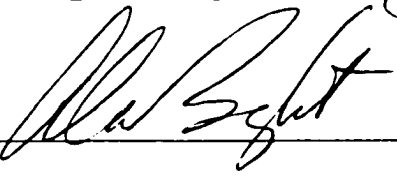
WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY RANDALL T. BURTZ ENTITLED INTEGRATIVE COMPLEXITY OF PUBLIC PERCEPTIONS ABOUT WILDFIRE MANAGEMENT BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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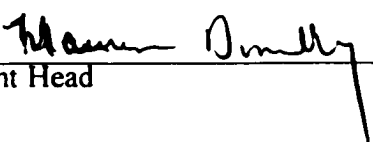








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ABSTRACT OF DISSERTATION

**INTEGRATIVE COMPLEXITY OF PUBLIC PERCEPTIONS ABOUT
WILDFIRE MANAGEMENT**

Since the early 1900s fire management has been, and remains, a highly controversial issue that is intensely debated. Perhaps as a consequence of its relevance, research has found that attitudes toward fire management practices have not been skewed in any particular direction: Subject responses have been fairly evenly distributed. The range afforded by attitudinal domains offers an appropriate opportunity to investigate the underlying structure of an attitude and its content manifestations. Beyond *what* people think (e.g., attitudes toward prescribed fire), it is equally important to understand *how* people think about the issues. In order to study how people think about wildfire and its management, we employed the use of integrative complexity. The measurement of integrative complexity was developed by cognitive psychologists and is based on two criteria: 1) The number of dimensions that people view related to an issue, and 2) how they integrate those dimensions. Integrative complexity analyzes the structure of thought an individual has about an issue, not its content. We measured the integrative complexity of perceptions regarding wildfire and its management. Homeowners in two Minnesota counties were asked to describe, in an essay, their position on this issue using a mail-back questionnaire. We examined how integrative complexity was related to attitudinal dimensions (direction and extremity) toward wildfire, value orientations, acceptability of management actions, and sociodemographics. We found that integrative complexity was

related to attitude extremity, but not attitude direction. Further, it was found that the relationship between value orientations and acceptability of management actions was influenced by integrative complexity. No relationship was found between integrative complexity and sociodemographics. Implications of this research lie in the further understanding of nature of the public's attitudes and values toward wildfire and its management, and how they are in turn influenced by integrative complexity.

Keywords: integrative complexity, attitudes, value orientations, sociodemographics, wildfire management

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TABLE OF CONTENTS

CHAPTER I. BACKGROUND / THEORETICAL OVERVIEW	3
Introduction	3
Theoretical Overview.....	6
Integrative Complexity	8
History of Integrative Complexity.....	10
Attitudes	14
Attitude Direction and Extremity.....	16
Attitudes Toward Fire Management.....	18
Values and Value Orientations.....	21
Chapter I Conclusion.....	24
CHAPTER II. ARTICLE 1	25
Introduction.....	25
Theoretical Background.....	26
Integrative Complexity.....	27
Integrative Complexity, Attitudes, and Sociodemographics.....	28
Attitude Direction.....	28
Attitude Extremity.....	29
Hypothesis.....	29
Methods.....	30
Sampling and Questionnaire Administration.....	30
Factor Measurement.....	31
Analysis.....	32
Protocol for Coding Integrative Complexity.....	32
Hypothesis Testing.....	34
Results.....	34
Description of Respondents.....	34
Response Rate.....	34
Respondent Characteristics.....	34
Reliability.....	35
Hypothesis Testing.....	35
Discussion.....	37
Implications.....	38
CHAPTER III. ARTICLE 2	41
Introduction.....	41
Values.....	44
Environmental Ideology.....	45
Goals and Objectives.....	48
Methods.....	48
Sampling and Questionnaire Administration.....	48
Factor Measurement.....	48

Analysis.....	50
Results.....	51
Description of Respondents.....	51
Response Rate.....	51
Respondent Characteristics.....	51
Interrater Reliability.....	52
Confirmatory Factor Analysis.....	52
Attitudes, Value Orientations, and Integrative Complexity.....	52
Discussion.....	53
Implications.....	55
CHAPTER IV. DISCUSSION AND IMPLICATIONS.....	60
LITERATURE CITED.....	62

LIST OF TABLES

Table 1.1 Exhibit of Scoring Protocol for Integrative Complexity.....	13
Table 2.1 Hypothesis and Research Question Testing.....	40
Table 3.1 Management Action Label and Description.....	56
Table 3.1 Confirmatory Factor Analysis on Wildfire Basic Belief Dimensions.....	57
Table 3.3 Management Actions and Value Orientations by High and Low Integrative Complexity.....	59

CHAPTER I. BACKGROUND / THEORETICAL OVERVIEW

Introduction

Since World War II, the American public has become more aware of wildland fire. After the war, dual trends emerged which have led to complex situations. People began to move out of urban areas and into suburban and semi-rural areas.

Simultaneously, the country's population continued to grow rapidly, and more people began to set aside additional time for outdoor leisure activities. As a result, settlements in and the use of wildlands increased (Fuller 1991). Occupants often chose the area for its pristine environment, or for recreational purposes.

Fire knows no human boundaries. It does not recognize wealth or poverty, property lines, or political lines. It does not distinguish between abandoned structures or places that we consider valuable. It does not consider the economic, social, or aesthetic value of the landscape. It will burn whatever is in its path, as it has always done, and always will. Fire is nondiscriminatory, and thus, it can affect any and all of us. California was one of the first states to experience the phenomenon, and has endured several devastating fires. One extreme example occurred in October 1991, when wildland fire broke out in an urban Oakland Park. It spread throughout the wildland-urban interface area, and ignited much of the adjacent urban area. Twenty-five people were trapped and killed, and more than 3,000 homes were destroyed. Before that, in 1985, major wildland fires destroyed more than 1,400 homes and killed 44 (Taylor et al. 1986).

Beyond the loss of human life and property, other issues related to fire and its management have arisen. Questions related to smoke management are being considered. How does smoke impact human health, transportation, agriculture, atmospheric carbon loading, and global warming? The regulatory community now struggles with atmospheric impacts, weighting them against the danger of reducing prescribed fire. (Carpenter et al. 1986). We have further witnessed the loss of 1000 year old cultural history on the New Mexico Cerro Grande (Los Alamos) fire in 1996 (incidentally, ruins were actually revealed for the first time in a fire 4 years later).

There is considerable debate about who should take responsibility for this unique problem, and what can be done about it. Some believe that homeowners should take the most responsibility arguing the risk-takers should pay for their decision to live in a potentially dangerous interface area by paying more taxes and by taking precautions around their property. However, critics argue that making the necessary economic investments would be impossible for some residents, and others are unwilling to modify their home and surroundings for fear of compromising the rustic look (Cortner, Gardner, and Taylor 1990).

Land management agencies have also been called upon to take a more active role in helping to control the problem by reducing fuel around interface areas regularly, so that fires are easier to manage and control. They may also rely on a prescribed fire regimen, but these carry some elements of risk. The concepts of "not in my backyard" and smoke impacts restrict options (DeBano, Neary, and Folliott 1998). However, a regimen that involves both land management agencies and private landowners

cooperating to maintain reduced fuel around structures could be much less destructive, more cost-efficient than suppressing fires, and potentially much safer.

Federal legislation and recent agency directives have emphasized the need for meaningful public participation in the development of natural resource plans and policies. Public land managers are more likely to develop plans that can be successfully implemented if they communicate and work with the public. Understanding how citizens perceive fire management and specific fuel treatments is essential to land managers success in negotiating mutually acceptable fire management plans (Manfredo et al. 1990).

Understanding the factors that influence public acceptance of management decisions may help policies have a higher probability of success. A broader understanding may inform managers sufficiently to provide effective responses to the questions, objections, and concerns of the public. There are many issues regarding fire management that have been identified as areas of concern to the public. For example, prescribed fire has generated controversy because of the vast distances over which the resulting smoke disperses and the potentially disastrous effects of prescribed fires that may escape. Mechanical treatment has led some to be concerned that fuel reduction would be used as a pretext for justifying the harvest of mature trees (Jehl 2001). These concerns are just a few of many that the public holds about wildfire and its management.

For managers, it may be necessary to understand the underlying nature of the public's concerns regarding the social acceptability of natural resource policies, in an attempt to predict acceptability of proposed practices (Winter 2002). Along with understanding the acceptability of certain management decisions, it may be a necessary prerequisite to understand how people cognitively process the issues surrounding fire

management. It may be necessary to understand the nature of attitudes toward wildfire and attitudes toward specific management practices. Current social research on public perceptions of fire have focused on attitudes and preferences regarding fire management and specific fire treatments. One drawback of this research is that it does not delve more deeply into what drives these perceptions. We extend this research by examining (a) the complexity with which people view fire management and (b) the underlying values people hold that influence attitudes and preferences. More specifically, it is insufficient to simply understand what attitudes are relevant to wildfire and its management, it is necessary to understand *how* people are thinking about the issues surrounding wildfire. Through the use of integrative complexity we may better understand the level to which people process issues related to forest fire management.

Theoretical Overview

The primary constructs that drove this research were the complexity of thought toward wildfire, attitudes toward wildfire and fire treatments, and wildfire value orientations. Below is a brief description of the theoretical background surrounding each construct.

The *What* and *How* of Information Processing

Whether applied to individuals, groups, or organizations, complexity theories are all concerned with the *how* of information processing. When viewed in a very limited and isolated fashion, complexity based approaches are not interested in *what* the information processed might be. The content of an attitude, for example, would not be of major interest. *How* an attitude, whatever its content might be, is developed, how contradictory information modified that attitude, and how the attitude is used in contributing to

information input-behavior-output chains *is* of interest. The emphasis is on how information is processed.

Complexity theorists suggest we consider the effects of content where necessary - that is, where the possibility exists that decision content may be handled appropriately in the task at hand, or perhaps inappropriately in a given context (i.e., if the public thought in a complex manner, but in favor of prescribed fire in a dry windy area). However, complexity theorists would argue that structure - again the *how* of information processing - is just as important. For example, though some specific decisions may be appropriate in content at a given time, it may be inappropriate on other occasions. Consider, for example, attitudes and behaviors toward fire management. An appropriate content decision in some areas might be to support forest service policy of using prescribed fires. However, setting prescribed fires in a particularly dry and heavily populated area could result in disaster. In this situation, an individual may consider such questions as:

What is the purpose of prescribed fires?

