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MAPPING IMPACTS OF EDUCATION FOR WILDERNESS MANAGEMENT PLANNING

A

THESIS

Presented to the Faculty

of the University of Alaska Fairbanks

in Partial Fulfillment of the Requirements

for the Degree of

DOCTOR OF PHILOSOPHY

By

Frederick Anthony Foster, M.Ed., B.A.

Fairbanks Alaska

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MAPPING IMPACTS OF EDUCATION

FOR WILDERNESS MANAGEMENT PLANNING

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ABSTRACT

Wilderness education is considered a key response to abate physical impacts caused by wilderness recreationists, but education's impacts upon the psychological values of wilderness are unknown. This investigation used a wilderness purism scale to measure how minimum impact instruction affects the intensity and quality of a student's wilderness experience and the relation of these expectations and preferences to appreciation, knowledge, and concern for the environment as a whole, i.e., environmental literacy. A wilderness purism scale, a spatial scale, and wilderness management scale measured how wilderness education affects recreationists' limits of unacceptability in wilderness conditions. Effects of wilderness education on multiple perceptions of wilderness specific to particular groups, are explained. Methods of how these can be collected, organized, and mapped using a GIS approach are demonstrated and techniques to build a wilderness experience typology are outlined. The investigation determined that environmental literacy is correlated with wilderness purism. Student's expectations and ethical perspectives toward wilderness became stronger following wilderness leadership education courses, specifically, their perceptions of wildness, experiential factors, and ethical perspectives of the wilderness experience. Educational programs increased respondents' wilderness perceptions and their desired spatial buffer distances from unacceptable conditions in wilderness. Distances from sights and sounds were found to be critical to wilderness recreationists' wilderness experience relating to sensing unacceptable conditions inside wilderness boundaries and "knowing" that unacceptable (human-made) conditions do not exist. Educators may use the findings to better design and assess their program's effectiveness. Results of the methodology could aid Limits of Acceptable Change (LAC) process for wilderness planning. Wilderness managers may use the protocol to plan for the maintenance of wilderness opportunities to meet increasing demands brought about by education. Management must be prepared to protect suitable conditions for this potentially growing population. If managers zone wilderness accordingly to wilderness purism groups, they can protect vast areas from bio/physical impacts by using the processes described in this study. It is a tool for managing wilderness areas for a range of wilderness experiences which will aid in insuring protection of wildlife, ecosystem integrity, and native biodiversity.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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CHAPTER ONE
INTRODUCTION

Overview and Framework of the Study

Overview

Wilderness areas worldwide are under pressure from both overseas and domestic recreational visitors. In the US, the pressure is exacerbated by paradoxical legislation. The Wilderness Act of 1964 (US Congress, 1964) mandates resource managers to administer wilderness "for the use and enjoyment of the people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character...." In an attempt to define physical and psychological conditions of wilderness, the act specifies "Wilderness is hereby recognized as an area where the earth and its community of life are untrammeled by man" ...and..."generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable, and has outstanding opportunities for solitude or a primitive and unconfined type of recreation." Human use is not only tolerable, but an integral part of the mandate. Yet human uses induce unavoidable impacts, to wilderness affecting wilderness values (Nash, 1982). This is the basis of management's problem. Management must protect the wilderness against the impacts of use. However, remedial actions must not affect the "wilderness experience."

The Wilderness Act permits limited "acceptable" change from the "pristine" with its use of terms such as "substantially," "primarily," and "generally" (Hendee, Stankey, and Lucas, 1990). This leaves land managers with a two-tiered dilemma: how to determine how much change is acceptable; when and how to intercede to preserve wildness and the wilderness experience.

There is general agreement about the value and the need for protection of wilderness. However, not everyone views wilderness the same way. Wilderness "purists" demand a total absence of any outside human influence, while many others accept, and indeed require, certain basic facilities. These perceptions of wilderness can be delineated and measured using scaling techniques (Kliskey, 1994). These scaling procedures can also measure change in attitudes. Therefore, it would be advantageous to understand factors which induce and enhance wilderness purism.

Land managers and outdoor recreation leaders believe that education is the key to limit recreation impacts to wilderness by changing recreationists' attitudes, ethical perspectives, and inducing appropriate behavior (Cockrell, 1991; Hampton and Cole, 1988; Hansen, 1989). The basic assumption inherent in applying the concept of perceptual environments to wilderness management are the existence of identifiable environmental images such as expectations of wildness, solitude, and remoteness. These images can be extrapolated, quantified, and mapped. This investigation evolved from a search to discover: a) how minimum impact instruction influences the intensity and quality of a student's wilderness experience; b) whether these perceptions relate to a greater appreciation, knowledge, concern for the environment as a whole, and initiate appropriate behaviors, i.e., environmental literacy; and c) how results can be applied for wilderness managers and planners. It will elucidate the effects of wilderness education on multiple perceptions of wilderness specific to particular groups, and show how these can be collected, organized, mapped using GIS, and used to form a wilderness experience typology

Wilderness education courses, with venues indoors or in the backcountry, and recreational trips were assessed for change in subjects' standards of wilderness purism. I then examined how this information might be used in wilderness planning and management.

This multi-dimensional study achieves five goals:

1. It identifies acceptable and unacceptable physical conditions of various people's perception of wilderness and ethics.
2. It determines if education and other experiences can have a positive affect on these perceptions.
3. It identifies the human influenced conditions and buffer distance from them necessary for a wilderness experience.
4. It spatially displays this "physical area" with Geographic Information Systems (GIS) imagery.
5. It determines if there is a positive relationship between wilderness purism and environmental literacy, including appropriate responsible behaviors.

The results of this study will provide natural resource managers with information to prepare wilderness management plans using the Limits of Acceptable Change (LAC) planning framework (Stankey, Cole, Lucas, Peterson, and Frissell, 1985). It will present a

procedure allowing managers to pro-actively protect a variety of levels of wildness and recreational development accommodating a range of satisfactory wilderness experiences, while insuring preservation of natural wilderness resources. It will also help educators better understand the relationship between wilderness skills, wilderness purism, and environmental literacy.

Wilderness Philosophy and Management

Henry David Thoreau's visionary statement "in wildness is the preservation of the world," offers great challenges for educators and resource managers (Thoreau, 1975). To some it is the abiotic and biotic interactions which are most critical to the planet's well-being; to others it is the intrinsic value of wilderness and it's component systems that must be preserved (Noss, 1990). In the United States the human centered values--experiential, psychological, and spiritual benefits of being in a wild area prevail (Nash, 1982). The Wilderness Act declared explicitly these experiential values must be maintained (US Congress, 1964).

Wilderness is a complex concept. While the physical and biological environs have a definite ecological reality, what makes that reality explicit are perceptions each individual who encounters wilderness (either physically or vicariously), brings to the area. The trapper from along Alaska's Noatak River might consider travel to Boundary Waters in Minnesota as a return to civilization, but to the vacationer from Chicago, it is indeed a wilderness adventure (Nash, 1982). Neither wilderness experiences nor physical wilderness are monoliths. Alaska's Brooks Range and Pennsylvania's Allegheny Islands differ greatly in size and physical characteristics. They subsequently attract recreational clientele with different expectations (Nash, 1979). This concept of "multiple perceptions of wilderness" suggests that a variety of experiences can be defined and managed to maximize user satisfaction while preserving ecosystems and minimizing user impacts (Kliskey, 1994). The measurement of perceptions involves a concept known as "purism" which is defined as "attitudes characterized by a high level of *expectations* of, and an acute *sensitivity* to variations in the quality of something." The term *wildernism*, used in this investigation, is a contraction of the term *wilderness* and *purism*, coined in 1968 by Hendee, Catton, Marlow, and Brockman in their classic study, *Wilderness Users in the Pacific Northwest-Their Characteristics, Values, and Management Preferences.*

American wildlands are protected by Congress within the National Wilderness Preservation System (NWPS). Traditionally, resource managers have tried to protect the

values of the wilderness resource and experience by defining the area's carrying capacity. They made estimates inventing a "magic number" of recreational use levels to limit negative impacts (Jubenville, Twight, and Becker, 1987). Restricting recreational activities and closing areas is not popular and not an "untrammelling" method of management.

Stankey et al. (1985) developed the LAC planning framework in search of a pro-active and quantitative approach to management. This planning approach is being adopted by many federal agencies for recreation areas. The LAC approach is supposed to define appropriate conditions and opportunities, called system outputs. To make the job possible, LAC calls for identifying and monitoring a few key wilderness value indicators. Stankey et al. suggested that the key indicators should relate to the amount and type of wilderness use, permit measurement in cost-effective ways at acceptable levels of accuracy, and be potentially responsive to managerial intervention. After indicators of wilderness "naturalness" and experiential qualities are identified, current inventories of the indicators are collected. Then the LAC process establishes acceptable levels or standards for these indicators. As an example, the definition of different "opportunity zones" within a wilderness is based upon varying standards across the selected indicators (Hendee, et al., 1990).

There are major problems implementing the LAC process because of the experiential reality wilderness hold for recreationists. The Wilderness Act defines appropriate indicators in a very general sense, and with the LAC process, wilderness managers retain the authority, responsibility, and accountability for decision making (Stankey, et al., 1985). Roggenbuck, Williams, and Watson (1993) claim that decisions the manager must make are largely value judgments. Current LAC applications recognize that these judgments can be made more defensible through public input from clientele groups who have knowledge and interest in the wilderness resource and wilderness experience (McCool, Ashor, and Stokes, 1985). Managers do not proactively plan for the variety of recreationists' perceptions of wilderness and their associated experiential values. Neither do they take into account the influence managerial actions have on recreationists' "acceptable" and "unacceptable" states of human influence in wilderness. Since managerial decisions are "value judgments," the environmental ethic guiding management is crucial in how well "wildness" is preserved (Hendee et al., 1990). Two contrasting philosophies are often used to characterize perspectives of wilderness stewardship: anthropocentric and biocentric. An anthropocentric philosophy" sees

wilderness primarily from a human-oriented perspective" as opposed to the biocentric philosophy or ethic which emphasizes the "maintenance of natural systems at the expense of recreational and other human uses" (Hendee, et al., 1990). "The important distinction between these philosophies," according to Hendee, Stankey, and Lucas (p. 18), "is the extent to which the human benefits of wilderness are seen as dependent on the natural integrity of the wilderness setting."

Wilderness protection is based on an anthropocentric perspective and because of objectives identified by the Wilderness Act: sustaining a "natural setting" and providing a special wilderness experience involving "outstanding opportunities for solitude or a primitive and unconfined type of recreation" (US Congress, 1964). Both the legislative motive and stated value of wilderness preservation is recreation--"human use and enjoyment" (H. Bader, personal communication, September, 1994). "According to the law," argued Bader, "all wilderness managerial policy and decisions *must* focus on providing experiential opportunities for recreationists not simply on protecting wildlife, ecosystems, or community types." Only through recreationist's expectations and desires, guided by their wilderness ethic, can managerial policy be directed to preserve natural ecosystems.

Wilderness managers are optimistic that wilderness education can lessen ecological impacts if recreationists follow what is called "minimum impact" or "Leave-No-Trace Outdoor Skills and Ethics" (Hampton and Cole, 1988; Hansen, 1989; Hendee, et al., 1990). The goal of such programs is for students to learn and practice decision making skills in conjunction with an expanded wildlands ethic, thus promoting appropriate behavioral changes. This investigation explored the effects of wilderness education on multiple perceptions of wilderness, specific to particular groups. It organized wilderness purism groups in Wildernism species; delineated acceptable physical buffer distance to and from facilities and access for each group (sense of space); compared these distances for change following education treatments; and mapped these "habitats" in a wilderness area using GIS.

Problem Statement

The 1964 Wilderness Act permits considerable diversity in amounts of use and styles of use within the boundaries of the various areas of the National Wilderness Preservation System (NWPS). Management must understand and assess recreationist's expectations and requirements if it desires to preserve natural ecosystems and native

biodiversity (Hendee et al. 1990; H. Bader, personal communication, September, 1993). Managers have found that defining wilderness and the wilderness experience is a difficult task because of varying degrees of wilderness and many types of wilderness users (Nash, 1978). This dilemma drives five subsequent issues: a) how to quantify various values *for* and perceptions *of* the wilderness experience; b) how to quantify various public' requisite conditions for wilderness experiences; c) how to address management's mitigation measures which may deteriorate naturalness and wildness, which displaces some recreationists and attracts others; d) how to determine the effects wildland ethics education has upon the publics' values *for* and perceptions *of* wilderness; and e) how to apply multiple perceptions of wilderness for wilderness management and planning.

1. Wilderness and its associated values appear impossible to identify and measure for statistically significant impacts. The "natural setting" and the "wilderness experience" aspects referred to in the Wilderness Act are based on recreationists' perceptions and expectations (Nash, 1982).

2. Quantifying and validating the requisites and use patterns of active wilderness recreationists and vicarious visitors is extremely complex and time consuming (Jubenville, Twight, Cotgrove, and Pendergrast, 1994).

3. Land managers perceive wilderness priorities and associated problems differently than do recreationists (Clark and Kozacek, 1997; Hendee and Harris, 1970; Hendee et al. 1990). Most mitigation measures chosen by agencies are both biologically and psychologically detrimental to wilderness experiences (Foreman, 1991; Noss, 1990). Some recreationists permanently displaced; naturalness and "wildness" may be lost forever (Nash, 1982; Noss, 1991).

4. There is a paucity of research on effectiveness of wilderness education. It is assumed wilderness education will instill an outdoor ethical perspective and appropriate wilderness behaviors (Hendee, et al. 1990). Wilderness values, ethical perspectives, and purism have been shown to be closely correlated by Manning (1996). Education may actually alter recreationists' requisite wilderness conditions. Conditions that are required by the "purist" may not be the current priority of management (Noss, 1990). Researchers concluded that in light of the objectives of the Wilderness Act, "the judicious application

of a biocentric ethical perspective is the most appropriate management of the NWPS" (Hendee, et al., 1990). The effects of such programs upon student's purism acceptability of managerial strategies has not been investigated.