What might be an alternative resolution to reducing fuel loads?

What is the best strategy in certain areas?

Who is responsible to protect homes built in these areas?

Does it benefit or harm nature?

Could these trees be used for utility rather than just being allowed to burn?

These questions may reflect cognitive activity along a number of content dimensions. The simultaneous and interactive (integrative) application of several dimensions takes this form of information processing to the idea of structure. Again, we are concerned with the *how* of information processing by asking *how* the various and

diverse answers to these questions may be combined to arrive at a decision. In contrast, attitude content, specific attributions, even the content of a specific decision are not directly considered because they reflect the content, that is, the *what* of information processing. That is not to say that the content is unimportant. It is of considerable significance. Without knowing whether an attitude makes sense, whether an event is attributed to the appropriate causal agent, or whether a decision is meaningful in its environmental context, we have gained little information by only considering some aspects of decision-making quality. But, an emphasis on content alone is equally insufficient. Attitudinal content and decision-making content has been and continues to be studied extensively, but unfortunately in isolation. Content alone is being investigated by behavioral scientists of many orientations, by economists, sociologists, and even management scientists. In an attempt to address this issue, we have included the investigation of integrative complexity, attitudinal components, and value orientations in our study.

Integrative Complexity

Complexity theory has its origins in cognition research. Early versions of various theoretical approaches to complexity were concerned with the styles persons employed when they process information. The first complexity theorists focused their interests primarily in the areas of perception, individual differences, and information processing. Invariably, the early orientation was concerned with individual human beings; specifically with the cognitive structure of those human beings (Streufert and Swezy 1986). Early theorists asked: How does information flow throughout the cognitive

structure? Where and when was information modified, distorted, and used? How did this structure express itself in the behavior of a particular person under study?

For the moment, let us focus on the potential cognitive structure of the public's decision making process. How many factors are considered in their decisions? How do they evaluate the impact of management decisions on the forest, or their personal property? What alternative management plans are available? To place these questions in the terminology used in complexity theory: How much dimensional differentiation and integration is underlying each potential decision? A cognitively complex decision might involve consideration of a variety of alternative actions as well as estimates of the consequences of each. These multiple, interrelated decision components involve considerable thought. Their development and interrelationships can be discovered, described, and predicted by considering the structural characteristics of information processing, an approach that has been pioneered by the complexity theories.

The terms of differentiation and integration are used to describe those structural characteristics. The use of these two terms has been similar across the complexity theories, and before the components of complexity theory approach to information processing is continued, it is appropriate to define these terms as they are used in this paper.

Differentiation describes whether or not a person acknowledges more than one dimension to a problem or issue. A person who sees an issue in black and white terms has little or no differentiation on that issue, while a person who acknowledges at least two dimensions to an issue shows differentiation in their thinking (Streufert and Swezwy 1986). The descriptions of differentiation may be aided by an example. When

asked about the role of wildfire in nature and how it should be managed, an individual might respond in one of the following two ways: 1) “Wildfires are destructive and should be immediately put out.” 2) “Wildfires are destructive and should be immediately put out unless there is no danger to personal property, in which case they should be allowed to burn.” The first statement shows no differentiation, while the second statement demonstrates the recognition of an alternative decision.

Integration refers to the development of complex connections among the differentiated characteristics. This involves recognition that the issue is not simple and that there are trade-offs and interrelationships among the dimensions of an issue (Streufert and Swezwy1986) In continuing with the second example used above: “Wildfires are destructive and should be immediately put out unless there is no danger to personal property, in which case they should be allowed to burn. However, a certain amount of material losses to humans are acceptable when there are benefits to the natural environment as well.” Here, the second of the two sentences demonstrates a greater amount of integration of the two differentiated issues.

Historical Development of Complexity Theory The earliest work that can be theoretically linked to integrative complexity as it has been developed in its current form can be attributed to Kelly (1955). Kelly proposed the psychology of personal constructs as a guide for psychotherapy and client-therapist interaction. His concept of personal constructs, while not originally intended as a complexity approach, has nevertheless provided the basis for later complexity theories. Kelly's construct is a bipolar dimension that consists of the results from an individual's process of “constructing or (cognitively) interpreting” events. Kelly considered dimensions in terms of similarity and contrast.

According to his view, a dimension (construct) emerges when two events or objects are viewed as similar and a third is viewed as dissimilar. Dimensions are presumed to relate to each other in terms of ordinal hierarchical relationships, but these relationships may be limited to certain areas (Domains).

The theories of Bieri (1961, 1966; Bieri et al 1966) are based on the work of Kelly. As is the case with Kelly, Bieri's work has been concerned with the effects of an individual's cognitive orientations on the judgments he or she makes. Bieri views complexity as a structural characteristic describing the use of psychological dimensions when describing an issue. According to Bieri (1968), complexity is concerned only with social judgments and social versatility. The degree of cognitive complexity is related to the number of cognitive dimensions available to an individual. The more dimensions present, the greater the degree of individual cognitive complexity.

Bieri has discussed differentiation both in terms of an individual's cognitive structure, and in terms of the social stimulus of the environment (the number of dimensions possessed by the stimulus). Social perception, in his view, consists of an interaction between stimulus complexity and structural complexity.

Scott's (1969) early cognitive structure theory was based on a combined approach of earlier formulations. Previously proposed distinctions between personality content and structural characteristics were elaborated by Scott into an encompassing theory of structural characteristics which focused on implications of social, personality, and organizational psychology. The definitions of content and structure advanced by Scott have been similar to those employed by Streufert (1978). Scott was one of the first theorists to emphasize that structural characteristics (differentiation) may be limited to

specific cognitive domains. Scott described dimensions and discriminations of dimensions (called attributes) which are viewed as concepts of objects. Scott's (1986) overview of his theory is as follows:

Any perception by a person based on the phenomenological world results in an image that represents a point on one or more dimensions (attributes) of cognitive space. Where, on any dimension the image falls, depends on the number of segments of the dimension (degree of articulation of the attributes). The number of independent dimensions (attributes) into which a person sorts information reflects the degree to which he or she differentiates the specific cognitive domain into which he or she has placed the perceived stimuli (p.21).

Streufert and Streufert (1976) investigated whether complex persons, when compared to their less complex counterparts, are more flexible and/or creative. They found that a tendency toward greater flexibility exists. Harvey et al. (1977) upheld the findings of Streufert and Streufert and termed this as concrete (low IC) and abstract (high IC), related to the types of information processing that occurs within individuals at these different levels of complexity.

Streufert and Streufert (1978) evolved their theoretical views from earlier theories and more than 50 studies conducted by Schroder, Driver, and Streufert between the years 1967 and 1977. In addition, the complexity theories advanced by Streufert and Streufert was extended to permit a more extensive focus on decision-making. At that time, the researchers aimed at creating a standardized scoring system for integrative complexity. The end result was a scoring manual created by Baker-Brown et al. (1992). A brief description of the coding rules follows in Table 1.1.

Table 1.1.
Scoring Protocol of Integrative Complexity

<u>Score</u>	<u>Criteria</u>
1	<p>There is no sign of either conceptual differentiation or integration at this scoring level. The author relies, without qualification, on a simple one-dimensional rule for interpreting events and making choices. Only one way of looking at the world is considered legitimate. The author either implies or explicitly states that there is one and only one reasonable approach to an issue. This position is typically expressed in the form of an absolute or categorical rule. The end result of the application of an absolute rule is, however, always the same: The imposition of the dichotomous category structure (right vs. wrong), with or no room for ambiguity or shades of gray. The author seeks rapid closure. The author may go on at great length and provide detailed descriptions, explanations, or examples of the preferred rule. This additional content it does not justify a higher score, as the author is elaborating on the dominant theme and is not introducing alternative perspectives or dimensions.</p>
2	<p>In a statement assigned a score of 2, the author recognizes the potential for looking at the same issue in different ways or along different dimensions. Differentiation is, however, emergent rather than fully developed. This scale value represents a transition level between the categorical structure of the score of one and the differentiated structure of the score of 3.</p>
3	<p>The crucial aspect of a score of 3 is a clear specification of at least two distinct ways of dealing with the same information or stimulus. The author recognizes that these different perspectives or dimensions can be held in the mind simultaneously, however, there is no evidence of conceptual integration. The critical indicator of a score of 3 is the recognition of alternative perspectives or different dimensions, and the acceptance of these as being relevant, legitimate, justifiable, or valid. Although the author may hold one viewpoint, he or she recognizes that others disagree and feels no need to disparage them. Increased tolerance for ambiguity or conflict is shown when the author considers a number of parallel or contradictory perspectives or dimensions. The author sees multiple perspectives. Differentiation is the key element of a score of 3.</p>
4	<p>In the earlier levels, the major elements determining the specific score was the presence or absence of differentiation. In the score of 4, we see signs of the emergence of a second major scoring element, integration. That is, we began to find indicators of the ability to integrate different and sometimes conflicting alternatives. Conceptual integration is not clearly apparent at this level, however. Instead, the integration of alternatives is implicit. There is only a suggestion that interaction exists between alternatives; there is no overt statement specifying the nature of this interaction.</p>

- 5 A score of 5 indicates the explicit expression of integration. Whereas a score of 4 signifies the emergence of integration expressed in a tentative or uncertain manner, the score 5 indicates that integration is clearly evident. Sometimes two or more alternatives are shown to be in a dynamic relationship with one another, in which each perspective affects and is affected by the other. The author must clearly recognize a relationship for the passage to be scored a 5.
- 6 In general, a score of 6 involves a high-level interaction indicating that the author is working with multiple levels of schemata. The alternatives at this level are dynamic; they are expressed as plans, processes, where courses of action made up of several moving parts, and as such they may often be referred to as systems or networks. At this level, alternatives are readily accepted, compared or contrasted, and integrated to present at least one outcome. Global overviews or organizational principles are often presented. Again, the author is aware of two alternative courses of action and is able to compare their outcomes with regard to long-term implications. In comparing alternatives, the author may still favor one over the other, but each is reasonably considered.
- 7 The unique characteristic of a score of 7 is the presence of an overreaching viewpoint pertaining to the nature (not merely the existence) of the relationship or connectedness between alternatives. In a score of seven, these alternatives are clearly delineated and are described in reasonable detail. How each alternative may be seen as part of some overreaching view, or how some overreaching view encompasses these alternatives, is made evident. Further, there is a discussion of the ways in which levels of the problem or concept interact and thus demonstrate the validity of the overreaching viewpoint. In general, this type of highly integrative passage explores specific complex interactions within a complex system, using an overreaching global viewpoint as a way of uniting these observations. The author might begin by taking a global view of the problem and then may provide examples for a particular interpretation.

Attitudes

Allport (1935) noted that attitude is "social psychology's most indispensable concept." Because of the importance accorded to attitudes as causes of individual phenomena such as attitude-consistent behavior and selective perception, as well as societal phenomena such as social conflict and discrimination, the concept of attitude has become a fundamental construct for most social scientists. The conceptual definition of attitude as suggested by Eagly and Chaiken (1993): Attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor.

Psychological tendency refers to a state that is internal to the person, and evaluating refers to all classes of evaluative responding. This psychological tendency can be regarded as a type of bias that predisposes the individual toward evaluative responses that are positive or negative. Because evaluation is the critical feature of attitudes, the observable responses relevant to inferring the presence of an attitude are therefore those that are regarded as revealing or expressing evaluation. Thus, evaluative responses are those that express approval or disapproval, favor or disfavor, liking or disliking, approach or avoidance, attraction or aversion, or similar reactions.

In the 1970s and 1980s, two major programs of research succeeded in clarifying attitude-behavior relationships. The first of these, directed by Fishbein and Ajzen (1974) suggested that attitude and behavior are correlated (a) when the observed behavior is judged to be relevant to the attitude, (b) when attitude and behavior are observed at comparative levels of specificity, and (c) when mediation of the attitude-behavior relation by behavioral intentions is taken into account. The second major line of research, directed by Fazio (1986) showed that attitude and behavior, and changes therein, are correlated (a) when the attitude is based on direct experience with the attitude object, and (b) to the extent to the attitude is cognitively accessible.

Evaluative responses can be translated into tendencies that are presumed to underlie them and are regarded as differing in valance or direction because they can be separated into positive and negative evaluations. In addition, evaluations of a given valance differ in intensity or extremity, when, for example, very positive evaluations are distinguished from moderately positive evaluations, which are, in turn, distinguished from slightly positive evaluations. Therefore, social scientists often represent the

hypothetical state that they assume underlies evaluative responding as a location on a bipolar continuum or dimension that may range from extremely positive to extremely negative, and include a reference point of neutrality.

Numerous studies have investigated the attributes of attitudes. Scott (1968) described 10 such properties: magnitude (extremity), intensity, ambivalence, salience, affective salience, cognitive complexity, over this, indebtedness, flexibility, and direction. Of particular interest in this study are two of the attitudinal attributes: extremity and direction.

Attitude Direction and Extremity

Many of the most significant changes in U.S. society have involved the shifting of seemingly unmovable and highly consequential attitudes. Among the most notable of these transformations are the shifts of attitudes from utilitarianism to protectionism toward the natural resources. In the case of natural resources and other issues like it, extreme attitudes were gradually transfigured as the result of intense social pressure and heated public debate. Such concerted efforts at inducing collective attitude direction change in these instances were inspired partly by the belief that people's attitudes were responsible for related utilitarian behaviors towards the environment. Therefore, and changing the direction of attitudes would be presumed to change behaviors.

Consistent with these informal observations, a number of studies conducted since the 1950s have made it clear that more extreme attitudes can be very stable, consequential, and difficult to change. As Hovland (1959), Hyman and Sheatsley (1947) and others have pointed out, extreme attitudes appear to change only rarely in the course of life, even when elaborate influence campaigns are mounted to induce shifts. Some

attitudes, such as those toward political candidates, are very powerful determinants of relevant behavior (e.g., voting in elections) as found by Schuman and Johnson (1979).

Although attitude strength has often been discussed in social science literature over the years, it has been more of a vague metaphor than formally defined social scientific construct. For example, when Raden (1985) reviewed the literature on attitude strength, he noted that "attitude strength has generally not been defined with any precision, and it does not appear to have any agreed-upon meaning for attitude researchers." Still, Krosnick and Petty (1995) suggested notion has on attitudes are stronger than others has powerful intuitive appeal in that attitudes can guide behavior, and the strong attitudes should be more likely to do so and then a weak ones.

The ability of an attitude to predict the subsequent behavior may be dependent on the attitude's stability. Fazio (1986) argued that attitudes influence our behavior in part by shaping our perceptions of the world around us. That is, the ability of an attitude to predict behavior is dependent in part on the attitudes ability to bias perceptions of the attitude object and the behavioral context. Attitudes can influence information processing and judgment in the sense that they make it more likely that certain information will come to mind, or that certain decisions will be rendered. Strong attitudes are more likely to impact bias on information processing activity and judgments than weak ones.

Attitude strength may further be related to behavioral commitment. The more a person performs behaviors toward an object that are consistent with his or her attitude toward it, the more committed he or she may be to the attitude (Kiesler 1971) The more committed and individual is to an attitude, the more likely he or she is to resist attempts

to change it (Hovland et al. 1957). The study of attitudes has played an important role in understanding the public's perceptions of fire management. Studies of the public perceptions of fire management are discussed below.

Attitudes Toward Fire Management In general, the public has been slow to accept fire as a legitimate wildland fire management tool for many reasons. One of the most significant reasons is because of the past message of fire suppression from those responsible for ecosystem management. This suppression message began back in the early 1900s when the United States Forest Service initiated the policy of extinguishing all forest fires. This policy was strengthened in 1935 when the U.S. Forest Service tried a continent-wide experiment called the "10 a.m. policy" (Pyne et al. 1996). This policy required managers to extinguish all wildland fires by 10 a.m. on the day following their ignition. This heavy-handed approach to suppress fire was packaged to the public along with education. Through long-term government educational campaigns the idea of immediate suppression endured. The icon for this suppression policy was first developed by the Wartime Advertising Council in 1944, and later updated by the U.S. Forest Service (Fuller 1991). Smokey Bear and his message of "only you can prevent forest fires" impacted individuals of all ages. With Smokey's help, agencies responsible for fire management had soon gained almost unanimous support for the immediate suppression of all fires.

During the 1960s and 1970s the development of the environmental movement gave rise to the idea that total wildland fire suppression may be harmful to the ecosystem. During this same time, research found that people preferred naturalness in wildlands, including naturally occurring woody debris. Yet, the same research found that the public

disliked the same woody debris if it had been caused by commercial logging activity (Shelby and Speaker 1990). In order to remedy these two situations, researchers in the late 1970s stressed using "prescribed fire" as a method of protecting, maintaining, and enhancing forest resources while reducing unsightly logging debris. From the success of these early trials, forest managers and researchers soon learned the benefits of re-introduced fire upon ecosystems where it had been suppressed.

In 1971, a study tested visitors on their knowledge of fire's effects upon the ecosystem in Montana's Selway-Bitterroot Wilderness (Stankey 1976). Results of the true/false test indicated that the average visitor could only identify about half of the statements that related to fire's effects upon the ecosystem. The most interesting theme to arise out of this study was that greater fire knowledge relates to increased support for decreased fire suppression activities.

In 1976, another survey found that over half of respondents agreed that occasional fires were an important part of ecosystem renewal (Folkman 1979). Yet, of those same Los Angeles and San Francisco residents, about 75% agreed that naturally ignited fires should not be allowed to burn even if they did not endanger human life or property. Slightly more than three-quarters of surveyed residents in Los Angeles and San Francisco also agreed that it is important for government agencies to suppress fire as soon as possible after ignition, no matter where the fire is located. In other words, even though people knew the importance of occasional fires, they still felt that immediate suppression of fire was important. A similar study conducted in Olympia National Park in 1978 illustrated this conflict between increased awareness about the benefits of fire and the support for fire suppression. About 70% of visitors to the National Park could correctly

define the practice of prescribed burning and understood the beneficial effects of fire, yet nearly 65% still wanted fires controlled at all costs (Rauw 1980).

By the early 1980s, researchers in the human dimension side of wildland fire observed a shift in public attitude towards less suppression and greater acceptance of fires as a natural part of the ecosystem. A survey conducted in 1981 found that two-thirds of people in Tucson, Arizona, knew about fire's beneficial effects upon the ecosystem (Zwolinski et al. 1982). Of the sample population studied, 84% had heard of prescribed burning and, more surprisingly, 80 percent in this group approved of the practice. During this time, other researchers noted a similar shift in perceptions and attitudes toward wildland fire. During the mid-1980s the trend of increased acceptance of fire as a natural and acceptable part of the ecosystem continued to gather support. McCool and Stankey (1986) returned to the Selway-Bitterroot Wilderness to re-sample visitors about their perceptions and attitudes towards wildland fire. In that thirteen-year period, the public had grown more knowledgeable about fire's effects, and gained an average overall score of 64% on their true/false test compared to 53% scored in 1971. The researchers also found that seven out of ten visitors supported letting fires burn in wilderness areas compared to 38% in 1971. In addition, the relationship between increased fire knowledge still translated into increased acceptance of less restrictive fire management policies. The research by Stankey (1976) and later by McCool and Stankey (1986) in the same study area illustrates a good example of the trend of increased support for alternative fire management options during the 1970s and 1980s.

Finally, in 1985, a milestone was reached by a study surveying visitors' attitudes and perceptions of wildland fire policy in Frank Church River of No Return Wilderness

(Patton and Oliver 1985). Researchers in this study found that not a single visitor preferred a suppression-only wildland fire policy. Education about the benefits of fire's re-introduction into the ecosystem and the role of fuel management had gathered enormous momentum.

Values and Value Orientations

An emerging and important area of research regarding perceptions of natural resources and their management focuses on the values that the public holds regarding those issues. This line of research has explored the connection between basic fundamental values, value orientations, and more specific attitudes and behaviors.