5. Proposals have been made for a wildemess classification system or typology in order to protect an area's naturalness and solitude. A typology would allow for wilderness areas to be managed for specific user types and expectations (Foreman, 1991; Hardin, 1969; Marshall, 1935; Nash, 1981; Sax, 1980; Jubenville and Workman, 1993. A typology would not be adopted without a statistically reliable technique which can accurately determine recreationists' perceptions towards wilderness conditions and ethics (R. Nash, personal communications, September, 1993). If validated, it could fill the gaps in the Limits of Acceptable Change planning framework.

The Research Questions

This investigation evolved from the recognition of the aforementioned managerial dilemmas, especially with the legal weight recreation holds in wilderness preservation. The reality of wilderness lies in the expectations and experience a person encounters in wilderness. The wilderness experience is a "feeling about the place, part of the geography of the mind"; it is a multi-dimensional "state of mind" more than it is physical reality (Nash, 1979). The purpose of this study was to increase understanding of wilderness perception; explain how perceptions might be affected by education programs, and explore a method of application for management and planning. The three questions that guided this research were:

1. What are the dimensions of the "wilderness experience" and wilderness purism (wildernism); how can they be described in ways that yield indicators of limits of unacceptable change in wilderness?

2. How are these indicators affected by wilderness educational experiences?

3. How can these findings be applied to aid wilderness management and planning?

Present Study

Definition of Terms

The following terms are defined since they are mentioned, both directly and indirectly, throughout this study.

1. **anthropocentric ethical perspective**: Wilderness is viewed from a sociological or human-oriented perspective; the naturalness of the wilderness is less important than maximizing direct human use (Hendee, et al., 1990).

2. **biocentric ethical perspective**: The maintenance of natural systems and native biodiversity (primeval wilderness) is emphasized, if necessary at the expense of recreational and other human uses (Hendee, et al., 1990). A biocentric perspective implies bestowing merit in the intrinsic values of wilderness and its systems. Note: the term ecocentric has been used interchangeably with biocentric. At other times biocentric will relate to only living organisms reserving ecocentric to encompass both biotic and abiotic systems. This investigation uses the broader definition.

3. **empowerment**: A feeling of ownership in the decision making process and an internal locus of control where an individual has a feeling that she/he can make changes and help resolve important environmental issues.

4. **environmental education**: A process aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of problems and the process to solve them, and motivated to work toward solutions (Stapp, 1969).

5. **environmental literacy**: Possession of a certain knowledge of natural systems and place(s), sensitivity and respect for the Earth and all its components, a deep stewardship value, knowledge of and ability to identify and analyze environmental problems and issues, knowledge of and ability to apply and evaluate action strategies seeking to influence the outcomes of environmental problems and issues; common sense and willingness to take thoughtful action to correct "environmental imbalances" (Roth, 1991; Wilke, 1993).

6. **land ethic**: A value position originally developed by Aldo Leopold; it depends upon an understanding of the science of ecology and the relationships among the parts of ecosystems. It also incorporates the belief that human beings are just one part of a larger earth community of plants, animals, water, soils, collectively called "the land." See definition Number 2, "biocentric ethical perspective."

7. **Leave No Trace Outdoor Skills and Ethics (LNT)**: A formalized wildland ethics education program (see definition Number 23, "wildland ethics") which promotes responsible use of wilderness. LNT Inc. is a partnership of four federal agencies (USDA Forest Service, USDI Bureau of Land Management, USDI. Fish and Wildlife Service, and USDI National Park Service) and the National Outdoor Leadership School (NOLS).

8. **pristine wilderness**: A place where the original and potential vegetation, fauna and ecosystems are intact and in full interaction and land forms are entirely the result of non human forces, i.e. native biodiversity; primeval, and remote; no sign of human impact or modern technology (Snyder, 1995).

9. **purism**: Attitudes characterized by a high level of expectations of, and an acute sensitivity to, variations in the quality of something (see definition Number 19, "wildernism."

10. **sense of place**: A significant personal relationship to a community or to a biophysical milieu. This attachment is a result of various factors: emotional, cognitive, social, cultural, and behavioral (Pruneau and Chouinard, 1996).

11. **Sense of Space habitats**: Coveted spatial perceptual requirements related to Wildernism Species' wilderness experience. Distances to and from human-made features and managerial or recreationally impacted conditions were determined by self-reported sampling of recreationists with the Sense of Space Scale. Minimum and maximum buffer distances were converted to coverages for Global Information Systems (GIS) mapping.

12. **wilderness (legal)**: Refers to congressionally designated wilderness areas as part of the National Wilderness Preservation system. "A wilderness, in contrast with

those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain" (US Congress, 1964; US Congress, 1974; US Congress, 1980). See definition Number 22, *wildlands*.

13. **wilderness education**: The process designed to teach sensitivity towards wildlands, knowledge of basic ecological understandings related to human impacts to the land and other recreationists, with appropriate outdoor travel, camping, and survival skills necessary for ethical and safe judgment, decision making, and behaviors.

14. **Wilderness Education Association (WEA)**: A nonprofit membership organization dedicated to promoting the educated use and conservation of wilderness lands; their goal is "to provide students with the training and experience necessary to lead safe and enjoyable wilderness expeditions while developing leadership qualities and learning the ethics to minimize impact on the resource" (Cockrell, 1991). Two WEA courses were sampled in this study: National Standard Program (NSP), a field oriented college course with a 21 to 30 day expedition; and Wilderness Stewardship Program (WSP), an introductory college course with a 10 day field expedition.

15. **wilderness experience**: "A state of mind, a feeling about a place, part of the geography of the mind"; may include, but not limited to all or any of the following values: connection with nature, education and personal growth, freedom, solitude, spiritual, aesthetic, challenges, remoteness, sanctuary, primeval, natural (Nash, 1982).

16. **wilderness experience properties**: A combination of indicators that best reflect the quality of the wilderness condition or wilderness experience (Stankey, et al., 1985); can be used within the Limits of Acceptable Change (LAC) planning framework. They incorporate the multi-dimensionality of wilderness experience through examining the variation contained in recreationist ratings of purism indicator items through principal components factor analysis (Roggenbuck, Williams, and Watson, 1993). In this study different perception levels of the wilderness experience are defined in terms of these wilderness experience properties: a) wildness (self-reliance/naturalness vs. recreational aids); b) economic developments; c) experiential (remoteness and solitude) d) ethical perspective; and e) ANILCA perspective i.e., indicators relating to accepted concessions

allowed in Alaskan wilderness areas by the Alaska National Interest Lands Conservation Act of 1980 (US Congress, 1980).

17. **wilderness leadership education**: Programs designed to develop wilderness guides and instructors with appropriate skills and behaviors to be effective role models through wilderness education processes. Aim is to promote the professionalization of outdoor leadership and to thereby improve the safety of outdoor trips and enhance the conservation of the wild outdoors and wilderness experiences of others (Cockrell, 1991).

18. **Wilderness Management Acceptance Standards**: Total score from the Wilderness Management Scale, a tool that measures respondents' acceptance of wilderness management strategies. Acceptance Standards are attained for both ideal and realistic preferences of respondents.

19. **wildernism**: A contraction of "wilderness" and "purist" first used by Hendee, et al., in 1968. The term *Wildernist* is a wilderness purist, used in this investigation as the most "purist" group of wilderness users on a wilderness perception typology.

20. **Wildernism Species**: Identified wildernism groups categorized by the variation or gradient of perception levels they portray. Based on wilderness recreationists' measured attitudes toward the desirability or undesirability of how various activities, facilities, and experiential indicator items fit into what they consider to be a wilderness setting. The four Wildernism Species identified in this study, from weak purist to strong purist were: *Camper, Backpacker, Mountaineer,* and *Wildernist.*

21. **Wildernism Standards**: Total score from the Wildernism Scale, a technique used to isolate recreationists' expectations, tastes, and philosophies and categorize into like-groups or "species" with specific coveted preferences related to their wilderness experience (see definition Number 19, *wildernism*).

22. **wildlands**: The concept of de facto wilderness, wild areas, and wild places. What each visitor perceives as a place where human's impact is minimal. Areas which generally appear to be primarily affected by nature with man's imprint substantially unnoticeable. A place where expectations of wilderness values can be met.

23. **wildland ethics education**: Process to empower outdoor users to develop guidelines for governing outdoor behavior, guiding and decision-making, that values acting to sustain and nurture the natural world, acting responsibly toward the outdoor activity in which they are engaged and acting with consideration for other outdoor recreationists. Leave No Trace (LNT) is a formalized program of wildland ethics education.

Theoretical Framework: Assessment of Purism and Ethical Perspective

Research in three areas provide the theoretical framework for this study. First, emerging theories in wilderness management predict that there are distinct differences between wilderness recreationists' preferences, expectations, and ethical perspectives, and that these can be measured with a wilderness purism measurement tool (Cole, 1996a; Gilbert, Peterson, and Lime, 1972; Hendee, et al., 1968; Jaakson and Shin, 1992; Kliskey, 1994; Lucas, 1985; Manning and Valliere, 1996; Marshall, 1935; Nash, 1982; Roggenbuck and Lucas, 1987; Shafer and Hammitt, 1995; Stankey, 1973; Warren, 1985; Young, 1983; Young and Crandall, 1984). Second, the results of wilderness purism research indicates a belief that wilderness purism is a fairly constant and stabile measure; this has not been determined. Third, theories in environmental education predict responsible environmental behavior can be taught and wildland ethics can be developed (Cockrell, 1991; Hungerford and Volk, 1990). These three theories are reviewed below.

1. There are distinct differences between wilderness recreationists' preferences, expectations, and ethical perspectives, and these can be measured with a wilderness purism measurement scale. Hendee et al. (1990) claim that an understanding of the diversity of recreationists' expectations and philosophies is essential (p.20). They contend a better understanding "would ensure that people who prefer a wild and pristine setting would not be displaced in favor of users whose tastes can be met in many other locations." In order to accomplish this, managers must be able to recognize recreational use patterns in wilderness. They must be able to monitor them to protect wilderness values (Clark and Stankey, 1979; Cole, 1996b; Driver and Brown, 1978; Hendee, et al., 1990). They must understand the cause and effect relationships between their managerial programming and the resulting recreational use patterns (Jubenville, et al. 1994).

The notion of multiple perceptions of wilderness and classifying recreationists based on wilderness purism is an approach to accomplish these tasks. Researchers have

used a form of a "wilderness purism scale" to better understand wilderness users. The wilderness scale is a valid indicator for appraisal of wilderness recreationists' attitudes, desired activities, ethics and differences in perceptions and expectations (Hammitt, 1982; Hendee, et al., 1968; Jaakson and Shin, 1992; Kliskey 1994; Manning and Valliere, 1996; Shafer and Hammitt, 1995; Stankey, 1973; Warren, 1985; Young and Crandall, 1984). A wilderness purism scale can isolate different user-preference groups of wilderness recreationists by means of calculating variations in their acceptable standards and expectations. Since wilderness purism is strongly related to wilderness values and ethical perspective, it can provide insight into many of the concerns land managers have regarding recreational use of wilderness areas (Manning and Valliere. The purism instrument can enable researchers and managers to: a) identify recreationists' attitudes and expectations towards wilderness conditions; b) predict recreationists' resource choices and use patterns; c) anticipate recreationists' perceptions toward managerial programs; d) identify recreationists' individual ethical perspective toward wilderness; and e) distinguish the decision factors to which recreationists' are responding (Clark & Kozacek, 1997; Jubenville, et al., 1994; Manning & Valliere). If the indicator items can be organized to represent the diversity of wilderness attributes and conditions, then the multi-dimensionality of the wilderness experience for a range of recreationists can be identified and preserved (Roggenbuck, et al., 1993).

2. There have been no studies indicating whether wilderness purism is a constant and stabile measure. Research and intuition suggest there is a relationship between the amount of outdoor wildland experience and desire for demanding and primitive experiences. This would indicate purism level changes (Krutilla, 1967). An investigation by Cole (1996) reviewed studies of wilderness recreation use trends from 1965 through 1994 revealing something different; purism appears to be a constant. A replication of recreationist surveys taken from three wilderness areas over a thirty-year period demonstrated "wilderness visitors of today, the trips they take, and their management preferences are not much different from those of a decade or two ago." There was a decline in purist attitudes regarding trail maintenance. Cole stated that support for high-standard trails, for building bridges over creeks (to keep from getting feet wet), and to keep trails clear of hazards and obstacles actually increased. His findings suggests current wildland recreationists are less purist and have a more anthropocentric ethical perspective towards wilderness conditions than recreationists to the same area thirty-years earlier.

This assumes the original recreationists were not displaced by "less purist" ones when the data were compiled.

3. Educational process designed to develop responsible environmental behavior and teach wildland ethical perspectives is based on research in the field of environmental education. Environmental literacy, characterized by responsible environmental behavior and ethical perspectives, has long been recognized as the ultimate goal of environmental education (Hungerford and Peyton, 1976; Roth, 1970; Sia, Hungerford, and Tomera, 1984; Stapp, 1970). If wilderness education courses and wildland ethics programs maintain the components of environmental education, and they are effective, changes in understanding, attitudes, skills and behavior should be predictable.

Hendee et al. (1990) maintained that if more recreationists would apply biocentric ethical practices it would minimize ecological changes and limit the growth of inappropriate kinds of use and impacts (20). An important objective of wilderness education courses is cultivation of responsible wilderness behavior and wildland ethics in outdoor leadership students (Cockrell and Detzel, 1985). Promoters of Leave-No-Trace Outdoor Ethics (LNT) wilderness education programs such as Cockrell (1991) from Wilderness Education Association (WEA), Hampton (1988) from National Outdoor Leadership Schools (NOLS) and Leave No Trace Inc. believe the techniques used in their programs will develop biocentric ethics. They feel that this will be accomplished through gaining an appreciation and connection for wild places along with ownership in the decision-making process. WEA and NOLS advocate that students will obtain and transfer appropriate wildland ethical perspectives and behaviors to other wilderness areas through minimum-impact instructional techniques which insure ownership of appropriate decision-making skills. They concluded that these skills and behaviors will ultimately "metamorphose" to an appreciation for all natural resources and an awareness of the interconnectedness of life forms on the planet (Cockrell and Detzel; Hampton and Cole, 1988; Monz, Henderson, and Brame, 1994).

Methods

This investigation's analysis is in three parts, based on the research questions. The first question regarding dimensions of wilderness experience, is addressed in Part One in which the multi-dimensions of the wilderness experience are identified and assessed with three perception scales. Then respondents are grouped according to their Wildernism

Standards. The second question is addressed in Part Two by testing the hypotheses that a wilderness education experience will make a significant positive change in indicators of the wilderness experience. The third question is addressed in Part Three. A geospatial application employs the results from Part Two. A Wildernism Typology is developed with results of the three perception scales.

Survey-Tests and Sampling

Five treatment-groups were selected and each was: a) survey-tested, b) exposed to one of the five treatments, and c) surveyed-tested again. The choice of the five treatments was an attempt to cover a spectrum of variables currently used to increase the public's appreciation and understanding of recreational impacts to wilderness (i.e., wilderness education experience). Five treatment groups completed the survey-test (N = 111).

1. *National Standard Program* (NSP) treatment-group consisted of students who completed a month-long WEA course (n = 33);

2. *Wilderness Steward Program* (WSP) treatment-group consisted of students who completed WEA's shorter 10-15 day courses (n = 22).

3. *Recreation Trip* (RT) treatment-group consisted of individuals who participated in a week-long guided recreational/non-instructional wilderness trip either in Alaska or California (n = 9).

4. *College Course* (CC) treatment-group consisted of students who were enrolled in Natural Resource Management classroom courses at the University of Alaska Fairbanks (n = 36);

5. *Non-Participants* (NP) consisted of individuals who showed an interest in but did not participate in a WEA wilderness leadership education course but because of factors beyond their control, could not participate (n = 11).

Part One: Defining the Wilderness Experience

First, the multi-dimensions of the wilderness experience were defined. This was accomplished in six steps.

1. Define wilderness experience properties. A principal component factor analysis was carried out on the 33 items of the Wildernism Scale in order to determine the various

dimensions of respondents' wilderness experience. These were assessed by comparing the three identified properties with those identified from previous research.

• Hypothesis One: There is a positive correlation between wilderness experience properties and properties identified by: a) Kliskey (1994), b) Jaakson and Shinn (1992); and c) Clark and Kozacek (1997).

2. Group respondents (into four Wildernism Species) based on Wildernism Standards and verify results. This was accomplished by: a) minimizing variability within clusters, b) maximizing variability between clusters, and c) comparing differences between groups.

• Hypothesis Two. a) Wildernism Standards can be grouped into four clusters; b) the four groups have different means.

3. Examine the validity of the Sense of Space Scale by assessing if the Sense of Space distances, which were identified by each subject, were representative of their Wildernism Specie grouping. Comparison of Sense of Place distances with Wildernism Specie classifications to determine if distances for each spatial indicator are aligned to the appropriate specie.

• Hypothesis Three: Sense of Space buffer distance for each Sense of Space indicator are not the same for the four Wildernism Species.

4. Compare Wildernism Standards with Environmental Literacy Scores. Examine whether there is a correlation between Wildernism Standards and environmental literacy and behavior.

• Hypothesis Four: There is a positive correlation between Wildernism Standards and Environmental Literacy scores.

5. Compare Wildernism Standards with Wilderness Management Scores in order to validate both scales, accomplished by comparing the Wildernism Standards with Wilderness Management Scale. Examine to determine if a correlation exists between Wildernism Standards and a Wilderness Management strategy typology.

• Hypotheses Five: a) There is a positive correlation between the Wildernism Specie and Wilderness Management Scale preferences; b) There is a significant difference between means of Wildernism Species' Wilderness Management Scores.

6. Compare Wildernism Standards and Environmental Literacy with respondents' background-personal data. Examine to determine if a correlation exists between these variables.

• Hypothesis Six: There is a positive correlation between Wildernism Specie and: a) years experience; b) wilderness skills.

Part Two: The Impacts of Wilderness Education

A goal of this study was to determine if wilderness education had an affect upon respondents' perception of wilderness and the experience they seek. The independent variables tested under the following hypotheses included participation in the following treatment-groups: a) National Standard Program (WEA course), b) Wilderness Stewardship Program (WEA course), c) Recreation wilderness trip, d) College course, e) Non-Participant. The dependent variables tested under the hypothesis were: a) Wildernism Standards, b) five wilderness experience properties, c) Wildernism Species, d) Sense of Space Scale scores, e) Wilderness Management Scale scores.

• Hypothesis Seven: Subject's pre-treatment and post-treatment wilderness perception scores will be higher following treatment.

Part Three: Application

Two applications were employed to produce a Wildernism Mapping Typology. First, the impacts of wilderness education on respondents' purism scores were displayed using Geological Information System (GIS) software following a process known as Wilderness Perception Mapping (WPM) pioneered by Kliskey (1994) in New Zealand. The Sense of Space habitats identified by each Wildernism Specie were examined and displayed as polygons on maps in the context of Kliskey's case-study area, the North West Nelson Ecological Region on New Zealand's South Island. Then, the validated Wilderness Management Scale was aligned with corresponding Wildernism Species' required wilderness conditions and Sense of Space responses. The Wildernism Typology is structured with four defined segments representing a) Wildernism Species, b) wilderness opportunities, c) buffering distances, and d) management strategies.

Significance

With the Wildernism Mapping Typology protocols wilderness areas are classified in order to maintain their specific wilderness qualities and opportunities for all

recreationists' needs. It is a tool for managing wilderness areas for a range of wilderness experiences which will aid in insuring protection of wildlife, ecosystem integrity, and natural biodiversity. It also provides data to help educators design effective environmental education programs. This will be accomplished because:

1. It identifies the acceptable and unacceptable physical conditions of various people's perception of wilderness and ethics.
2. It determines if education and other experiences can have a positive affect on these perceptions.
3. It identifies critical distances to or from human-made features and managerial or recreationally impacted conditions.
4. It spatially displays what recreationists consider acceptable and unacceptable physical conditions required to have a favorable wilderness experience.
5. It produces a means for incorporating recreationists' perceptions of wilderness within the management process.
6. Wilderness agencies can use experiential wilderness values to protect the physical and biological components, and ecological processes of wilderness.
7. It determines whether wilderness purism is correlated with environmental literacy, biocentric ethics.

Limitations Of The Study

The sample of treatment-groups were incidental self-selected subjects in that they primarily were college-age students interested in wilderness leadership, resource management or environmental education (N =111). Some of the treatment-group sample sizes were small. This made the multiple comparison of effects of treatment impossible. Since this study was designed to investigate trends toward change in wilderness purism and ethics, it was not necessary to replicate other studies which sampled a specific wilderness area. Initial plans were to verify if environmental literacy scores changed due to education and experience. Time limitations, length of survey-test instrument, and inability to insure completion of all parts of the instrument restricted this part of the study. It also was the cause of a smaller sample size for this portion of the study (n = 66).

CHAPTER TWO
BACKGROUND

A paradigm shift in environmental perception and land management is nearing fruition. Anthropologists cited a "consistent decline in the relationship between people and their environmental milieu and community (Pruneau and Chouinard, 1996, p. 1). As humans world-wide become more centralized in urban communities and disconnected to primary sources of food, shelter and other needs; they become less-conscious of other beings with whom they share natural resources. Feelings of locus of control and empowerment in environmental problem solving are reduced as crowding increases (Hiss, 1990; Malmberg, 1992; Pruneau and Chouinard, 1996; Pyle, 1992). Pruneau and Chouinard fear that this "global social phenomenon may be responsible for the apathy and lack of concern for the environment...[with the] loss of place connection and lack of land ethics [being] the earth's fundamental threat " (p. 2).

Wild lands are fundamental to humankind's well being, rooted in a primeval connection to the earth (Nash, 1982). Wilderness provides an opportunity for recovering a sense of place, sense of self, and sense of adventure (Marshall, 1930). Besides these anthropocentric values, preservation of natural biodiversity and evolutionary process within wildlands are recognized as essential mechanisms to maintain environmental health of global systems. (Martin, 1988; Noss, 1991; Noss, 1990). Individuals want to know that wilderness exists and is protected (McCloskey, 1990; Nash, 1982). Perhaps most important, wilderness areas allow every citizen the opportunity to assume ethical behaviors of earth stewardship in a place where he or she can have empowerment as earth stewards (Simpson, 1996).

Wilderness as an education venue "is a microcosm of the world and a doorway to wider knowledge" (Orr, 1994). Most environmentally-minded people fantasize about restructuring society to create new environmental utopias, but those best able to link their dreams with direct action are those "anchored by tradition in the concrete realities of particular places..." (Tuan, 1990). Perhaps the greatest step at reducing threats to wilderness and conceivably the entire earth may be through enabling wilderness visitors the opportunity to recover their pre-historic sense of place connection and to develop a land ethic (Orr, 1991; Simpson, 1996).

Management Dilemma

Recreation is both a threat and specific value of wilderness. Recreational use is in itself a threat to the natural setting and, if visitor contacts degrade solitude or cause conflicts, it can also be a threat to the wilderness experience (Hendee, et al., 1990). Only two months after the Wilderness Act was signed into law in 1964, David Brower, then president of the Sierra Club, remarked that "The basic problem of wilderness is how to enjoy it today and still have it tomorrow" (Brower, 1964, p. 1-1). Marshall noted "at the same time that wilderness boundaries are being established and protected by acts of congress, attention must be given to the quality of wilderness within these boundaries, or we may be preserving empty shells" (Marshall, 1969). Accordingly Nash stated "wilderness management rests on the assumption that uncontrolled recreation is just as much a threat to wilderness' qualities as economic development" (1982b, p. 320-321).

Numbers of people and types of activities impact wilderness (Nash, 1982). As early as 1942 the stockman's term of carrying capacity was used to refer to the "maximum degree of the highest type of recreational use which a wilderness can receive, consistent with its long term preservation" (Sumner, 1942). Carrying capacity can refer to impacts to the bio/physical resource or it can be social. In either case managers should determine maximum permissible use and adhere to it (Sumner, 1942). Today, this "highest type use" is referred to "minimum impact camping", or Leave No Trace (LNT) outdoor ethics (Hampton and Cole, 1988). No matter how careful a person behaves, there is a maximum use level (Nash, 1982).

Most managers that claimed to have estimated a backcountry carrying capacity have done so without the aid of scientific research. This lack of analysis calls into question the validity of such carrying capacity estimates (Marion, 1994, p. 35). Jubenville, Twight, Cotgrove, and Pendergrast (1994) suggest a revised definition of wilderness carrying capacity: cumulative recreational use pattern and related impacts within a wilderness area or zone in response to managerial programs, assuming that such programs are developed in such a way as to ensure that the resulting use does not create unacceptable change (27). According to this definition, there is only one carrying capacity--the recreational use pattern--with both social and ecological impacts, that is a cause and effect relationship between managerial programming and the resulting recreational use pattern. However, land managers must address three concerns associated with carrying capacity and the wilderness management paradox: (a) complication in

defining wilderness and wilderness experience, (b) inability to legally address resource impacts, and (c) complexity in understanding varied recreational requisites and use patterns.

Defining wilderness is challenging to measure for statistically significant impacts. Wilderness is a state of mind; if a person does not hear, or smell civilization, she or he is in wilderness. (Nash, 1982). Some need the knowledge that roads and other signs of civilization are many miles away, some want them close, others don't differentiate distance. Marshall (1930) demanded an area so large that it could not be traversed without mechanical means in a single day.

When people experience wilderness or choose places to recreate they make a mental distinction between places that have purposely been changed and the places that have not. Nash wrote that once an area "is proclaimed wilderness and managed as such, is not wilderness by these very acts" (p. 27, in Hendee et al. 1990). Management of any kind minimizes a region's wildness. Artifactual structures such as campsites or bridges, and even maps, trails, and signs indicate change. Litter, fire rings, or even a foot print can be visualized not so much as an impact but as an erosion of the intensity of the wilderness condition. Nash suggested a spectrum of civilization and wilderness (Figure 1). Litter such as a soda can beside the trail doesn't necessarily destroy a perception of wilderness, but moves the mix down a little toward the "civilized end of the spectrum." In theory, an "educated" visitor could "expand" anothers' wilderness by simply removing the can or eliminating all evidence of a fire ring. Similarly, a large guided group can move that line inadvertently towards the civilized end for all encountering them. Wilderness boundaries are subjective. Each visitor "reads" the proportions differently (R. Nash, personal communication, June 1997). The specific point where an individual stands on this spectrum can be labeled as their "wilderness purism standard." It is important to remember that this point will be different for everyone experiencing wilderness.

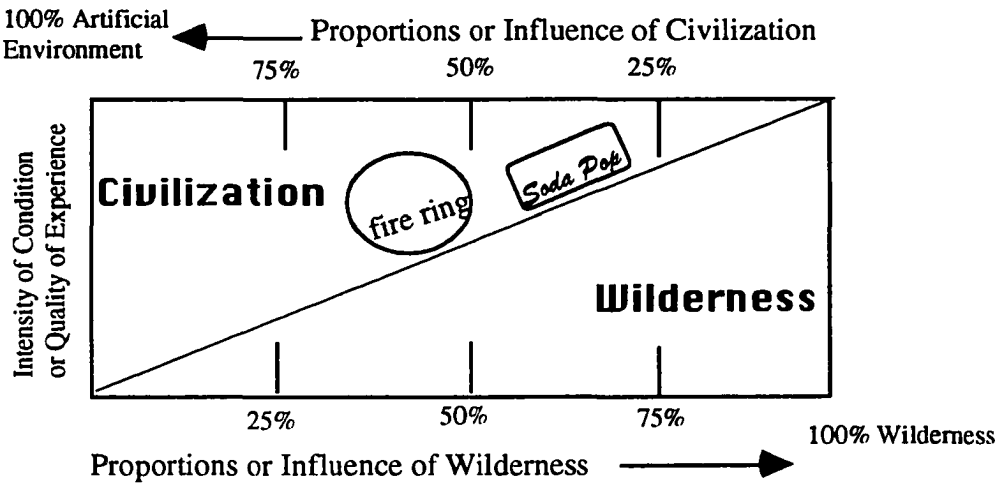


Figure 1. Wilderness to Civilization Spectrum (based on a sketch by R. Nash, personal communication, June, 1997).