Value Orientations. Value orientations are derived from an individual's basic fundamental values. Fundamental values are "an enduring belief that a specific mode of conduct is personally or socially preferable to an opposite or converse mode of conduct or end state of existence" (Rokeach 1975, p. 5). They are the most basic abstractions of social cognitions that an individual uses to adapt to his or her surroundings (Homer and Kahle 1988). Fundamental values differ from attitudes in that they (a) are stable beliefs that are standards for evaluating objects and behaviors, (b) transcend objects, situations, and issues that are the focus of more specific attitudes, (c) are the heart of a person's belief system and therefore difficult to change, and (d) are limited in number (Vaske & Donnelly, 1999). The connection between fundamental values and attitudes toward environmental issues is the orientation of those values toward the environment. Environmental ideology represents that value orientation. Previous research supports the importance of environment and natural resource based value orientations in attitude prediction (Bright and Manfredo 1996; Bright, Manfredo and Fulton 2000; Burtz and

Bright 1998; Fulton, Manfredo, and Lipscomb 1996, Stern, Dietz, Kalof, and Guagnano 1995; Vaske & Donnelly 1999). Bright and Manfredo (1996) and Burtz and Bright (1998) found that the most important predictors of attitudes toward reintroducing wolves were the orientation of values (termed symbolic beliefs in their studies) related to the role of wolves in society. While no research was identified that connected value orientations to the complexity of thought about wildfire and its management, the connection between complex thought and attitudes suggests that a similar link may exist between value orientations and integrative complexity regarding the management of wildfires.

Public lands in the western United States have become the subject of both national and regional debate concerning the proper use and long-term well-being of forests. Public concern for wildlife habitat, protection of wildlife species, recreation access, and other nonextractive use values associated with these lands has increased substantially since the 1960s, and the primacy of management for timber has become the subject of an increasing controversy and litigation, particularly with regard to federal forests (Wollendock 1988). At the heart of this debate are differing values and interests concerning the natural environment and the proper relationship of humans to their ecological surroundings. These views in turn may be connected to different conceptions about how the management of natural resources ought to be provided for (Steel 2002). The value changes entailing greater attention to "postmaterialist" needs are thought to have brought about changes in many types of personal attitudes - including those related to natural resources and the environment (Steger et al. 1989) (Steel 2002).

Individual value structures among citizens may represent "higher order" needs (quality of life) or may represent more fundamental subsistence needs (material

acquisition). The representation of these different values may reveal many types of personal attitudes, including those related to natural resources. These differing value orientations among individuals and groups may represent conflicting natural resource management paradigms. The former value orientations may advocate the anthropocentric belief that the management of federal forests ought to be directed toward the production of goods and services beneficial to humans. The latter paradigm has emerged more recently and grown rapidly in popularity in post industrial society. It has a biocentric view toward forest management that emphasizes maintaining intact all the elements of forest ecosystems (Steel 2002).

A majority of citizens in a national cross-section survey disagreed with the statement that "Plants and animals exist primarily for human use." in addition, a majority of respondents disagreed with the anthropocentric statement "Humankind was created to rule over the rest of nature." most striking is the strong support registered for the biocentric statements that "Humans have an ethical obligation to protect plant and animal species" and "Wildlife, plants, and humans have equal rights to live and develop on the earth." While one may take issue with the wording of the statements (Brechin and Kempton 1994) or question the commitment to support of behavior on the part of responding individuals (Dunlap, Grieneeks, and Rokeach 1983), they do indicate a very strong support for protection of nature in the National Public policy context. The same high level of support for environmental protection has been documented in a number of studies of the "New Environmental Paradigm" (NEP) conducted by Riley Dunlap and his associates in recent years (Dunlap 1992).

Linkages of attitudes, values, and complexity of thought have been considered in Tetlock's (1986) investigations of policy issues, and in Rokeach's (1973) research on value confrontations. Tetlock (1986) showed that people often relate social policy issues to values with conflicting implications for the issue. For example, the issue of whether more public parklands should be opened to mining and oil exploration in order to promote economic growth and prosperity might be related to valuing a world of beauty versus valuing a more comfortable and prosperous life. With value linkages of this type, Tetlock has maintained that an increase in an individual's complexity of thought occurs.

Conclusion

In the previous pages we have explored aspects of both the *what* and *how* of the human thought process. In the past, studies have often explored either one aspect of thought or the other. In this paper, we have chosen to explore both. Following are two research articles that have included the exploration of the interaction of integrative complexity (the *how*) and attitudes (the *what*). The first paper examines the connection between integratively complex thinking about wildfires and more specific characteristics of attitudes toward wildfire, more specifically, attitude – direction and attitude – extremity. The second paper examines the connection between values oriented toward wildfire and attitudes toward specific management actions, in a analysis of the value – attitude hierarchy, while examining the effect of the integrative complexity of thought about wildfire on the strength of associations represented by this hierarchy. Finally, a discussion of the combined results concludes this paper.

CHAPTER II. INTEGRATIVE COMPLEXITY AND ATTITUDES: A CASE STUDY OF WILDFIRE AND ITS MANAGEMENT

Introduction

Historically, natural resource managers throughout this country have made decisions based primarily on the physical and biological sciences. The public however has become increasingly interested and involved in how natural resources are managed. This increasing involvement has resulted in a growth of public interest regarding information from the social sciences as an aid to natural resource management. One primary reason this has occurred is that society is demanding a more balanced decision-making process due to the growth of a variety of recreational, ecological, historic, scientific, utilitarian, educational, and aesthetic values related to natural resources.

Considering the growing public interest in how natural resources are managed, a concern of natural resource managers is that the public participates in the decision-making process in an informed manner, as well as having an effective communication channel open with the public. One goal of effective communication is to increase public awareness about the nature of resource management issues. An important prerequisite to this goal is to understand not only the nature of public attitudes regarding these issues, but also the complexities of the public's thought processes.

Recent fire events throughout the United States have brought wildfire management to the public's attention. The devastating 2002 fires in Colorado garnered even more

attention when it was discovered that two of the major fires had been set by Forest Service employees. The annual drama of flames, ashes, and despair broadcast on prime time television and featured on the front pages of newspapers from the smallest weekly, to national circulation giants increases the salience of these events.

Studies that simply examine public perceptions of the issue might not address the diverse ways that people think about that issue. The purpose of this study was to examine the nature of people's thoughts about the role of wildfire in nature using a measure called "integrative complexity". Integrative complexity represents the intricacy of a person's thought processes in evaluating information and making decisions (Suedfeld, Tetlock, and Streufert 1992). Objectives were:

1. To obtain descriptions and justifications for respondents' attitudes, in an essay format, toward the role of wildfire in nature, and its management.
2. To apply an established method of coding for integrative complexity to the essays about wildfire and its management.
3. To determine the extent to which integratively complex thinking about wildfire and its management is related to two attitudinal components: attitude direction toward wildfire and attitude extremity toward wildfire.
4. To explore the relationship between sociodemographic factors and integrative complexity of thought toward wildfire

Theoretical Background

The primary theoretical constructs utilized in this study include integrative complexity of thought toward wildfire and characteristics of attitudes (direction and extremity) toward wildfire

Integrative Complexity

The measurement of integrative complexity was developed by cognitive psychologists and is based on two criteria: 1) The number of dimensions that people view related to an issue, and 2) how they integrate those dimensions. Integrative complexity has its focus on the structure of thought an individual has about an issue, not its content. Differentiation and integration (Streufert and Swezwy 1986) are the two factors measured when assessing integrative complexity. Differentiation describes whether or not a person acknowledges more than one dimension to a problem or issue. A person who sees an issue in black and white terms has little or no differentiation on that issue, while a person who acknowledges at least two dimensions to an issue shows differentiation in their thinking (Streufert and Swezwy 1986). Integration refers to the development of complex connections among the differentiated characteristics. This involves recognition that the issue is not simple and that there are trade-offs and interrelationships among the dimensions of an issue. Differentiation is a necessary but not sufficient condition for integration. A coding manual was developed by Baker-Brown et al. (1992) for scoring integrative complexity (described later) and is determined by assessing the level of differentiation and integration expressed.

Applications of integrative complexity. Integrative complexity has often applied to political and controversial issues. A majority of these studies have involved issues that have strong dichotomies. In a study related to natural resource issues, Bright and Wyche (1998) examined how coursework in environmental education affected college students' level of integrative complexity using written essays about the Endangered Species Act. Study findings indicated those who took coursework in environmental education had

more complex reasoning on the Endangered Species Act and related tradeoffs than those who had not.

A multitude of political issues have been the focus of early integrative complexity research. Tetlock (1981, 1989) identified the political affiliation of members of the United States Congress to determine if conservative members of Congress were more or less integratively complex on political issues than liberals. Other issues examined using the construct include the reasoning of members of the British House of Commons (Tetlock 1984), American versus Soviet foreign policy-makers (Tetlock 1985, 1988), Middle East leaders during the Persian Gulf Crisis (Suedfeld, Wallace, and Thachuk 1993), public attitudes toward nuclear weapons (Kristiansen and Matheson 1990), debates over slavery in the antebellum South (Tetlock, Armor, and Peterse, 1994), and arguments used by members of student political groups (Suedfeld et al. 1994).

Integrative Complexity, Attitudes, and Sociodemographics

Research on integrative complexity has focused on its connection to attitudes toward a specific object or behavior, such as supporting or opposing political decisions, or management issues. The study reported here examined individuals' attitudes toward wildfire and its management. We were interested in two characteristics of attitudes: attitude-direction and attitude-extremity. We also examined the connection between integrative complexity and sociodemographic factors.

Attitude – direction. One measure of an individual's attitude toward an object or behavior is the direction (positive or negative) of that evaluation. For example, do individuals believe that fire in forested areas is a good or bad thing? Tetlock (1983) proposed and upheld a hypothesis suggesting that conservative politicians are less

integratively complex than liberal politicians on policy issues. He further suggested that politicians to the right of the political spectrum were more rigid in their thinking about political issues than were liberal politicians. Subsequent research by Tetlock (1984) provided evidence that the difference in integrative complexity was a result of the majority/minority status of each political party. Finally, De Vries and Walker (1987) found no relationship between attitude – direction and complexity of thinking about capital punishment. Therefore, while different levels of integrative complexity can be identified, complex thinking does not appear to be related to the direction of one's position on that issue.

Attitude – extremity. In addition to direction, attitudes are held with varying levels of extremity. Individuals may feel extremely favorable or unfavorable toward wildfire (extreme attitudes), moderately favorable or unfavorable (moderate, or less extreme attitudes), or neither favorable nor unfavorable (the least extreme attitudes). Linville (1982) found that moderate attitudes toward an attitude object were characterized by more complex belief systems regarding that attitude object than were extreme attitudes. Similar results were found in a study of attitudes toward natural resource management issues (Bright and Manfreda 1992). It appears that different levels of integratively complex thinking about an issue may be related to the extremity with which one holds an attitude toward that issue.