The concept of psychological carrying capacity (impact of people on people) is an even more difficult wilderness value to assess. There are recreationists who want varying degrees of amenities in wilderness. There are those who want absolute solitude and those who do not mind seeing others. The impact of wilderness lovers upon other wilderness lovers is an example of how wilderness is loved to death (Nash, 1981).

There are levels of experiential tolerances. Figure 2 shows levels of satisfaction for wilderness and urban environments. The urban sidewalk is an unsatisfactory place (perhaps frightening) with few people in view. Alone a pedestrian can be robbed or raped, but more people raises the curve to a level of acceptance where it remains until the crowd builds and impairs walking.

Wilderness recreation is an activity more satisfying at lower occupation densities. Large groups of people cannot enjoy solitude. However, the level of acceptance varies with the individual, "complicating the task of the manager attempting to formulate policy" (Nash 1979, p. 31).

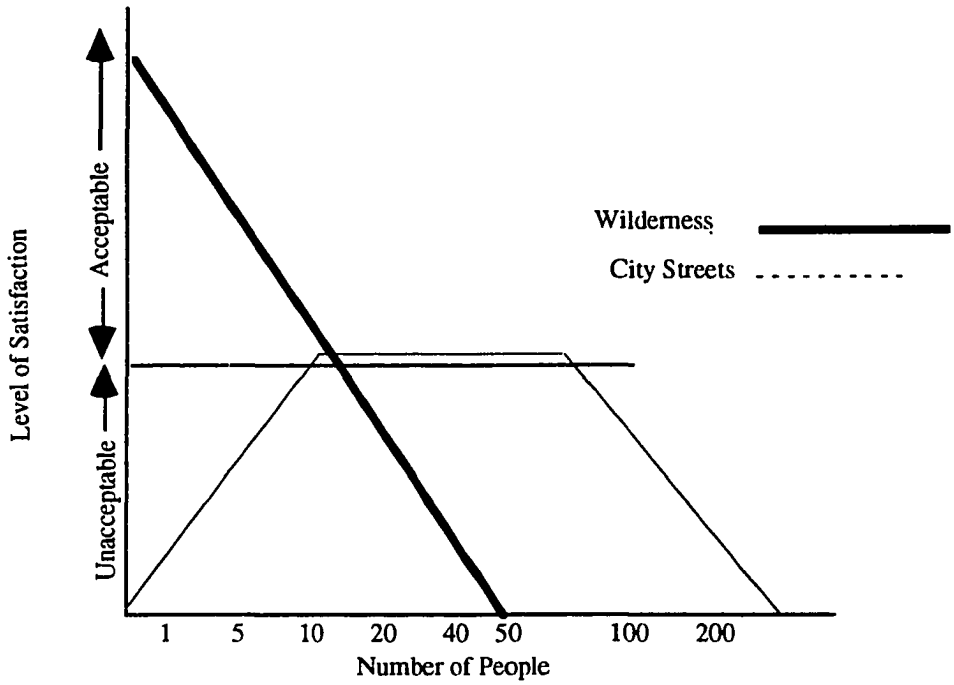


Figure 2. The Psychological Carrying Capacity Concept (from Nash 1979, pg. 41).

Clark and Stankey (1979) proposed a recreation opportunity spectrum (ROS) model, (Figure 3). One's tolerance decreases towards the pristine end of the spectrum. In addition, the psychological carrying capacity varies by individual depending upon the motives for trips and conditions such as weather, vegetation, and terrain. Agencies must include vicarious users into a wilderness management model as well. The varying degrees of wilderness and the innumerable types of wilderness users must be recognized and wilderness perception become integrated into wilderness planning (Kliskey, 1994; Nash, 1981).

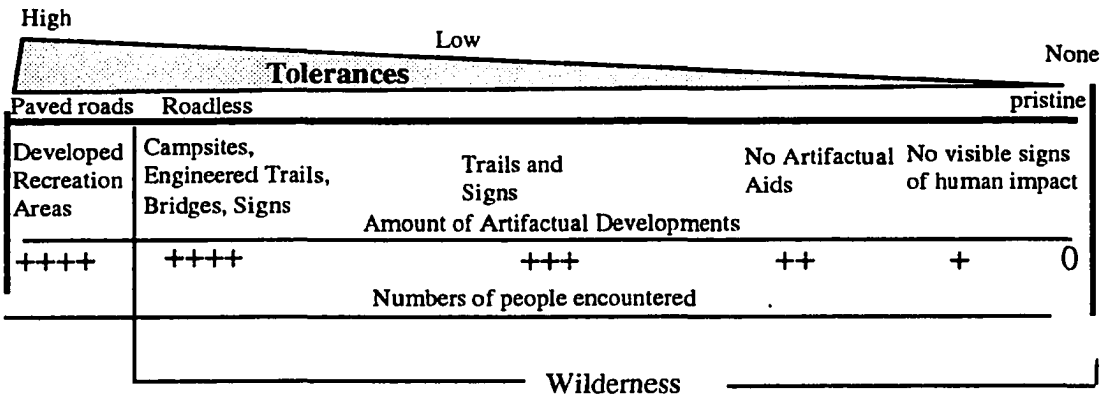


Figure 3. Intensity of Tolerances (based on Clark and Stankey 1979; Stankey et al. 1985).

An important concern in wilderness management is preservation of native biodiversity and ecological processes. This has not been a priority or interest of all land agencies. Because of the Wilderness Act's use and enjoyment clause, most agency assessments and research of wilderness concerns have focused on recreational values (Noss, 1990; Roggenbuck 1990; Hendee et al., 1990). Recreationally induced impacts were viewed by managers as a problem in more than 70% of the units comprising the NWPS (Washburne and Cole, 1983, p. 56). This was complicated by a previous discovery, managers perceive wilderness problems differently than do recreationists (Hendee and Harris, 1970). Recreationists indicate concern with anthropocentric social conditions such as crowding, conflict among visitors, and the aesthetics of littering. Managers consider visual physical or biological impacts on campsite vegetation, soils, trails, and wildlife as the greater threat (Lucas, 1979; Washburne and Cole, 1983). Neither visual nor psychological impacts may be ecologically significant. Mitigation measures may be both biologically and psychologically significant (Foreman, 1991). More importantly, those impacts that cause significant change often times go unnoticed or ignored (Noss, 1990). According to Hendee et al. (1990), to best preserve the diversity of wildland settings and achieve the legal goals of the wilderness system, management should emphasize the natural integrity of wilderness ecosystems (p. 20). This reflects a biocentric management ethic. Bader (personal communication, May, 24, 1997) maintains,

the only way this can be done legally is if directed by the expected recreational wilderness experience.

Managerial responses to increasing use can lead to unanticipated shifts in the kinds of recreational opportunity an area offers. Developments to protect a site can attract a different clientele (Hendee, et al., 1990). By definition, there is a contradiction of terms in the concept of wilderness management. To minimize intrusion into the recreationists' experiences, agencies try to manage accordingly. Most recreationists accept some artifactual mitigation and regulation within limits of a satisfactory wilderness experience. According to Nash (1982) as management increases in intensity, visitor satisfaction declines.

Purism and Ethics

Clark and Kozacek (1997) explored ethical perspectives of land managers with a uni-dimension scaled instrument they called The *Wilderness Values Test.* Most wilderness managers tend to be characterized "in the 'middle' of the anthropocentric-biocentric continuum of the Wilderness Values Test (p. 12). Resource scientists score more towards the anthropocentric. Ethics have been correlated to purism standards which are determined by assessing attitudes and anticipated acceptable recreational perceptions (Manning and Valliere, 1996). Manning and Valliere found that the more importance respondents attached to scientific values of wilderness, the less purist their overall attitude toward wilderness management conditions (Figure 4). Because of the use and enjoyment clause in the Wilderness Act (1964), current wilderness policy leans towards the anthropocentric end of the continuum and permits a multitude of development and artificial aids for convenience, research and controlling visual impacts (Foreman, 1991; Hendee, et al., 1990; Noss and Cooperrider, 1994). Managerial concessions include constructed and maintained trails, signs with mileage, maps, guidebooks, stocked wildlife, bridges, culverts, enhancement of game habitat, helicopter access for data collection, and in Alaska, even recreational aircraft landings and snowmachine travel. These amenities are desirable to some. Others need the opportunity to experience maximum challenge, native biodiversity, and wild primeval conditions (Foreman, 1991).

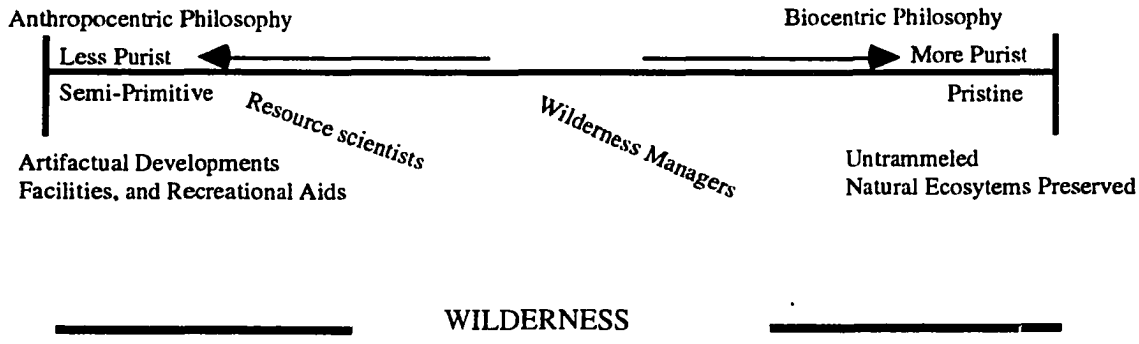


Figure 4. Wilderness philosophies, managerial programs, and purism exremes along the Anthropocentric-Biocentric Continuum (based on Clark and Kozacek, 1997; Hendee, et al., 1990; Manning and Valliere, 1996).

Sights and sounds of groups and human-made facilities are detrimental to the wilderness experience of those who prefer the primeval end of the ROS. Recreational constituency is disturbed by the physical deterioration" of wilderness. This style of recreation is depriving wilderness areas of their central symbolism, their message about the relationship between man and nature, and man and industrial society (Sax, 1980, p. 14). Those who believe that nature must be taken on its own terms are like the patriot who objects when someone tramples on the American flag. It is not the physical act that offends, but the symbolic act. They detest that recreationists who enter and travel the area by horseback, in guided groups do not pay physical or psychological dues" (Nash, 1983). These purists/preservationists are concerned that aided recreationists are physically or psychologically unprepared. They believe these recreationists do not have the appropriate knowledge and skills necessary to follow the new ethic for the wild outdoors, a code of behavior necessary for safe, enjoyable, protective use of the nation's primitive and recreational lands (Petzoldt, 1984). An anthropocentric wilderness ethic would facilitate direct human use emphasizing recreation and comfort. A biocentric philosophic perspective requires recreational users to take wilderness on its own terms (Hendee, et al., 1990). The latter would be the essence of an untrammeled wilderness as dictated by the Wilderness Act (Nash, 1982; US Congress, 1964).

Less purist recreationists desiring more amenities would not feel comfortable in the extreme primeval level of wilderness. They are characterized on the developed end of

the ROS and the anthropocentric-biocentric continuum models (Hendee, et al., 1990). They prefer the amenities, expecting and accepting encounters with people, developments or managerial artifactual aids. In the last thirty years, agencies have tended to favor this latter group and are allowing wilderness areas to become developed into what might be called backpacking parks designed and managed for comfort and safety (Foreman, 1991). According to Nash (1981) and Jubenville (personal communication, September, 1992), the result is a slippery slope deterioration of the primeval nature of the wilderness experience and the natural wild ecosystems they encompass. This effects vicarious users wanting to know that wild places exist under protection and those recreationists coveting opportunities for wild, primitive and challenging experiences. The latter are physically displaced through loss of their habitat (Hendee, et al., 1990; Nash, 1982).

Wilderness must be wild. It must be both intimidating and, for that very reason, is appealing to some visitors (Nash 1988, p. 6). The changes management encourages, allowing and inadvertently condoning can destroy the essence of wilderness. Wilderness is basked in an illusion when it is regarded as a backpacking park, a paradise, or sanctuary from the stresses of civilization. Wilderness has its own stresses associated with the absence of civilization and its amenities. Wilderness must be taken on its own terms. If this is not possible, it will be managed under the precepts of an anthropocentric philosophic perspective. The result is having a designated wilderness that is not a wild habitat, attracting wilderness recreationists for whom myth replaces reality.

CHAPTER THREE
LITERATURE

A review of related literature and discussion of the characteristics and significance of the elements forming the framework for this research is presented. Research in the fields of wilderness management, education, and resource planning are integrated in four sections.

Section One focuses on the wilderness management dilemma with citations about: a) recreational impacts; b) recreationist use; c) user characteristics studies that incorporate wilderness purism scales; and d) wilderness typology. Section Two establishes a link between: a) environmental literacy; b) wildland ethics; and c) place connection, as means to address the wilderness management dilemma. Section Three consists of a review of studies on effective environmental education (EE) and the processes and elements necessary to insure behavioral change. It is combined with studies in ethics education, and experiential wilderness leadership education. Section Four is a review of current research in land resource management which brings together place connection, public input and geographic information systems (GIS) to aid in addressing wilderness management issues and pro-active planning.