Study Hypotheses

Based on the research that suggested no relationship exists between attitude – direction and integrative complexity (Dillon 1993, Tetlock 1984; de Vries and Walker 1987) we hypothesized that:

Hypothesis 1. There will be no relationship between the direction of one's attitude toward and integratively complex thought regarding wildfire.

Research has suggested that the extremity of attitudes influences the complexity of thought about an issue (Bright & Manfreda 1992; Linville 1982). We hypothesized that:

Hypothesis 2. Individuals with moderate attitudes toward wildfire will exhibit higher levels of integrative complexity than individuals with extreme attitudes toward the issue.

In addition to these hypotheses, we have included 4 research questions aimed at exploring potential relationships resting in the interaction of sociodemographics and integrative complexity. These were:

Research Question 1. What is the relationship between the integrative complexity of thought about wildfire and age?

Research Question 2. What is the relationship between the integrative complexity of thought about wildfire and sex?

Research Question 3. What is the relationship between the integrative complexity of thought about wildfire and education?

Research Question 4. What is the relationship between the integrative complexity of thought about wildfire and residence, defined as full time resident versus seasonal resident?

Methods

Sampling and Questionnaire Administration

A stratified random sample of 1000 homeowners was obtained from the County Records Offices of Cass County, and Brainerd County in Minnesota. Five hundred surveys were mailed per stratum. The survey administration was conducted using a

modified tailored design method (Dillman 2000) as follows: One week prior to survey administration, an introductory postcard was mailed explaining the purpose of the study. The main survey was then administered, with a follow-up reminder postcard sent with one week. Those who did not complete and return the questionnaire after the first mailing were sent a second questionnaire two weeks later.

Factor Measurement Information was obtained regarding how respondents thought about forest fire management. This information was obtained by asking survey recipients to respond to the following statement:

Recent fire events in forests and other natural areas throughout the United States have brought wildfire management to the attention of Americans. Some people think that fires are part of a natural process and should be allowed to burn. Others believe that forest managers should engage in activities that control fires.

Respondents were then given the following instructions:

Considering the above paragraph, please describe in the space below; your opinion on the issue of wildfire, its role in nature, its management, and why you feel that way.

This style of questioning was taken from previous studies designed to look at integrative complexity (Tetlock 1986). Respondents answered this question in essay format on the page provided in the questionnaire. Respondents were also given instructions allowing them to type a response and/or use additional paper if necessary. Further, survey questions were asked to determine respondent value orientations, preferred fire management techniques, and attitudes toward wildfire. Further survey questions were asked to determine respondent attitudes toward wildfire, as well as a

number of sociodemographic factors. Respondent attitudes toward wildfire were determined by asking individuals to score, on a 7 point scale, words paired "extremely" bad, harmful, and negative to "extremely" good, beneficial, positive. These three items were used to create an attitude toward wildfire index used for analysis.

Attitude extremity was measured by a "folding" technique introduced by Suchman (1950) and used by Bright (1998) in a study on attitudes toward forest management issues. The process of folding is done by collapsing the original 7 – point scale into a 0 to 3 measure where 7 and 1 (extreme scores) become a score of 3; 6 and 2 become a score of 2; 5 and 3 become a folded score of 1; and 4 (a raw score equaling "neutral) becomes a 0. This process then gives you a direction-neutral extremity index. Finally, sociodemographic questions regarding age (open ended), gender (male or female), education (high school and below versus some college, versus college degree and above), and residence (I am a full time year-round resident, My primary residence is elsewhere but I own a 2nd home in Itasca or Cass County Minnesota) were asked.

Analysis

Protocol for coding integrative complexity

Integrative complexity analysis was based on the responses to the essay question provided previously. The Conceptual/Integrative Complexity Scoring Manual (Baker-Brown et al. 1992) and exercises provided by Smith and Franz (1992) were used to train coders in assessing integrative complexity. Integrative complexity scores range from 1 through 7, with 1 representing the lowest level of integrative complexity and 7 representing the highest. For example, a person who expresses a viewpoint that suggests only one valid side to an argument would receive a low integrative complexity score (1).

that is, no differentiation exists and the individual sees the issue in black and white terms. With an integrative complexity score of 3, the respondent recognizes the validity of at least two viewpoints on the issue. Not only are the different viewpoints acknowledged, but also the respondent gives evidence that within each perspective there may be pluses and minuses. In other words, each viewpoint cannot be easily evaluated on a single dimension. A rating of 5 indicates not only the existence of multiple viewpoints (differentiation) but that there is a moderate level of awareness of interactions and tradeoffs among the alternatives (integration). A score of 7 indicates high levels of both differentiation and integration and suggests the inclusion of deeply held basic values related to the issue. Intermediate scores of 2, 4, and 6 can be assigned if coders have difficulty choosing between values of 1, 3, 5, or 7 for a passage. Scores of 0 were used to represent passages that were not codable for integrative complexity. The identification and deletion of unscorable statements prior to selecting the final sample ensure the efficient use of the coders' time. Examples of what might make an essay unscorable could be the use of quotations, providing simple descriptions rather than opinions, and scorer uncertainty (this occurs when scorers are 2 or more points apart and cannot reconcile the difference).

Prior to evaluating the responses, 10 essays were randomly selected and independently coded by the three researchers. The researchers compared codings and discussed how they were determined. For the final coding, researchers independently coded the remaining responses on the 1 – 7 integrative complexity scale. Once completed, researchers compared scores on each response. If the scores were within one

unit, the original scores stood. Differences of 2 or more were resolved by discussion. If no agreement was reached, the passage was dropped from the analysis.

Hypothesis Testing

Hypothesis 1 was tested using Pearson's bivariate correlation analysis examining the relationship between attitude direction (the 3 item index) and integrative complexity. Hypothesis 2 was examined through the use of a t-test. The dependent variable was integrative complexity, and the independent variable was attitude – extremity (2 levels: moderate, and high). To answer the additional research questions, t-tests examined the difference in integrative complexity across sex (males versus females) and residence (full-time residents versus seasonal residents). Pearson's bivariate correlation examined the relationship between integrative complexity and age while one-way analysis of variance examined integrative complexity across education level (high school and below versus some college, versus college degree and above).

Results

Description of the Respondents

Response rate Of the 1000 surveys mailed, 148 were nondeliverable. With a total of 852 delivered surveys, 339 usable surveys were returned resulting in a response rate of 40%. Nonresponse tests were not conducted due to time and costs. This was not deemed to be a serious drawback of the study since the purpose was not to generalize to a larger population, but rather to test theoretical relationships among social psychological constructs.

Respondent characteristics Most respondents were male (60%). The mean age of respondents was 58 years. The modal level of education was "some college" (23%).

About one-fourth (26%) had a high school education or less, and a majority (60%) of the respondents had a 4-year college degree or more. The respondents were fairly evenly divided between permanent residents (55%) and seasonal residents (45%) of Cass and Itasca Counties Minnesota.

Excluding uncodable responses, about 65% of the respondents had integrative complexity scores of 2.67 or less. The mean integrative complexity score was 2.43. Table 1 provides examples of passages receiving scores of 1 through 7 along with each coder's score.

Interrater Reliability Inter-rater reliability of the 3 coders was measured using Cronbach's alpha. Reliability was high at $\alpha = .97$. Tetlock, et al. (1992) suggested that coders are considered qualified when they reach a correlation of at least .80.

Hypothesis Testing

Below is a description of the results of analysis testing the study hypotheses. Results of all hypothesis testing are presented in Table 2.1.

Hypothesis 1 Hypothesis 1 stated that there would be no significant relationship between attitude direction and integrative complexity. Pearson's bivariate correlation was performed to explore the relationship between attitude direction and integrative complexity. Consistent with the findings of Bright et al. (2001), no significant relationship was found between attitude direction and integrative complexity ($r = .088$, $p = .130$). Hypothesis 1 was therefore accepted.

Hypothesis 2 Hypothesis 2 stated that individuals with moderate attitudes toward wildfire would exhibit higher levels of integrative complexity than individuals with extreme attitudes toward the issue.

T-tests were performed to examine the relationship between integrative complexity and attitude extremity. A significant relationship was found, again consistent with findings of Bright et al. (2001). The extreme attitudes group ($m = 2.66$) had a significantly lower integrative complexity score than did the moderate attitude group ($m = 3.41$; $t = 2.92$, $p = .004$). Hypothesis 2 was therefore accepted.

In addition to the hypothesis testing, research questions examined the relationship between sociodemographic factors and integrative complexity toward wildfire (Table 2.1).

Research Question 1 Research question 1 explored the relationship between integrative complexity and age. Pearson's correlation found no significant relationship between integrative complexity and age ($r = .023$, $p = .693$).

Research Question 2 Research question 2 examined the relationship between integrative complexity and sex. There was no significant difference in integrative complexity between male ($m = 3.01$) and female respondents ($m = 2.99$, $t = .106$, $p = .273$).

Research Question 3 Research question 3 explored the relationship between integrative complexity toward wildfire and education. One-way analysis of variance found no significant difference in integrative complexity among the "low education group" ($m = 3.267$), the "moderate education group" ($m = 2.823$), and the "high education group" ($m = 2.923$, $F = 1.01$, $p = .367$).

Research Question 4 Research question 4 examined the relationship between full-time and seasonal residents. T-tests found no significant difference on integrative

complexity scores between seasonal ($m = 3.15$) and full-time residents ($m = 2.93$, $t = 8.63$, $P = .346$).

Discussion

The low level of integratively complex thinking about wildfire found in this study was consistent with research on integrative complexity toward other issues. It has been suggested by Tetlock (1986) that people prefer integratively simple styles of reasoning. Tetlock noted that it is not unusual for 50% or more of the integrative complexity scores to be at the lowest value of the scale. Research in natural resources support the notion that the general public is not highly knowledgeable about these issues, a factor which has been hypothesized to be somewhat related to integrative complexity.

We found no significant difference in the integratively complex thinking between individuals with positive and negative attitudes. This is consistent with Dillon (1993; in a study of attitudes toward abortion), and de Vries and Walker (1987; in a study on attitudes toward nuclear weapons) who similarly found no differences between policy opponents in the complexity of their thought about these issues. Even Tetlock (1983), who originally suggest the rigidity – of – the – right hypothesis, suggested that the phenomenon might be due to minority/majority status of political parties rather than an inherent way of thinking about issues based on the direction of one's position.