Wilderness Management Dilemma

The impacts recreational use has on all wilderness values must be determined before educational strategies can be designed or assessed for their effectiveness in protecting wilderness,. Recreationists have an excessive impact on resources because of their lack of knowledge about wilderness ecosystems and wildland ethics (Hampton and Cole, 1988; Lucas, 1981). Alpine backpackers and weekend day hikers alike are attracted to precisely the environs that are rare within wildlands--areas with trees and areas around water (Noss, 1990). Noss (1991) pointed out that these are typically the lands with the greatest species richness and are most susceptible to indiscretion by recreational activities.

Researchers have devoted considerable attention to assessing recreational impacts on both the physical and biological wilderness resources (Cole, 1994; Hammitt and Cole, 1987; Kuss, Graefe, Alan, and Vaske, 1990). Unfortunately, the wilderness experience, a major value of wilderness, is the most complex to monitor and for legal purposes, the most important to maintain (Nash, 1983). Wilderness carries so many meanings of a

personal, symbolic, historical, and ecological kind it resists definition (Nash, 1979). The perception of wilderness appears to vary from person to person. Therefore, there is a premium on variations of intensity rather than on absolutes. Therefore, there are many types and intensities of wilderness experience that need to be defined and monitored.

Managers use the carrying capacity technique when trying to identify how much use an area can tolerate before unacceptable impacts occurs. Managers appear to believe the real concern is not the number of users involved, but impacts on the conditions of the area that result from the use. The use of the Limits of Acceptable Change (LAC) process, reflects this management strategy. Once the appropriate and acceptable degree of change has been identified, managers can select from an array of techniques to maintain or restore desired wilderness conditions.

A series of opportunity classes can be developed after public issues and managerial concerns have been identified. These opportunity classes define the "resource, social, and managerial conditions considered desirable and appropriate within the wilderness" (Hendee, et al., 1990, p. 223). The basic ROS system has six such defined classes (Figure 5). Two are rather broadly defined "semi-primitive non motorized" and "primitive" classes at the wilderness end of the scales (Clark and Stankey, 1979; Driver and Brown, 1978). Hendee et al. (1990) suggest that several subclasses be included in the wilderness end of the scale depending on characteristics of the area under study. The specific number can be determined "only after analysis of the issues, the current range of conditions, the demands for wilderness recreation, and regional supply of different wilderness settings....smaller wildernesses may have only one or two [sub-] classes, while larger areas may have as many as four to six" (p. 223). The idea of a Wilderness Opportunity Zone (WOS), like the ROS is a kind of zoning, to address finer gradations of primitive and semi-primitive classes. The WOS includes, for example, portal, primitive, and pristine, designations, indicating increasing degrees of naturalness and solitude (Hendee et al., p. 209). Agency managers appear to use LAC: (a) to identify their management objectives and desired recreational use patterns for the particular wilderness, or zone; (b) to gain an understanding of recreationists' expectations, desires, and decision factors; and (c) to project the critical impact variable and the carrying capacity thresholds.

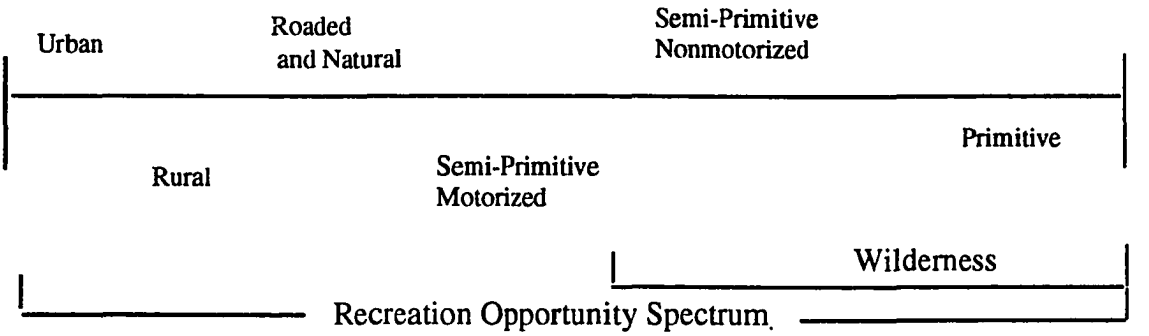


Figure 5. Classification of opportunities along ROS and Wilderness Opportunity Spectrum (WOS) continuum (based on Clark and Stankey 1979; Driver and Brown 1978).

Wilderness advocates Marshall (1924) and Nash (1982b) propose a WOS that is based on experiential variations of wildness within wilderness (Figure 1). Stankey and Schreyer (1989), Driver (1976), and Jubenville and Workman (1993) attest that neither the natural world nor managers of it provide a wilderness experience. Instead, management can only provide the opportunity for the wilderness to act as a catalyst for the expression of fundamental and inherent emotional states. Jubenville et al. (1994, p. 10-12) maintain:

> the sustainability of the wilderness recreational opportunity...is dependent on what type of opportunity [management]wishes to sustain... agencies can benefit from wilderness recreation research by focusing on "cause-effect relationships between managerial programming and resulting recreational use pattern....In order to truly understand recreational use patterns in wilderness, [managers] must be able to distinguish between types of users who make those patterns and the decision factors they are responding.

Purism Scales

Jubenville, et al. (1994), suggest paper and pencil tests, as developed and tested by Hendee (1968) and Stankey (1973), can be used "to isolate different 'species' of wilderness recreationists" (p. 11). These instruments were designed to distinguish between types of recreationists and to relate recreationists' values to various wilderness management practices in specific areas. They are called Wildernism-Urbanism (Hendee) and wilderness purism (Stankey) scales.

The Hendee Wildernism-Urbanism Attitude Test (Hendee, 1968), developed and tested in the Pacific Northwest, was used to investigate visitors' attitudes toward management policies. He coined three terms: a) *wildernism* (wilderness + purism), b)*wildernist* (wilderness + purist.), and c) *urbanist* (urban + purist); and identified a clustering of items from the scale to represent the dimensions of wildernism. Using a 30 item, 9-point attitude continuum scale, he categorized five groups called: a) Urbanist, b) Neutralists, c) Weak Wildernists, d) Moderate Wildernists, and e) Strong Wildernists.

The wilderness purism scale developed by Stankey (1973) used a similar gradation device to differentiate wilderness users in relation to their acceptance of facilities, regulations, and visitor encounters. The device measures the degree of purism (characterized by the level of expectation and sensitivity toward wilderness values) and ranks users' involvement, concern, and knowledge about wilderness. It consists of 14 items relating to wilderness conditions as defined by the Wilderness Act of 1964. He grouped respondents into four categories: a) Non Purists, b) Neutralists, c) Moderate Purists, d) Strong Purists.

Young (1980), using the Stankey purism scale, found that purism scores and knowledge about wilderness were positively correlated. Young (1983) also investigated purism in relation to wilderness approval and visitation frequency. He found purism values are a valid variable to use as a predictor of who will use wilderness as it distinguishes between user and non-user and potential users and potential non users.

Warren (1985) used the Stankey purism scale to explore attitudes of recreationists in Alaska's Arctic National Wildlife Area. He grouped recreationists as defined by Stankey with the exception that Stankey's Strong purists category was subdivided into: a) Strong purists and b) Very strong purists. Warren compared the environmental attitudes of recreationists who engaged in human propelled and non consuming activities (e.g., backpackers, photographers, nature study) with those involved in consuming activities (e.g., hunting). He found their purism scores to be statistically different, determining they

were distinct groups with different tolerances to carrying capacity and access, and regulations. Thirty-four percent of the hunters were categorized as Non purist compared to only eight percent of the Non-hunters; thirty-eight percent of Non-hunters were Very strong purist in contrast to fifteen percent of the hunters.

The internal consistency of the Stankey purism scale was tested by a) Jaakson and Shin (1992) in Canada; b) Kliskey (1994) in New Zealand; and c) Australian, Shafer and Hammitt (1995) in western United States. They found the purism scale has a high internal consistency as a measure of the degree of purism in attitudes toward wilderness. Jaakson and Shin expressed a necessity for an expanded wilderness purism scale beyond the content of the Wilderness Act (1964) allow wildernesses worldwide to accommodate all values. Shafer and Hammitt concluded that "measuring the alignment of one's attitudes with intended resources and their use is essential to understanding attitudinal aspects of recreational experiences and aids recreational management in wilderness." They confirmed that "the uni-dimensional purism measure" of the purism scale, is indeed, closely related to the "resource-use conditions." Most importantly, Shafer and Hammitt found that "purists can provide the level of specificity needed in the selection of resource indicators used to monitor the health of recreational experiences in wilderness (p. 27).

Schreyer, Roggenbuck, McCool, Royer, and Miller (1976) argue that the purism concept can help managers guard against a floating baseline in which new, less purist recreationists can induce a change in managerial policy. This evolution would likely displace those purists who are strongly aligned with the wilderness ideal (Hendee, et al., 1990; Knopf, 1983; Schreyer and Roggenbuck, 1978; Shafer and Hammitt, 1995).

Higham (1997) recently applied wilderness perception scaling to international visitors in New Zealand wilderness settings. He based his research on the assumption that wilderness perceptions are shaped by cultural and sociological factors and will vary according to nationality and previous background experience. Higham used a 21 variable purism scale, translated into four languages. He sampled 465 international tourists on twelve trails of varying remoteness, artifactual structures, and use intensity. Scoring of the findings indicate a difference in purism score based on nationality. Asian visitors generally hold non-purist perceptions of wilderness and "are likely to seek certain qualities of wilderness experience (e.g., naturalness and scenery) in a relatively safe and humanized natural setting (e.g., with search and rescue services and a high level of facility development provided)." Continental European recreationists (i.e., Swiss, German, Dutch, and Austrian) scored "neutralist" or "moderate" purist wilderness

standards. This group might seek may seek locations of moderate remoteness and naturalness and facilities. Canadian, American, British, and Australian visitors exhibit the strongest purism and are most likely to seek the least humanized (i.e., wildest) settings.

Watson and Niccolucci (1992) and Brown, Driver, and McConnell (1978) suggest factor analysis and principal-component techniques are useful in understanding the underlying dimensions of wilderness recreationists' experience level. Shafer and Hammitt (1995), Jaakson and Shin (1992), and Kliskey (1994) each used this statistical technique (with varimax rotation) to identify the specific descriptors conditions requisite for a wilderness experience. The principal component that emerged are listed in Table 1. They demonstrate that principal components reflect the equivalent or similar properties.

Table 1. Results of factor analysis wilderness properties from four purism research studies

PURISM RESEARCHER	PROPERTY	PROPERTY	PROPERTY	PROPERTY
Kliskey 1994	Anti-Artifactual	Anti-Development	Experiential	Natural vs. hunting
Jaakson and Shin (1992)	Minimum Human Influence;	Human Infrastructure	Size and Remoteness;	Natural Systems
Shultis and Kearsey (1989)	Artifactualism	Solitude	Remoteness	Naturalness
Shafer and Hammitt (1995)	Management-aided travel; Primitive Travel	Human Impact	Solitude; Management Confinement	Natural features and processes

Kliskey (1994) compared two methods to statistically analyze the purism scale's results with New Zealand wilderness users in his multiple wilderness perception mapping (WPM) research. Using an apriori approach to delineate each group's buffer distances, he spatially categorized purism groups with geographic information systems (GIS). The first technique analyzed his purism scale as a uni-dimensional model. The "alternative method" used multivariate cluster analysis and took his results from factor analysis (Table 1) providing multi-dimensional aspects of the wilderness scale. Kliskey suggested that the latter method would be advantageous to determine users' motivation, but the former would be less time consuming and would be as adequate for most agency use.

However, both approaches for operationalizing WPM provide a means for incorporating user perceptions of wilderness in the management process. The first has the most potential as a pragmatic tool. The second has more potential as a research tool. It, in parallel with the management application, can provide a feedback mechanism between research and management allowing the management application to be evaluated on the basis of theoretical developments (Kliskey, 1994, p. 235).

Manning and Valliere (1996) explored the environmental values and ethics of wilderness recreationists in reference to how these influence purism scores. They concluded that wilderness values and ethics can be isolated and measured and are both "significantly related to attitudes toward wilderness purity" (p. 30). They found that statistical relationships demonstrate that "beliefs in selected wilderness values and environmental ethics are associated with certain attitudes toward wilderness management" (p. 32). This may help establish an empirical basis for more effectively meeting the diverse and sometimes competing values and ethics of wilderness visitors avoiding inevitable conflicts. This could be accomplished using a comprehensive wilderness management policy to categorize wilderness areas by specific purism types.

The uni-dimensional wilderness purism scales of 1968 and 1972 have been modified, by recent researchers, into one with multi-dimensional properties representing components of the wilderness experience. The scale has been used in four nations to distinguish between types of recreationists and to relate recreationists' values to various wilderness management practices in specific areas. Purism has been combined with scales measuring ethical perspective, specialization, and self-actualization. It has been used to compare international recreationists' wilderness perceptions. It has been shown to be useful as a predictor of recreational use patterns. Finally, a GIS methodology (WPM) was developed to geospatially apply the scale to answer the question of "whose wilderness is where" (Kliskey, 1994, p. 200).

Wilderness Opportunity Typology

Identifying the spectrum of wilderness recreation opportunities is necessary to satisfy the diversity of visitor preferences (Higham, 1997). Wilderness areas must be managed to provide various attitudes regarding visitor activities, facilities, and services. Roggenbuck et al. (1993) focused on variability of recreationists' standards of acceptable wilderness conditions when he stressed the need to manage different zones in wilderness for different user groups and experiences. Opportunities for various qualities of wilderness experiences must be available for a wide range of settings to allow tourists to achieve wilderness experiences that reflect their wilderness expectations.

The LAC planning process (Stankey et. al., 1985) and Roggenbuck, Williams, and Watson (1993) suggest that wilderness managers could respond to diversity of visitor opinions of wilderness by zoning the wilderness for different experience opportunity classes and establishing different condition standards within each. This would enable managers to aid recreationists planning their trip by providing information for them to locate the zone that best meets their experience preferences. Alternately, management could zone an entire wilderness for one recreationist group using that group's standards for acceptable and unacceptable conditions.