The extremity with which individuals held their attitudes was related to integrative complexity. The highest level of integrative complexity toward wildfire was found for individuals whose attitude toward the issue were of low extremity. These findings make intuitive sense. Individuals with a non – extreme attitude toward an issue such wildfire and its management may hold that attitude because they recognize more than one side to

the issue, a notion supported by past research (Bright and Manfreda 1992; Linville 1982). It is reasonable to suspect that recognition of multiple sides to the same issue may result in more moderate issues. There were no significant relationships found between integrative complexity and the sociodemographics used in this study. This intuitively makes sense. Just because someone is more educated or in a different age group, there is no reason to suggest an individual should be more or less integratively complex.

It is important to note that this study experienced a relatively low response rate. One reason for the low response rate may be that many potential respondents found that writing an essay about wildfire and its management was either too difficult or time-consuming. This raises an important methodological question: What is the best way of obtaining appropriate data to measure this construct? Assessment of integrative complexity in this study presumed that respondents were willing to take the time to write adequate responses to an open-ended question on a mail-back questionnaire. Other methods of collecting data, such as personal interviews, may be more successful in revealing differences in integrative complexity. More highly controlled research should be conducted in order to better understand the concept of integrative complexity and how it can be used to enhance our understanding of public perceptions of natural resource and environmental issues.

Implications

The controversial and complex nature of the role wildfire and its management makes it important that researchers and managers acknowledge the extent to which people are able to understand the intricacy of those issues. Given the exploratory nature of this study, many of the implications focus on questions related to theoretical and

methodological concerns. One concern addresses the usefulness of the integrative complexity construct. Much of the research on public perceptions of natural resource issues focuses on attitudes, beliefs, and values – often as separate measures. Integrative complexity potentially takes into account the interrelationships among all three constructs. Therefore, an important research question is: How does a measure of integrative complexity enhance what we already know about public perceptions of a natural resource issue?

The level of sophistication (or complexity) behind one's attitude toward a natural resource issue has implications for the effectiveness of communication campaigns. Does integrative complexity influence the extent to which an individual searches for and elaborates on information about natural resource issues? What type of information do people with high levels of integrative complexity about an issue search for? Does the level of integrative complexity an individual has about a natural resource issue influence the extent to which the individual is influenced by information?

Measuring public attitudes toward an issue provides basic information about their perception of an issue, often with the purpose of assessing behavior related to that issue. Does integrative complexity about an issue mediate and/or moderate the often-studied relationship between attitudes and behavior? Is a person with high integrative complexity more or less likely to behave consistent with a general self-report measure of attitudes? Finally, as noted before, obtaining information suitable for integrative complexity assessment is clearly an important concern if valid and reliable information is to be obtained. Other methods for collecting open – ended responses may be more suitable for

understanding what an individual knows about an issue and how his or her knowledge and beliefs regarding the issue are integrated to form an overall position.

Table 2.1
Hypothesis and Research Question Testing

A. Study T-tests for Attitude Extremity, Sex, and Residence					
Group Label and Mean Score					
Mean Integrative Complexity Score by Attitude Extremity	Moderate 3.41	Extreme 2.66	t-value 2.92	P .004	
Mean Integrative Complexity Score by Sex	Male 3.01	Female 2.99	106	.273	
Mean Integrative Complexity Score by Residence	Resident 2.93	Seasonal 3.15	863	346	
B. Analysis of Variance for integrative Complexity by Educational Level					
Group Label and Mean Score					
Mean Integrative Complexity Score by Attitude Extremity	Up to High School Degree 3.267	Vocational Degree / Some College 2.823	4 Year Degree and higher 2.923	t-value 1.01	P .367
C. Pearson Correlations of Integrative Complexity X Attitude Direction and Age					
Mean Integrative Complexity Score by Attitude Direction				R .088	P .130
Mean Integrative Complexity Score by Age				.023	.693

CHAPTER III. VALUE ORIENTATIONS AND ATTITUDES TOWARD WILDFIRE MANAGEMENT: AN EXPLORATION OF INTEGRATIVE COMPLEXITY

Introduction

The combination of fire suppression, urban sprawl, and mitigation to rural areas has created an extensive wildland-urban interface where wildfire poses a serious threat to people, property, and resources (U.S. General Accounting Office 1999). Hazard reduction in such ecosystems is considered critical to reducing the likelihood of future catastrophic fires (USDA 2000) and has spawned several nationally prioritized initiatives to expand fuel treatment implementation and research. Fuel reduction relies on management practices such as prescribed fires, natural fire, and/or mechanical treatments. It is important for forest managers to understand public opinion regarding these and other issues related to fire management.

If public acceptability is to be an explicit objective of national forest management, the Forest Service will require methods to measure acceptability of current practices, predict acceptability of proposed practices, and understand the reasons for failures to achieve acceptability (Brunson in Kruger 1996). Several studies have addressed the question of how the public perceives the outcomes of prescribed fires (Gardner et al. 1985; Schindler and Reed 1996; Winter and Fried 2000) and mechanical thinning (Schindler and Reed

1996). Historically, the public has been unwilling to accept some management practices such as prescribed fire, possibly due to the potential for its negative impacts. Previous experiences with wildfire and land management agencies sometimes magnify fears of negative consequences (Fried et al. 1999).

Understanding how citizens perceive fire and specific fuel treatments is essential to land managers' success in negotiating mutually acceptable fire management plans (Manfredo et al. 1990; Litchman 1998). There are issues beyond simply understanding attitudes toward these issues. It may also be important to understand what drives those attitudes. For example, does the public trust the USFS to implement the correct management actions? Trusting those responsible for managing technology, especially in situations with a high hazard potential, is an important explanatory factor of risk perception and support for resource management policies (Wagner et al. 1998). Only half of the respondents in Schindler and Reed's study (1996) trust the Forest Service "To implement a responsible and effective prescribed fire program." while the rest were nearly evenly divided as not trusting the agency or been neutral on the issue. Their results showed that trust levels were slightly higher for mechanical thinning programs.

Fire management has been, and remains, a highly controversial issue that is intensely debated. Perhaps as a consequence of its relevance, attitudes toward fire management practices have not been skewed in any particular direction: Subject responses are evenly distributed (Winter 1990). The range afforded by attitudinal domains offers an appropriate opportunity to investigate the underlying structure of an attitude and its content manifestations. Beyond *what* people think (e.g., attitudes toward prescribed fire,

the expectation of freedom in decision-making), it is equally important to understand *how* people think about the issues.

In an attempt to understand the how of people's thinking about these issues, we have chosen to employ the use of integrative complexity. The integrative complexity construct is a descendant of Kelly's (1955) personal constructs theory. Because the emphasis of its work is on the structure of thought rather than its content, the closest relatives of integrative complexity are cognitive complexity (Bieri 1979) and cognitive structure (Scott, Osgood, and Peterson 1979). The direct line of development proceeds through conceptual systems (Harvey, Hunt, and Schroeder 1961), conceptual complexity (Schroeder et al., 1967), to integrative complexity (Suedfeld and Tetlock 1990).

Briefly, the successive versions of the theory focused on the complexity of information processing and decision making, complexity being defined and measured in terms of degrees of differentiation and integration (Streufert 1990). Differentiation refers to the perception of different dimensions within a stimulus domain, and to the taking of different perspectives when considering the domain. It is a necessary but not sufficient prerequisite for integration, which is the development of conceptual connections among differentiated dimensions or perspectives. Such connections are inferred from references to trade-offs between alternatives, a synthesis between them, and a reference to a higher-order concept that subsumes them (Suedfeld, Tetlock, and Streufert 1992).

Schroeder et al. (1967) claimed that attitudes are typically described in terms of the magnitude and direction of their contents. Cognitive structural processes however, should affect the way in which content is assimilated, organized, and expressed. That is, attitudes may be formed as a consequence of the differentiation and integration of dimensions of,

and perspectives on, information relevant to a particular domain. Within this complexity framework, conceptually simple attitudes are assumed to be based on a narrow range of highly salient information. Information that does not fit, or is discrepant with, the existing attitude is only minimally perceived and utilized or readily discounted and discarded. Hence, attitudes that are structurally simple are expected to be more categorical. The more complex the attitude however, the broader the range of information that is perceived as relevant. Tetlok (1993) has used the study of integrative complexity to explore the effects of accountability, political ideology, and value conflict on decision-making.

Values

Public lands in the western United States have become the subject of both national and regional debate concerning the proper use of and long-term well-being of forests and rangelands. Public concern for wildlife habitat, protection of fish species, wilderness preservation, recreational access, and other non extractive use values associated with these lands has increased substantially since the 1960's, and the primacy of management for timber and grazing has become the source of increased controversy and litigation, particularly with regard to federal forests (Wollendock 1980). Centering this debate are differing values and interests concerning the natural environment and the proper relationships of humans to their natural surroundings. These views in turn may be connected to conceptions about how the management of natural resources ought to be provided for in the contemporary forest setting.

The concept of values has been central to the study of human dimensions of natural resource management since the field's early development (King 1947). Values have been offered as a basis for explaining fundamental differences in people's attitudes

toward wildlife issues (Kellert 1976) and in making allocation decisions among competing uses of natural resources (Manfredo, Sneegee, Driver, and Bright 1989). Kellert (1980) refers to the term values as fundamental cognitions which serve as a foundation for attitudes and beliefs. Values are defined as fundamental, enduring beliefs or mental constructs that are used to evaluate the desirability of specific modes of conduct or the ends achieved through such conduct (Schwartz 1992). An understanding of values is important because values are the most fundamental concept within the hierarchy of factors that directs much of our volitional behavior (Rokeach 1973).

Fundamental values are the most central to one's cognitive structure; they are the fewest in number; and the most stable (Schwartz 1992). Fundamental values are not focused on specific objects or situations with which an individual has contact or experiences, rather they are more abstract cognitions that are concerned with desirable end states and modes of conduct. Values transcend specific situations and influence behaviors and attitudes across a broad array of experiences in life (Feather 1990). Values are thought to influence behavior through their impact on higher order beliefs and attitudes (Homer and Kahle 1988). The cognitive hierarchy structure is viewed as consisting of values, basic beliefs, attitudes, norms, behavioral intentions, and behaviors (Rokeach 1973, 1979). These cognitions are theorized to build upon one another, with values forming the foundation. In an attempt to explore these foundational values through an intermediate step by determining an individual's value orientations.