Nash (1982) discussed the concept of wilderness classifications or zones as a means to preserve wildness and the wilderness experience. As early as 1933, founder of the Wilderness Society Bob Marshall postulated that extremely wild areas should be set aside for those individuals who prefer a "super wilderness condition" (Marshall, 1935). In what became known as the USDA Forest Service "Copeland Report" and in the 1935 Wilderness Society charter. Marshall defined seven types or classes of wilderness ranging from developed campsites to pristine and challenging super wilderness (in Glover, 1986). Marshall believed this would protect both the physical and psychological wilderness experience. Nash (1982), used the analogy of baseball when he argued that wilderness recreation could be enjoyed from the backyard level all the way to the major leagues. "Players, fans, and umpires recognize these distinctions; wilderness managers could follow suit" (p. 384).

Proposed classes of wilderness designation focus on the experiential variations of focusing on the wildness within wilderness (Marshall, 1935; Nash, 1982. Managerial induced conditions and artifactual structures are what affect a recreationist's perception of wilderness and consequently distinguish each class. Nash's suggested "lower tiered classes" included those lands which might have "high visitor carrying capacity and

intensive management in the form of constructed trails and bridges, hikers' huts outhouses, and frequent signs and ranger patrols" (1982b, p. 385). This experiential WOS spectrum, a multi-dimensional perspective, is illustrated in Figure 5. For example, these classes might include assigned campsites with constant electronic surveillance of both recreationist and wild animals which would ensure the safety of both (Nash, 1981).

Nash's spectrum includes country that is an extremely large land mass, remote, potentially dangerous and relatively unmanaged. In these areas commercial guides and outfitters might be "prohibited in the interest of maximizing self-reliance" (1982b, p. 385). Nash, Sax (1980) and Foreman (1991) suggest that this wild end of the spectrum, what Hardin (1969) and Marshall (1935) called "super wilderness," would require a recreationist to be completely on his or her own requiring complete self-reliance, competence and responsibility. Nash, echoing Marshall, explained this as "true" wilderness, allowing recreationists the opportunity to "at least think of themselves as explorers."

Hardin's classifying process would require managers to zone wilderness on a "graded series of wilderness and park areas" based on a person/acre ratio (1969, p. 27). His "extreme zone" would require a restriction of one person per 1000 acres. This would instill competition for the opportunity for admission with merit and extreme physical vigor as the price. Management should endeavor to make wilderness "as difficult and dangerous as possible."

Foreman (1991) suggested a "Primeval Class" focusing on recreation and aesthetics. This class would benefit wildlife by limiting the number of people in such areas. An additional class, beyond the Primeval, which would be a pristine, human enclosure zone. Foreman proposed that these "large areas where no human beings, including scientific researchers or rangers, would be permitted" could operate as a biodiversity sanctuary (p. 67-68). Restrictions within the "higher class wilderness", such as the control of aircraft flyovers and landings and the "no rescue" policy would likely require new federal legislation (Foreman, 1991; Nash, 1983). Foreman added that managing agencies need to be absolved of responsibility for accidents and injuries. No wilderness recreationist "should expect to be protected from the inherent dangers of the natural world" (p. 660).

Nash (personal communication, September 19, 1993) indicated that his proposed categories were from anecdotal evidence and merely philosophical. They must be verified statistically to be operable. The "wildest class" on the spectrum must be defined by the

expectations of recreationists who represent the "extreme end of the purism scale." Once the extreme wilderness opportunity class is elucidated, the subsequent classes can be defined accordingly.

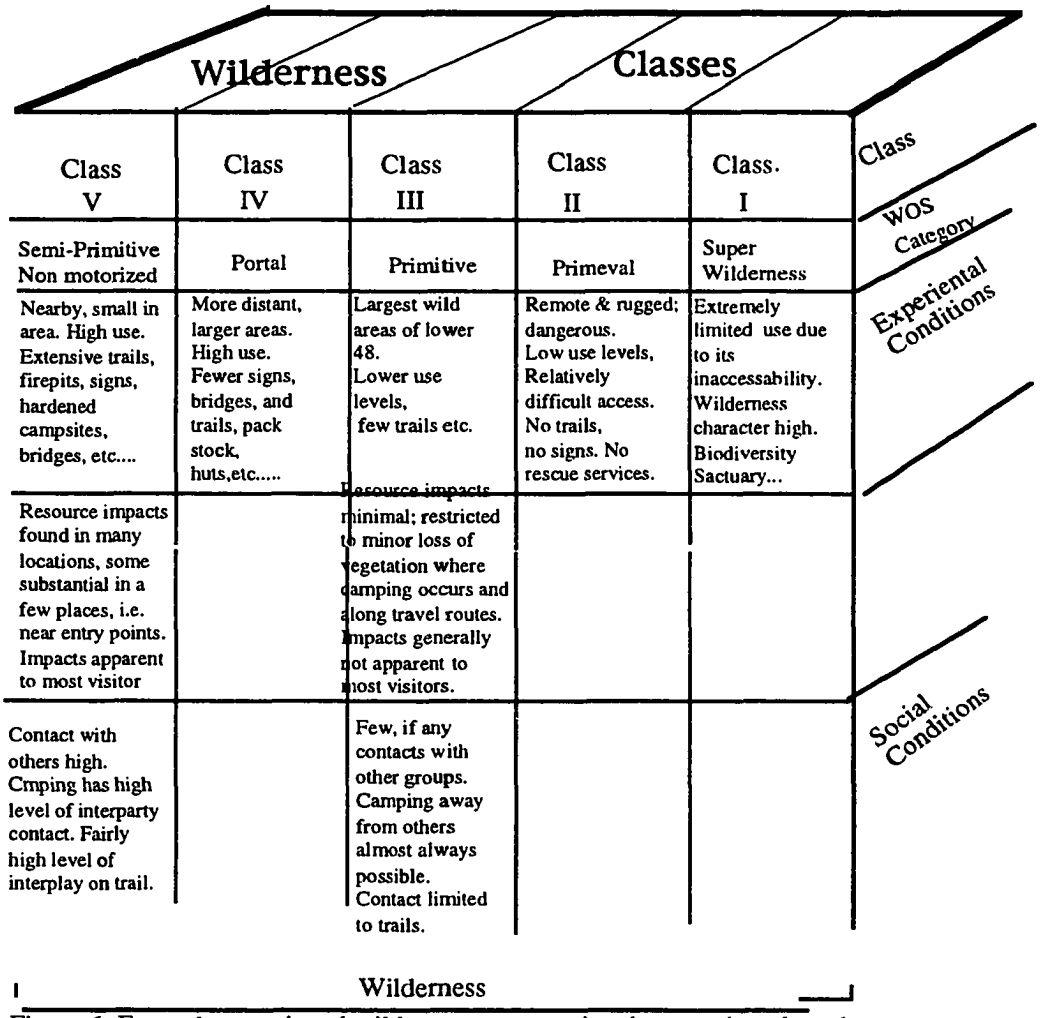


Figure 6. Example experiental wilderness opportunity class typology based on Marshall (1933), Nash (1981), Foreman (1990) and Hendee et al. (1990).

Education

Wilderness Education

The concept of wilderness demands that management decrease their visitor control and assistance (Nash 1982). This would demand a higher level of visitor competence and responsibility if wilderness is to be preserved (Nash, 1982). Sixty years ago Wagar (1940) proposed an education program to certify wilderness recreationists in an attempt to resolve a concern about ease of access and quality backcountry equipment (p. 491). In earlier times nature certified wilderness visitors, the poorly prepared and careless simply did not return. Now, anyone could become a wilderness traveler. Education can solve the problem of the increasing masses in the wilderness who do not know how to care either for themselves nor for the country.

More recently, Petzoldt (1974) blatantly stated that "no one should be allowed in the wild outdoors until he can prove he is ecologically housebroken" (p. 229). In later publications Petzoldt (1981) suggested an entrance exam be required prior to graduation from the wilderness leadership education program. "We know we cannot conserve our wilderness areas adequately, even with all the restrictions, without educating the user"(p. 22). Petzoldt's (1984) solution is for wilderness education as the process to advance "the new ethic for the wild outdoors" (p. 19).

Environmental Literacy

Wilderness managers and educators are optimistic that education is a key to wilderness preservation (Hansen, 1989; Roggenbuck and Manfredo, 1989). It has been suggested that the process involved in developing an environmentally literate citizenry, the goal of environmental education (EE), may be a means to overcome both global environmental degradation and the wilderness management dilemma (Cockrell, 1991; Hampton and Cole, 1988; Passineau, 1990; Pruneau and Chouinard, 1996).

Studies indicate that effective wilderness education must become more comprehensive and not simply skill or rule oriented, if lasting behavioral and ethical changes are the goal. (Passineau, 1990; Petzoldt, 1974; Petzoldt, 1984). The path towards environmental literacy and wilderness advocacy, according to Passineau (1990), necessitates systematically addressing the specific goals of environmental education. The following objective of EE, based on the Belgrade Charter (UNESCO 1978) and the

Tbilisi Declaration, were adopted at the first international conference on EE held in the USSR in 1977.

> Environmental education must be a complete program designed to develop students who have a (1) sensitivity: an awareness and sensitivity to the total environment and its allied problems/or issues, (2) a basic understanding of the environment and its allied problems/issues , (3) feelings of concern for the environment and motivation for actively participating in environmental improvement and protection, (4) skills for identifying and solving environmental problems /issues, and (5) active involvement at all levels in working toward resolution of environmental problems/issues (Hungerford and Volk, 1990; Orr, 1991; UNESCO, 1978).

Iozzi (1989) stated that EE programs need to encourage sensitivity through development of higher levels of ethical reasoning and sense of place. Orr (1994) argued that sense of place education must be an integral factor of environmental literacy (p. 132). Place connection, according to Orr (1994), historically was "woven throughout the myths, religions, and minutes of early humankind, which saw itself participating with nature." This was confirmed by Wilson (1984) who believes this connection, which he termed "biophillia," is "hard-wired" into the human brain (p. 121). However, place connection must be a learned and practiced personal choice. Recovering this sense of place must be taught (Hawken, 1993; Orr, 1994; Wilson, 1984). Technological advances and increased population as well as processes tend to "over-ride human natural selection." Noss (1991) agrees that to insure wilderness protection, recreationists will need to gain a biocentric, philosophic perspective and altruistic behavior to choose *not* to visit delicate areas. Empowerment variables are "crucial in the training of responsible citizens in the environmental dimension... 'Empowerment' seems to be the cornerstone.." (Hungerford and Volk, 1990, p 12). Instruction must go beyond an 'awareness' or 'knowledge' of issues and problems. Students must be given the opportunity to develop the sense of 'ownership' and 'empowerment' to be fully invested in an environmental sense and promoted to become responsible, active citizens (p. 17).

A substantial number of EE researchers agree that students should be given opportunities to develop an understanding of problem-solving strategies and skills and be able to apply them (Hungerford, Peyton, Tomera, Litherland, Ramsey, and Volk, 1980; Hungerford and Volk, 1990; Marcinkowski, 1993; UNESCO, 1978). Writers from

numerous disciplines suggest that along with ecological knowledge and wilderness skills, wilderness literacy must incorporate: (a) wildland ethics literacy, i.e. a change in perception and philosophical perspective manifested in altruistic behaviors, with motivation and commitment to participate in management issue assessment and decision making; and (b) wilderness sensitivity/place connection (Ajzen, 1980; Besick, 1992; Cockrell, 1991; Dwyer, Lemming, Cobern, Jackson, and Porter, 1993; Fishbein and Ajzen, 1975; Geller and Lasley, 1985; Hampton and Cole, 1988; Hines, Hungerford, and Tomera, 1986; Hungerford and Volk, 1990; Jackson and Norton, 1979; Leopold, 1949; Mathews and Riley, 1995; Orr, 1991; Passineau, 1990; Petzoldt, 1984; Pruneau and Chouinard, 1996; Relph, 1976; Schwabb, 1982; Sia, et al., 1984; Stapp, 1970; Tallmadge, 1981).

Wildland Ethics (Ethics Literacy)

Land (wildland) ethics, as defined by Leopold (1949) and others, is not simply an attitude or knowledge about protecting the natural world but must entail a connection to place, and of the entire Earth community (Graber, 1976; Leopold, 1949; Simpson, 1985). It is of concern to some that only focusing on wildland ethics will make a strict division between wild and human developed lands thus promoting a negative view of non-wild landscapes. There is a critical need for individuals to develop global environmental ethics which include urban and suburban developments as well as wilderness.

Responses to what Mathews and Riley (1995) called "slob behavior" in the outdoors include stricter laws, increased enforcement, and area closures. These strategies treat the symptoms, not the problem. Agencies and recreationists are optimistic that education-based responses will be more effective (Hansen, 1989; Roggenbuck and Manfredo, 1989). Ethics education is a process of teaching guidelines for governing behavior and guiding and enabling choices about what is the right thing to do. The assumption is that those recreationists educated about appropriate behavior who include the natural world in their value systems will act in a more ethical manner by exhibiting more positive outdoor behaviors. The aim of wildland ethics is to empower recreationists "to develop an ethic that value acting to sustain and nurture the natural world, acting responsibly toward the sport or activity in which they are engaged, and acting with consideration for other recreationists" (Mathews and Riley, p. 9). The concept of ethical literacy is built upon this goal.

An ethically literate individual has the "ethical skills and qualities necessary to operate at the highest levels of ethical behavior." These skills include five components: a) the sensitivity to recognize a situation as posing one or more ethical considerations; b) the knowledge of what responses are legal versus what responses might be ethical in that situation; c) the willingness to act; d) the judgment to weigh various considerations where there are no laws or guidelines; and, e) the humility to seek consultation and additional knowledge to guide one's actions (Quinnet, 1994, p. 7).