Value orientations are defined by the pattern of direction and intensity among a set of basic beliefs regarding a natural resource issue. Value orientations have also been defined as clusters of related fundamental values (Homer and Kahle 1988). These value

orientations provide consistency and organization among the broad spectrum of beliefs, attitudes, and behaviors regarding the natural resources. It has been suggested by Fulton et al. (1996) that wildlife value orientations are important because they are determinants of attitudes, which in turn may help explain patterns of human intentions toward behavior related to natural resources. The Fulton study suggested that value orientations toward wildlife explain a large portion of the variability among respondents attitudes toward natural resource issues. Value orientations should not be expected to be strong direct predictors of specific behaviors. Instead, value orientations are important because they may influence other cognitions (i.e., attitudes) that, in turn, directly influence behaviors. In the analysis for this study, we focused on the specific basic belief dimensions related to wildfire.

Environmental ideology In some research, value orientations have been studied by looking at an individual's environmental ideology. An environmental ideology is derived from an index score made up of questions pertaining to the orientation of an individual's fundamental values. The connection between fundamental values and attitudes toward environmental issues is the orientation of those values toward the environment. Environmental ideology represents that value orientation. Previous research supports the importance of environment and natural resource based value orientations in attitude prediction (Bright and Manfredi 1996; Bright, Manfredi and Fulton 2000; Burtz and Bright, 1998, Fulton, Manfredi, and Lipscomb 1996; Stern, Dietz, Kalof, and Guagnano 1995; Vaske and Donnelly 1999). Bright and Manfredi (1996) and Burtz and Bright (1998) found that the most important predictors of attitudes toward reintroducing wolves were the orientation of values (termed symbolic beliefs in their studies) related to the role

of wolves in society. While no research was identified that connected value orientations to the complexity of thought about environmental issues, the connection between complex thought and attitudes suggests that a similar link may exist between value orientations and integrative complexity. The New Environmental Paradigm (NEP) (Dunlap et al. 1992) is commonly used to measure the orientation of basic values to the environment. The NEP spans a continuum of beliefs that range from a concern about the earth to humans' dominance over nature. While traditionally viewed as uni-dimensional, the NEP may measure several dimensions of an environmental ideology (Bright and Barro 2000; Bright, Barro, and Burtz, in press; Kuhn and Jackson 1989; Noe and Snow 1990).

Recent research on value orientations have suggested that a majority of citizens in the national cross-sections survey disagreed with the statement that "Plants and animals exist primarily for human use." In addition, a majority of respondents (47.5%) disagreed with the anthropocentric statement "Humankind was created to rule over the rest of nature." Most striking the authors suggested was the strong support registered for biocentric statements that "Humans have an ethical obligation to protect plant and animal species" and "Wildlife, plants, and human have equal rights to live" (Steel and Brunson 1993). The same high level of support for environmental protection has been documented in a number of studies in the "New Environmental Paradigm" conducted by Riley Dunlap and his associates in recent years (Dunlap 1992). Questions used in this study were based off of the style of questioning used in the NEP scales, and adapted to forest management issues.

Goal and Objectives

The goal of this study was to examine the relationships among wildfire value orientations, integrative complexity, and the acceptability of specific fire management treatments. Objectives designed to address this goal are below.

Objective 1. To identify respondent's wildfire value orientations.

Objective 2. To measure acceptability of specific fire management treatments.

Objective 3. To determine the extent to which wildfire value orientations predict support for fire management treatments.

Objective 4. To determine the extent to which integrative complexity moderates the relationship between wildfire value orientations and fire management treatments.

Methods

Sampling and Questionnaire Administration A stratified random sample of 1000 homeowners was obtained from the county records offices of Cass County, and Brainerd County in Minnesota. Five hundred surveys were mailed per stratum. The survey administration was conducted following a modified tailored design method (Dillman 2000). One week prior to survey administration, an introductory postcard was mailed explaining the purpose of the study. The main survey was then administered, with a follow-up reminder postcard sent with one week. Those who did not complete and return the questionnaire after the first mailing were sent a second questionnaire two weeks later.

Factor Measurement Information was obtained regarding how respondents thought about forest fire management. This information was obtained by asking survey recipients to respond to the following statement:

Recent fire events in forests and other natural areas throughout the United States have brought wildfire management to the attention of Americans. Some people think that fires are part of a natural process and should be allowed to burn. Others believe that forest managers should engage in activities that control fires.

Respondents were then given the following instructions:

Considering the above paragraph, please describe in the space below; your opinion on the issue of wildfire, its role in nature, its management, and why you feel that way.

This style of questioning was taken from previous studies designed to look at integrative complexity (Tetlock 1986). Respondents answered this question in essay format on the page provided in the questionnaire. Respondents were also given instructions allowing them to type a response and/or use additional paper if necessary. Further, survey questions were asked to determine respondent value orientations, preferred fire management techniques, and attitudes toward wildfire.

After responding to the essay on wildfire, respondents were asked a series of 25 questions regarding their value orientations on five bipolar dimensions. The five value orientation dimensions were (a) Anthropocentric (b) Biocentric (c) Responsibility (d) Freedom, and (e) Artificial Management. These questions were on a seven-point scale that ranged from “strongly disagree” (1) to “strongly agree” (7) with a “neutral” (4) response option.

To determine respondents’ preferences for wildfire management, ten management techniques were identified and briefly described. Respondents were asked to respond on a seven-point scale whether each technique was “highly unacceptable” (1) to “highly

acceptable” (7). A “no opinion” (4) was provided as a neutral point. Table 1 provides the survey questions used.

Analysis

Respondent essay writings were coded for integrative complexity using The Conceptual/Integrative Complexity Scoring Manual (Baker-Brown et al. 1992). Integrative complexity is scored on a 1-7 scale. Scores of 1 indicate no evidence of either differentiation or integration. The author relies on one-dimensional, and evaluatively consistent rules for processing information. Scores of 3 indicate moderate or even high differentiation but no integration. The author relies on the least two distinct dimensions of judgment, but fails to consider possible conceptual connections between these dimensions. Scores of 5 indicate moderate to high differentiation and moderate integration. The author notes the existence of conceptual connections between differentiated dimensions of judgment. These integrative cognitions can take a variety of forms: The identification of a superordinate category linking two concepts, insights into shared attributes of different dimensions, the recognition of conflicting goals or value trade-offs, or the specification of interactive effects and causes of events. Scores of 7 indicate high differentiation and high integration. Here a general principle provides a conceptual framework for understanding specific interactions among differentiated dimensions. Scores of 2, 4, and 6 represent transitional levels in conceptual structure. Here the dimensions of differentiation and integration are implicit and emergent rather than explicit and fully articulated.

The identification and deletion of unscorable statements prior to selecting the final sample ensure is the efficient use of the coders time. Examples of what might make

an essay unscorable could be the use of quotations, providing simple descriptions rather than opinions, and scorer uncertainty (this occurs when scorers are 2 or more points apart and cannot reconcile the difference)

Prior to conducting analyses, respondents were placed in one of two categories, high and low integrative complexity. Following this, three sets of regression analyses were conducted. First, the acceptability of each fire management treatment was regressed on all wildfire basic belief dimensions for the entire sample, resulting in ten separate regressions. Then, the same ten regressions were run for the high integrative complexity group and the low integrative complexity group respectively.

Results

Description of the Respondents

Response rate Of the 1000 surveys mailed, 148 were nondeliverable. With a total of 852 delivered surveys, 339 usable surveys were returned resulting in a response rate of 40%. Nonresponse tests were not conducted due to time and costs. This was not deemed to be a serious drawback of the study since the purpose was not to generalize to a larger population, but rather to test theoretical relationships among social psychological constructs.

Respondent characteristics. Most respondents were male (60%). The mean age of respondents was 58 years. The modal level of education was "some college" (23%). About one-fourth (26%) had a high school education or less and majority (60%) of the respondents had a 4-year college degree or more. The respondents were fairly evenly divided between permanent residents (55%) and seasonal residents (45%).

Excluding uncodable responses, about 65% of the respondents had integrative complexity scores of 2.67 or less. The mean integrative complexity score was 2.43.

Interrater Reliability The three integrative complexity passage coders achieved an interrater reliability of 0.97. Tetlock, et al (1992) suggests that coders are considered qualified when they reach a correlation of at least 0.80.

Analysis of Study Objectives

Confirmatory Factor Analysis Prior to the primary study analysis confirmatory factor analysis, using Amos 4.0, was conducted on the wildfire basic belief dimensions in order to determine if the data were a good fit of the wildfire basic belief model used in this study. Table 3.2 presents the factor loadings for each item within its dimension and the results of tests of internal consistency. Goodness of fit indices from this analysis found the data to be a good fit of the model ($\chi^2/df = 2.30$; NFI = .973; CFI = .985). Cronbach's alphas supported the high internal consistency of the anthropocentric ($\alpha = .762$), biocentric ($\alpha = .860$), responsibility ($\alpha = .755$), and freedom ($\alpha = .775$) belief dimensions. Having only two items, the artificial management index was assessed for internal consistency using Pearson's correlation. The correlation between the two artificial management items was statistically significant ($r = .549$, $p < .001$) and deemed to be adequate for building the index.

Attitudes, Value Orientations, and Integrative Complexity Results of this section are presented in Table 3.3. Attitudes toward fire management actions were influenced to a greater degree by belief dimensions for the high integrative complexity group for all but one of the fire management actions (Table 3.1). Acceptability of prescribed burns were most strongly predicted by the artificial management value orientation ($r = -.373$). The

low integrative complexity group was more highly influenced ($r = -.341$) than was the high integrative complexity group ($r = -.203$). Acceptability of requiring homeowner defense was most strongly influenced by the freedom value orientation ($r = -.227$). The influence was greater for the high integrative complexity group ($r = -.299$) than the low integrative complexity group ($r = -.251$). Acceptability of clear cutting was more strongly predicted by the biocentric value orientation ($r = .139$). Again, this relationship was more strongly predicted by the high integrative complexity group ($r = .203$) than for the low integrative complexity group ($r = .153$). Acceptability of brush management was strongly influenced by both responsibility ($r = .206$) and artificial management ($r = .298$) value orientations. Acceptability of chemical treatment was significantly influenced by all of the value orientations except responsibility. Finally, acceptability of leaving the forest in a natural state was most highly influenced by artificial management value orientations ($r = .361$). The low integrative complexity group ($r = .319$) more strongly predicted this relationship than did the high integrative complexity group ($r = .160$).