Mathews and Riley (1995) found that methods in ethics education have been theorized but most remain untested. More is known about what is not effective than what is. Few wildland ethics programs are based on approaches the literature shows are effective. In the early 1900s, ethics education was known as "character education." This process used lecturing and moralizing by a teacher or group-leader (Mathews and Riley, 1995). The approach was employed by the newly formed Boy Scout and Girl Scout organizations. The scout leader provided a moral example for children who were encouraged to comply to a strict set of morality codes. Hartshorne and May (1928) demonstrated these methods were ineffective. They concluded that there is no relationship between preaching and moralizing and appropriate conduct--no matter how much students may become "emotionalized." Even though this research raised serious questions regarding the effectiveness of didactic approaches to character education, most wildland ethics education programs still rely on similar methods: a) lectures; b) externally applied codes of conduct; c) the teacher as hero and role model; d) morality stories; and e) videos (Mathews and Riley, 1995).

An emerging body of literature illustrates specific factors that influence moral development and ethical behavior. Even so, when hunters were surveyed, no significant correlation between education courses and the actual behavior of hunters in the field was found (Bromley, Hampton, and Wellman, 1989; Jackson and Norton, 1979). Gray, Borden, and Weigel (1985) and Simpson (1985, 1993) express reservations that any short-term or limited program can have a lasting effect. Mathews (1995) identified six aspects or common threads apparently do influence behavior.

- importance of community--including parents, family, neighborhood, and culture as the context for developing and nurturing ethical behavior;
- teachers as guides, not as authoritarian figures;
- importance of peer teaching, counseling, and support;
- positive climate of mutual respect;

- group consensus-building and ownership of group norms, including codes of moral behavior;
- importance of responsible service and action strategies in the community (p. 18).

There is still a large degree of uncertainty pertaining to what factors work and how they work despite numerous investigations into responsible environmental behavior (Hines, et al., 1986; Smith-Sebasto, 1995). There is a definite lack of research exploring what affect an outdoor experiential education program has on students' attitudes, perceptions, and behavior. Research conducted by Gillett, Thomas, Skok, and McLaughlin (1991), Hammitt (1995), McRae (1986), Perdue and Warder (1981) and Shepard and Speelman (1986) is limited in scope and without substantive results.

Harshman (1979), substantively linked environmental and wildland ethics education to the value/moral education tradition. Harshman categorized the processes in three areas: a) value clarification; b) value analysis; and c) moral development. Knapp (1983) expanded these thoughts, emphasizing the importance of experiential education. He suggested that experiential-based EE programs should teach students to: a) evaluate actions related to the environment as desirable or undesirable; b) make the most rational decisions in resolving and alleviating environmental issues and problems; and c) function as members of a group in reaching a consensus on ethical environmental behavior and practice.

Caduto (1983) revealed the success in using behavior modification as another EE strategy for influencing values and ethics. Cockrell (1991) suggested using a three-part decision-making activity within a wilderness program (p. 66). An initial decision, for example, such as to building a campfire, would be offered. The decision would be analyzed to address its justification and consequences. Finally, it would be adapted into future plans or behavior. He further noted that decisions regarding appropriate conduct in the backcountry often encounter contradictory principles. Considerations of ecological and social impacts will often involve values that come into conflict. Such conflicts support the adoption of the EE processes critical to the shaping of attitudes, intentions, perceptions, and behavior. Development of these principles or ethics, will not be a result of information alone. Goodkin (1996) states, development of good ethical habits is ultimately a composite of personal emotions, learning experience, and the reinforcing actions of those around (p. 19). Leaders can induce sensitivity and place connection and thus instill good ethics if they provide a comfortable learning environment with three

elements: a) effective role modeling; b) positive reinforcement; and c) encouraging critical analysis of recommended practices. This fosters ownership and leadership in a community that both supports the individual and sets clear expectations for them to care for the environment.

Sense of Place

Rootedness in place is the most important and least recognized need of human soul(Orr, 1994, p. 147). Sense of place is as a complex cognitive structure, characterized by a large number of attitudes, values, thoughts, beliefs, gestures, and behavioral tendencies that reach beyond emotions and sense of belonging to particular places (Proshansky, Fabian, and Kaminoff, 1983).

Different terms identify an individual's devotion to sense of place and the milieu that defines sense of place. Numerous models are offered: topophilia (Tuan, 1974); ecological identity (Thomashow, 1995); place identity (Proshansky, et al., 1983); biophillia (Wilson, 1984); insideness (Relph, 1976); place attachment (Low and Altman, 1992); environmental sensitivity (Pruneau and Chouinard, 1996); and sense of place (Orr, 1991; Orr, 1994; Pyle, 1992; Rubinstein and Parmelee, 1992; Sale, 1991; Sobel, 1993; Tallmadge, 1981). All these terms begin with a feeling of empathy towards the environment.

Environmental Sensitivity includes an interest and attention for the components of milieu and abilities to perceive and to experience these components (Pruneau and Chouinard, 1996). The sense of place concept often refers to a link with the natural environment, In this environment, individuals connect with specific biophysical elements because of a high level of ecological comprehension. This includes cognitive and intuitive dimensions developed as a result of direct experience with geographic landscapes. It may indicate the cultural environs and community (Relph, 1976).

Emotional, cognitive, social, cultural, and behavioral factors require an extensive knowledge of place. This understanding can be ecological or indigenous (Brown and Perkins, 1992). A persons ability to perceive details of the landscape is usually refined (Hay, 1988). Individuals linked to a particular place are apt to be involved in actions to maintain or to improve place. Limitations may be a person's lack of knowledge of appropriate actions, lack of locus of control, or lack of necessary resources to implement changes (Proshansky, et al., 1983).

A connection with place may be induced following a significant positive experience in a place with unique landscapes (Kaplan and Kaplan, 1989). Developing an attachment to place occurs with special experiences with nature. This can occur whether alone or with a small group of people, however being comfort is important (Chawla, 1992; Cooper-Marcus, 1992). For example, children building tree-houses or forts develop emotional relationships with their mini-environment, while adults may relate to their environment through a community project destined to improve a particular area (Nabhan, 1994; Sobel, 1993; Trimble, 1994). To Tallmadge (1981), a sense of place is the result of a wilderness experience likened to a divine connection with wildness. He described wilderness experiences on a continuum from weak to intense depending on person and place. On a long wilderness trip a person will go through six stages leading to sense of place: a) uncomfortably in the wilderness; b) overcoming basic survival needs; c) sensitivity to the place and ecological community; d) changes in space and time sensed; e) focusing on other beings in nature; and f) a sense of place. The result is the individual connects ecologically and spiritually to the place (Tallmadge, 1981).

A place attachment relationship brings advantages not only to the people who share them but also to the object of the affinity, i.e. the milieu (Pruneau and Chouinard, 1996). Place attachment reinforces personal identity, provides a sense of control contributing to continuity with the past while promoting the desire to protect place (Pellow, 1992). People care of places for which they have affection (Belk, 1992; Cornell and Deranja, 1994; Foreman, 1991; Hay, 1988; Hiss, 1990; Hungerford, Volk, and Ramsey, 1990; Passineau, 1990; Smith-Sebasto, 1992; Tallmadge, 1981; Trimble, 1994; Tuan, 1974; Tuan, 1991; Van Matre, 1990; Wilson, 1984; Wolke, 1991). Inducing sense of place can protect wildlands. When individuals become personally aware of the state of their place they identify dissonances between their needs and certain characteristics of the place to which they are sensitive. Instilling suitable values makes it possible to plan intuitively and logically carry out appropriate wilderness behavior (Pruneau and Chouinard, 1996). This is the goal of environmental literacy.

Environmentally Responsible Behavior

To understand environmentally responsible behavior, it is necessary to review research involving the three categories of variables contributing to responsible behavior, or what Hungerford and Volk (1990) termed environmental literacy. Young (1980) found that knowledge of wilderness and understanding of natural history do not necessarily

correlate to an adoption of wilderness values or behavior. No evidence to date supports a strong linear correlation between awareness, knowledge, skill levels, and attitudes with changes in behavior (Dwyer, et al., 1993; Mathews and Riley, 1995). Three additional variables are needed acting in a complex and synergistic fashion for behavioral change to occur (Hungerford and Volk, 1990). Hines, Hungerford, and Tomera (1986) conducted an extensive search of all responsible environmental behavior research reported since 1971. Their three goals were: a) identify variables strongly associated with responsible environmental behavior (REB); b) determine relative strengths of relationships between each of these variables and REB; and c) formulate a model of REB representative of findings synthesized in their research. Their model asserted an individual must first possess knowledge of appropriate courses of action and have the skills to effectively apply this knowledge. They must posses the desire to act, affected by three specific factors: (a) sensitivity and positive attitudes toward the environment, (b) ownership variables, and (c) empowerment and locus of control variables (Hines, et al., 1986). These variables are discussed in the following three sub-sections:

Sensitivity and Attitudes

Environmental sensitivity refers to an empathetic view of the environment and its problems and issues (Volk (1993, p. 48). Research indicates environmental sensitivity is significantly more prevalent among those behaving in environmentally responsible ways (Hungerford and Volk, 1990; Marcinkowski, 1989; Sia, et al., 1984; Volk, 1993). The Researchers agree a formula for environmentally sensitivity is for individuals to: a) participate in outdoor activities such as hiking, hunting, and fishing, b) with a small number of close acquaintances, c) over an extended period of time (Graber, 1976; Nabhan, 1994; Peters-Grant, 1987; Scholl, 1983; Tanner, 1980).

Role models are important to instilling environmental sensitivity--especially the teacher or group leader who has an empathetic and concerned perspective toward the environment (Volk, 1993). Educators erroneously trusted the linear model of REB. Increased knowledge does not necessarily foster a sensitivity and attitude or result in favorable action toward the environment (Ramsey, 1981). Most agencies involved with the management of wildland resources have informational programs aimed at educating users about how to reduce resource impacts (Hammitt and Cole, 1987, p. 175). Managers hope to create a minimum impact ethic in recreationists eventually leading to permanent behavioral change in visitors. Allen and McCool (1982) similarly stressed the importance

of "awareness" in their linear version of the model that addresses relations between participation in outdoor recreational activities and REB. In their model exposure to natural environments leads to increased awareness and environmental sensitivity to personally caused impacts. Increased awareness facilitates development of an environmental ethic and provide intrinsic motivation to conserve energy and minimize impact on the environment.

Ajzen's (1985) Theory of Planned Behavior relates attitude and behavior. Behavior can be predicted by understanding the intention to perform an action. Petty and Caccioppo (1986) outlined a framework for understanding the processes responsible for changes in attitudes and sensitivity. In their model, attitudes are a predisposition to evaluate other people, objects, and issues as either favorable or unfavorable to their beliefs. A person's evaluation and interpretation of new information, as well as the subsequent integration of thoughts and feelings into memory, are the critical determinants of attitude and behavioral change .

The National Park Service contributed to educational efforts in the late 1970s. The Park Service completed an investigation using an attitude scale to measure shifts in environmental concern among park visitors. Dunlap and Van Liere (1978) developed the "New Environmental Paradigm" (NEP). The NEP is an inventory of 12 Likert-scale questions designed to measure attitudes about the environment in general. It demonstrated reliability and validity in its ability to equate attitudes with beliefs. Dunlap (1992) developed the "New Ecological Paradigm" in response to criticism of the scale's lack of uni-dimensionality by Albrecht, Bultena, Hoiberg, and Nowak, 1982.

Fazio's (1986) "Process Model" attempted to explain how behavior is influenced by attitudes. He defined "attitudes" as a memory association between an object and how it is evaluated. The major determinant of the attitude-behavior relationship is the ability to spontaneously access one's attitude from memory. Attitudes are influenced only with spontaneous behaviors stemming from perceptions of the immediate situation. For those behaviors that are deliberate or even pre-planned, Fazio (1990) conceded that Ajzen's (1985) model is more appropriate. He proposed that motivation to act, as well as the opportunity to do so, are the critical delineating factors of the two models. These results are affirmed by Hammitt and Cole (1987):

> The motivating force behind one's recreation, the group context within which behavioral acts are carried out, and one's education and past experience with a particular activity all have an influence on whether wildland recreation is

conducted in an appropriate manner that leads to minimal levels of resource impact (p. 188).

Bandura (1986) provided his "social-cognitive theory" as a framework to aid in understanding the attitude-behavior relationship. Attitudes are insufficient to explain behavioral responses. Other intervening or moderating variables may be necessary to translate attitudes and intentions into behavior. For example, the social-cognitive theory views anticipated personal consequences as an important determinant of behavior, whether such expectations stem from personal experience, observed experiences of others, or cognitive reasoning processes. If motivation is lacking, correct behavior may not result even though the person is aware, positive, and sensitive. Additionally, new actions or skills, whether directly experienced or learned through role-modeling, may be necessary to produce behavioral change. Persons who are respected might serve as effective role-models of appropriate behavior. Personal assessments of one's capabilities, as well as judgments of one's self-efficacy and competence, increases the persistence of a behavior.

Ownership Variables

Ownership variables make environmental issues personal (Hungerford and Volk, 1990). An understanding of issues is crucial to ownership. An understanding of the nature of an issue and its ecological and human implications will temper attitude, philosophic perspective and ultimate behavior. Personal investment in an issue or place is a major factor in the ownership variable. A person is invested in an issue or place if he/she has a "proprietary interest in it which induces motivation to act." This need not be an economic nor anthropocentric motivation but rather biocentric motivated by a strong personal need for stewardship of intrinsic ecological values (Hungerford and Volk, 1990). Pruneau and Daigle designed a model to induce ownership with place attachment (Pruneau and Chouinard, 1996). The model is based on intuitive knowledge about ownership. This bioregional perspective targets rehabilitation and protection of one's immediate region. Participants discover where and how they live. They become devoted and interested their milieu and participate in management and use of their resources (Sale, 1991). The Pruneau and Daigle model has four stages.

1. The learner is invited to perceive his or her environment in order to appreciate, criticize, and know it (Adams, 1991; Van Matre, 1990).

2. The teacher provides allows students the opportunity to share his or her experiences, information, preferences, concerns, and objectives related to his or her environment (Thomashow, 1995).