Discussion

Tetlock (1986, 1989) has suggested that the integrative complexity of people's beliefs about social issues reflects the linkage of these issues to their underlying values. Thus, people tend to think about an issue in an integratively complex fashion to the extent that it activates values with conflicting implications for their attitude on the issue. For example, an individual high in integrative complexity might perceive his or her positive attitude about letting fires burn naturally enhances their biocentric value orientation, but diminishes another value orientation (e.g., anthropocentric) since there is little human utility from a burnt forest

We hypothesized that one's value orientations, being strongly value-based, may be related to integrative complexity. This was based on the notion that high levels of integrative complexity are characterized by the infusion of broad-based values applied to a specific issue (Baker-Brown et al. 1992). That value orientations did correspond to higher integrative complexity may suggest two things. Individuals who score higher on integrative complexity tend to use value related arguments when discussing their opinions. Second, these results may suggest that individuals who score more highly on integrative complexity rely on values more heavily to determine their attitudes.

This suggested relationship was potentially validated if we look at the value orientations influence on acceptability of certain management actions. For example, the freedom value orientation was most influential when considering the "require homeowner defense" management actions. Intuitively, this makes sense. We would expect a strong relationship between *requiring* homeowners to perform activities around their homes, and individuals valuing their freedom of choice. In another example, we see a significant relationship between the management action of prescribed fire and the value orientation of artificial management and leaving the forest in a natural state. Again, it would be reasonable to suspect this relationship if we consider that the value orientation toward artificial management would influence the acceptability of leaving a forest in a natural state or instituting a prescribed burn policy.

Implications

Quite often, research into the management of forested areas looks at attitudes toward the acceptability of management actions. While this information is important, it

ignores some components of the process that determines these attitudes. In finding that values play a role in the relationship in the acceptability of management actions, it may be prudent for managers and communicators to include discussion of values in these campaigns. For example, if certain management actions are being considered for a particular area, appealing to the corresponding influential value orientations to those stakeholders may be prudent. More research into this area is clearly warranted.

Research also suggests that levels of integrative complexity significantly affect an individual's decisions (Streufer 1989; Streufer and Swezey 1986; Tetlock and Boettger 1989). The finding that different levels of integrative complexity influenced the relationship between value orientations and acceptability of management actions may suggest that researchers should consider how to further the understanding of this relationship, and explore its application in behavioral and attitudinal modification.

**Table 3.1
Management Action Label and Description**

Label	Description
Prescribed Fire	Artificially ignite and burn trees (alive or dead and standing or fallen) and undergrowth (grass or shrubs) in a forest.
Public Fire Defense System	Modify or remove plants and trees from public property. This creates strips of public land that would have no forests or ground fuel that might ignite a fire.
Homeowner Fire Defense System	Require homeowners who live near a forest to modify or remove vegetation and trees from their property in order to decrease fire danger.
Clear-cutting	Remove the trees in a forested area, then planting trees to regenerate the forest.
Brush Management	Remove woody plants from a forest floor. This means restoring native plants by planting them or moving them from another area.
Chemical Treatment	Use herbicides to remove growth from the forest floor. It means spraying plants with chemicals that will kill them.
Mechanical Thinning	Remove some trees from the forest, leaving large mature trees standing, creating an open, widely dispersed forest.
Biological Thinning	Use grazing animals (cows, sheep, AI, etc) or insects to remove plants in a forest.
Natural Forests	DO NOT do any artificial wildfire actions in a forest.

Table 3.2
Results of Confirmatory Factor Analysis on Wildfire Basic Belief Dimensions

Belief Dimension / Survey Item	Factor Loading	Internal Consistency ²
Anthropocentric		$\alpha = .762$
The value of forests is only in the human mind; without people forests have no value.	.55	
The main value of forests is providing timber, grazing land, and minerals for people.	.66	
Forests are valuable only if they produce jobs and income.	.73	
Nature's main value is to provide commercial products.	.73	
Biocentric		$\alpha = .860$
Wildlife, plants, and people have equal rights to live.	.81	
Forests have as much right to exist as people.	.88	
Nature has as much right to exist as people.	.78	
Responsibility		$\alpha = .755$
Responsibility for protecting homes from wildfire lies primarily with the homeowner. ¹	.39	
When people build homes near forests, it is their own fault if their homes are damaged by wildfire. ¹	.44	
The government agency that manages the forest (for example, the U.S. Forest Service) is the most responsible for protecting homes, built near a forest, from wildfire.	.57	
When people build homes near forests, they have the right to expect their home will be protected from wildfire by the government agency managing the forest.	.66	
If a wildfire breaks out in a forest, the first priority of the government agency managing that forest is to make sure private property is not destroyed.	.69	
If a wildfire starts, the government agency that manages the forest should make sure private property is not destroyed.	.77	
Freedom		$\alpha = .775$
People should be allowed to build homes where they want, even in a high wildfire zone.	.58	
There should be laws against building homes in potential danger	.91	

from wildfires.¹

People should not be allowed to build homes near forests where their homes could be destroyed by wildfire.¹ .72

Artificial Management

r = .549

Prescribed fires are not really controllable, and therefore are NOT an appropriate forest management tool.¹ .62

Forest managers should not artificially manage natural processes like forest fire.¹ V41 .89

¹ These items were reverse – coded prior to analysis

² Internal consistencies were tested using Cronbach's α for scales with 3 or more items. Having 2 items, artificial management was assessed using Pearson's correlation, which in this case, was significant at $p < .001$ and deemed adequate for building the index.

Goodness of fit indices from structural equation analysis using Amos 4.0 found the data to be a good fit of the model ($\chi^2/df = 2.30$; NFI = .973; CFI = .985).

Table 3.3
Management Actions and Value Orientations by High and Low Integrative Complexity

Belief Dimensions		Prescribed Fire	Public Defense	Homeowner Defense	Clear Cutting	Brush Manage	Chemical Treat	Mechanical Thinning	Biological Thinning	Tree Pruning	Leave Natural
Anthropocentric	All	-.096	.042	.028	-.011	.018	-.222*	-.100	-.134	.009	-.117
	1	-.163	-.057	.080	-.234*	.054	-.396*	-.249*	-.185	-.172	.145
	2	-.101	.002	.048	-.079	.034	-.263*	-.146*	-.142*	-.039	.117*
Biocentric	All	-.064	.085	-.021	.139	-.031	.190*	.008	-.118	.077	.006
	1	.005	.124	.087	.203	-.029	.305*	-.003	.020	.350*	-.033
	2	-.036	.088	.011	.153*	-.027	.216*	.004	-.069	.163*	-.003
Responsibility	All	-.097	.079	.027	.053	.206*	.047	.000	.143*	.080	.064
	1	-.116	.061	-.001	.072	.249*	-.176	.160	.122	.190	-.196
	2	-.094	.075	.019	.066	.219*	-.049	.057	.148*	.131*	-.013
Freedom	All	.031	.052	-.227*	-.101	-.092	-.203*	-.120	-.005	-.134	-.030
	1	-.038	.053	-.299*	-.076	-.073	.194	-.094	-.085	-.161	-.121
	2	.003	.050	-.251*	-.092	-.089	-.131*	-.120*	-.035	-.151*	-.043
Artificial Management	All	-.373*	-.027	.121	-.013	-.298*	-.151*	-.104	.046	-.031	.361*
	1	-.203*	-.197	.121	-.032	.083	.004	-.028	.011	.089	.160
	2	-.341*	-.078	.122*	-.028	.009	-.116*	-.094	.028	-.016	.319*
R	All	.405	.121	.278	.175	.208	.384	.171	.202	.158	.389
	1	.307	.278	.383	.377	.257	.530	.334	.252	.516	.403
	2	.369	.146	.309	.222	.220	.401	.209	.206	.263	.367

CHAPTER IV. DISCUSSION AND IMPLICATIONS

A majority of research in human dimensions literature has been focused on the *what* of gathering information from the public. This research may only be looking at one component of the public thought process. By combining the *what* and *how* of public opinion, we sought address both components at once. Complexity theories are all concerned with the *how* of information processing and when viewed in a very limited light, complexity based approaches are not interested in *what* the information processed might be. The content of an attitude would not be of major interest but *how* an attitude is developed *is* of interest. The emphasis is on how information is processed.

We should also consider the effects of content where necessary. Without this information, we may only see the other half of the story. Understanding what specific attitudes are is of considerable significance. For example, without knowing whether the public's attitude is positive or negative toward proposed management actions, we have gained little information by only considering some aspects of decision-making quality. But, an emphasis on content alone is equally insufficient. Attitudinal content and decision-making content has been and continues to be studied extensively, but unfortunately in isolation. Content alone is being investigated by behavioral scientists of many orientations, by economists, sociologists, and even management scientists. In an attempt to address this issues, we have included the investigation of integrative complexity, attitudinal components, and value orientations in our study.

Findings in this study were consistent with previous research. Research studies by Bright and associates measured two components of attitudes. In the first, integrative complexity of perceptions about plant and wildlife species protection was measured. It was found that attitude direction was not related to integrative complexity. It was also found that attitude extremity. In a later study, integrative complexity of perceptions about the Endangered Species Act was measured, and again it was found that integrative complexity was not related to attitude direction, but was related to extremity. Findings in this study were consistent with both of the previous studies.

The use of integrative complexity is but one of many different ways in which we might study the how of information processing. Further, attitude direction and extremity, are but two of several attitudinal components. With the inclusion of value orientations, we have expanded the understanding of the relationship between attitudes, values, and integrative complexity. It may be prudent to include other components of human cognitive process, such as affect. It may be reasonable to suspect that as an individual becomes more emotionally attached to an issue, the more extreme their attitude may become and the individual may argue in a less complex manner. Research exploring these questions is clearly warranted.

These were also fairly small-scale studies in terms of sample size and number of variables measured. The use of integrative complexity on a larger scale may become too cumbersome. Cost effectiveness and a relatively low response rate are drawbacks to using integrative complexity. This raises the question of the usefulness of using integrative complexity to study public opinion. Though it may be very useful in studying small-scale issues and deepen understanding of thought related to these issues, it may be

necessary to explore the possibility of creating fixed-item questions from integrative complexity for use in public opinion studies. Again, research into this line of questioning is warranted.

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