3. The teacher provides an opportunity for students to develop a vision of his or her future environment (Hicks, 1996; Inayatullah, 1993).

4. The learner is invited to take positive action to improve his or her environment (Hungerford, et al., 1980; Hungerford and Volk, 1990; Sakofs, 1987; Sia, et al., 1984; Stapp, 1970; Stapp and Cox, 1979).

According to Pruneau and Chouinard (1996), positive effects on the participants' relationship with their environment would occur. Students would: (a) be more protective of their place in terms of prevention from change, (b) increase the number of people conscious of their needs in their milieu, (c) be are able to recognize areas of deterioration; d) avoid engaging in environmentally destructive behavior, and (e) get involved in projects to initiate improvements in their milieu.

Pruneau and Chouinard (1996) conducted three studies: (a) third grade students for nine months, (b) fourth grade students for nine months, and (c) fourth grade students with senior citizens for ten months. The results show an increase in perceptive skills specifically relating to the senses of sight, touch, and hearing. Significant changes in relationships the students had with their environment, "especially concerning an awareness of the quality of the surroundings and desire for action resulted.

Empowerment and Locus of Control

Personal empowerment and locus of control can be improved with guided practice and specific skills training. This spawned investigations into the relationship between locus of control (LOC) and environmental action (Bandura, 1986). Tomera (1979) first investigated the connection between LOC, empowerment and environmental action with her four item forced-choice scale instrument (Smith-Sebasto, 1992). Campeau (1982) developed the "Perceived Environmental Control Measure," a situation-specific LOC questionnaire. Smith-Sebasto (1992) developed and tested a new instrument, the "Environmental Action Internal Control Index" (EAICI). The EAICI is based on Sia's "Index of Environmental Action Knowledge" and the "Environmentally Responsible Behavior Inventory", a self-reported survey of environmental action (Sia, et al., 1984). Unlike previous instruments, the EAICI could be used to accurately classify those who are likely to be "high environmental action takers" versus low action takers on the basis

of scores. The correlation between perceived knowledge of environmental action and skill using these strategies coupled with environmentally responsible behavior could be analyzed.

Behavior Change Assessment

Research addressing environmentally responsible behavior was operationalized in 1990 with the *Environmental Literacy Instrument* (ELI) (Bluhm, Hungerford, McBeth, and Volk, 1995). The ELI was based on objectives outlined at the 1978 Tbilisi Declaration and on research into the precursors of responsible environmental behavior (UNESCO, 1978).

Faculty at the University of Wisconsin-Stevens Point coordinated the National Environmental Literacy Assessment Project with Southern Illinois University, Florida Institute of Technology, and University of Tennessee-Knoxville in 1993. This was part of the National Project for Excellence in Environmental Education under the leadership of the North American Association for Environmental Education (NAAEE) with funding from the National Center for Environmental Education and Training and the Environmental Protection Agency (EPA) (Bluhm, et al., 1995). The objectives were to: (a) develop a framework for assessing environmental literacy, (b) develop and validate instruments for assessing environmental literacy, and (c) conduct an assessment of environmental literacy within small -scale and national samples. Assessment of environmental literacy was to be completed within four groups: (a) middle school students, (b) high school students, (c) pre-service teachers and (d) practicing teachers (Bluhm, et al., 1995).

The ELI framework and assessment instruments were pilot tested and validated with small-scale assessments involving schools from five states. The project began the process of providing a "snapshot" of the status of environmental literacy of the nation. The middle school component, the first edition of *The Middle School Environmental Literacy Instrument* (MSELI) was completed and validated in 1993. It is a compilation from three sources: (a) the revised fourth edition of the ELI as the basis for the instrument, (b) new material developed specifically for the MSELI, and (c) portions of an ecological foundations assessment instrument developed at the University of Wisconsin-Stevens Point (Bluhm, et al., 1995).

Bluhm et al. (1995) found a high degree of validity and reliability in the MSELI. Both the ELI and MSELI assume environmental literacy should test for the acquisition of

variables that appear to impact responsible environmental behavior: a) issue awareness; b) ecological foundations; c) issue analysis; and, d) citizenship action. Middle school students were tested on issue investigation and their knowledge of ecological foundations, knowledge of actions, their belief in their ability to use action strategies (LOC), their own reported overt environmental behavior, and their ability to identify appropriate issue statements.

The objective of the MSELI is to identify environmental education needs and to guide planning of district, state, and national efforts to address these needs. To ascertain environmental literacy levels in the United States, the MSELI should be used in as many national samples as possible and in different geographic regions. A pre and post exam as a tool to assess EE programs is essential.. The developers of the MSELI stated their concern about its length. "Additional research is recommended to determine whether the instrument, in its present state, is a necessary literacy measure or if a shorter version could function as well" (Bluhm, et al., 1995).

Wilderness Recreationist Behavior

Numerous studies attempted to assess the effectiveness of resource agency's information and education programs by observing recreationists' behavior (Roggenbuck and Manfredo, 1989; Roggenbuck, 1990; Swearingen and Johnson, 1994; Thornburgh, 1989). Recreationists are more likely to comply with a "threat of punishment" rather than ecological explanations when (Swearingen and Johnson, 1994). Threat of punishment align with Kohlberg's lowest level of motivation but controls immediate behavior only and will not transfer to other areas (Kohlberg and Candee, 1984).

Krumpe & Brown (1982) found that 30% of visitors to Yellowstone National Park backcountry changed their planned routes when given alternatives from a "backcountry trail selector" at the ranger station. Oliver, Roggenbuck, and Watson (1985) determined site-specific information about appropriate behavior can reduce recreationists' impacts. However, Stubbs and Roggenbuck (1994) are pessimistic about educational programs that attempt to persuade users to make correct low-impact judgments where appropriate behavior is ambiguous or complex. Paul Petzoldt (1974) supports this conviction believing rote memorization of rules (or codes of ethics) does not work. Only through ownership in decision-making can lasting judgment skills and ethics occur (Hampton and Cole, 1988; Petzoldt, 1974). Passineau (1990, 1994) suggested a more "holistic approach" to teaching wilderness ethic since ambiguous situations are normal in

backcountry travel. Thornburgh (1986) found general (holistic) minimum-impact camping programs were not effective unless recreationist clearly identified problems and necessary actions. When six techniques were compared, the most effective strategy allowed for no ambiguity of desired behavior. Generalized educational programs can teach ethical care for the land but many specific behavioral recommendations must be site-specific (Hammitt and Cole, 1987, p. 270). Effective wilderness information programs must coincide with ethical decision-making. This can not be accomplished with a brochure, the most widely used method for site-specific wilderness education (Cole, 1994).

Wilderness Leadership Education

Site- specific education programs must be supplemented with specific strategies that address: a) self-cognition, b) terminal values, and c) higher level cognitive processes (Gray, Borden, and Weigel, 1985). With this formula, enhanced awareness, sensitivity, and wildland ethics, gained from outdoor experiences should transfer to future environmental contacts. This would occur through "stimulus generalization," behavioral transference into recreationists' everyday lives, an added outcome of wilderness education programs (Cockrell, 1991; Hampton and Cole, 1988). Gass (1985) described three types of behavioral transference that might occur following wilderness education: a) specific transference where students continue to use practices on subsequent trips to similar environments; b) non-specific transference where students seek ways to minimize personal impact on life forms in other settings; and, c) metaphoric transference where students perceive minimum-impact techniques as symbolic of a lifestyle actualized on a daily basis. The transferred principles are not equivalent but are analogous or metaphorical to those learned in the initial experience (Cockrell, 1991). Therefore, influence might extend to personal recycling and sewage disposal decisions, alternative transportation choices, or conservation activism and voting practices.

Several national outdoor adventure organizations such as Wilderness Education Association (WEA) and National Outdoor Leadership School (NOLS) use programs to teach wildland ethics. They foster wildland ethic through applying minimum-impact, Leave-No-Trace (LNT) camping techniques. Participants in WEA programs develop appreciation for wild places through shared adventures. This will ultimately generalize to appreciation for all natural resources and awareness of the interconnectedness of life forms on the planet (Cockrell, 1991, p. 1). Values and biocentric perspectives evolve

through educational wilderness adventures, but not automatically--they must be deliberately planned (Cockrell, 1991; Simpson, 1985).

The curricula of national wilderness education programs are based on values and educational behavior research. Many experiential education courses are ineffective because wilderness leaders believe trip participants will automatically develop a sound environmental ethic as a result of mere exposure to the overwhelming beauty of the wilderness (Simpson, 1985, p. 23). Simpson's (1993) recommendations for enhancing minimum-impact training effectiveness and augmenting metaphoric transference have been adopted by WEA as integral part of their trips. In each class WEA instructors: a) explain the natural systems involved and logic behind minimum-impact actions; b) turn the decision-making process over to the students; and, c) explicitly link minimum-impact behavior with environmental ethics (Cockrell, 1991).

WEA Program Curriculum

Cockrell (1991) states that "the WEA way is not the only way" he says that "it is a way that works!" (p. 2). WEA claims to avoid the shortcomings articulated by Gray and Simpson by maintaining a clear and consistent focus on the curriculum.
WEA's 18 point curriculum balances technical skills with group skills, wildland ethics education, and wilderness management. WEA's emphasis on student assessment insures participants possess a minimum standard of competency set forth by the curriculum.

The curriculum is research based. The Environmental Ethics and backcountry conservation practices' activities are the primary vehicle for teaching wildland ethics Instruction in natural history, resource management and environmental advocacy also play important roles (Cockrell, 1991). The wildland ethics portion of the WEA curriculum has evolved over time; the seminal work accomplished by Paul Petzoldt at the National Outdoor Leadership School in the 1960's and 1970s. The entire curriculum (Appendix C) includes: a) foundation (18 concepts) in formal classes, b) focusing on careful planning throughout, c) lessons providing practice in decision making, d) continuous instructor modeling, e) thorough debriefing , f) follow-up and built-in evaluation, g) taking opportunities for "teachable moments." Each are considered crucial techniques for maximizing the transference of wilderness lessons to future lives (Cockrell, 1991).

Cockrell (1991) stated WEA's emphasis on maximizing transference of ethical learning and practices from the course to student's home life is accomplished through a nine step process.

1. Design conditions for transfer before the course activities begin with behavioral objectives and applications that are appropriate to desired skills students will demonstrate.

2. Careful planning to enhance transfer of environmental ethics by teaching and practicing how to live comfortably under wilderness' terms. Plan and be prepared to know how and when to modify particular practices with ideas of how these practices can serve as metaphors for environmental ethics in everyday life. Avoiding survival situations lessens recreational impacts upon the wilderness (Cockrell and Detzel, 1985; Petzoldt, 1984). Desperation encourages construction of unethical fires, selection of unethical campsites, gear abandonment , careless food storage, and improper waste disposal. To WEA, the time, energy and climate control plans in the curriculum are also resource conservation plans.

3. Role model environmental values. Mentor-ship is a key element in development of a strong commitment to the environment (Orr, 1991). Teachers model appropriate behavior, over significant periods of time, prepared with logical explanations for approval and disapproval of student's behavior (Bennet, 1988; Besick, 1992; Howe and Disinger, 1989; Lemming, 1993; Lickona, 1983; Lickona, 1991; Sichel, 1988).

4. Practice using the decision making process for environmental ethical concerns; The feature of the WEA curriculum that distinguishes it most from other outdoor leadership programs is it's emphasis upon theoretical and experience-based judgment and decision-making ability as the necessary foundation of all outdoor leadership competence (Cain, 1991), p. 13). Decision making implies that there is a choice to be made among alternative courses of action; the process of making choices requires judgment, which is only one aspect of the decision-making process.

Teaching good judgment relative to environmental ethics is similar to the process of environmental values education (EVE) espoused by several environmental educators. When decisions lead toward selection of final goals, they are called "value judgments"

when they involve implemcntation of these goals they are "factual judgments" (Simon 1976, p. 4). WEA incorporates Simon's "value judgment and factual judgment " research by applying the "Normative Model" as outlined by Reitz (1977): a) objective setting, b) problem or issue recognition, c) problem evaluation, d) exploring alternative solutions, e) assessing alternative solutions, f) choosing between alternatives, g) acting, i.e., execution of chosen plan, and h) evaluation of outcome and consideration of subsequent decision making and actions (Cain, 1991).

Phipps (1986) developed and tested a group dynamics teaching model for use on WEA courses . The model is based by Hersey and Blanchard's model of situational leadership and Jones' (1973) model of group development. It systematically teaches nine basic "units" of leadership competence, continually assessing changes in students' leadership behaviors and group interaction patterns: a) group development, b) expedition behavior, c) feedback, d) conflict strategies, e) conflict resolution, f) group dynamics, g) role functions in groups, h) defense mechanisms in groups, and i) group dynamics questionnaire. Phipps (1991) reported improved leadership behaviors and attitudes as well as more positive group dynamics on those courses using the teaching model.

5. Didactic communication of information through classes and readings. Courses and readings in: a) wildland ethics, b) ecology, c) site-specific natural history, d) resource planning and management, e) impact analysis, and f) environmental advocacy (Cockrell, 1991, p. 77-78).

6. Opportunity teaching aligns abstract concepts with reality. Cockrell (1991) stated timing is critical. Interest, curiosity and motivation must be developed through direct experience before the provision of information can have maximal effect. The principle of opportunity teaching is the same as in timing classes. When curiosity and motivation are strong, information has a better chance to be integrated into cognitive structure and associated with positive feelings. It is therefore critical in building wildland ethics.

7. Thorough processing (e.g., debriefing, journals, application) enhances transfer of values. Processing encourages students to reflect, describe, analyze and communicate the relevance of learned material (Quinsland and Van Ginkel, 1984). The nonspecific and metaphoric transference of ethical practices depends on reflection about the meaning of

principles and their application. Processing should occur though "morning meetings," campsite "inspection" conducted by peer review, individual student-instructor interviews at midcourse and final evaluations, personal reflection and journal writing (Cockrell, 1991).

8. Provide opportunities for "peak experiences" as a potential for implementing wildland values and enhancing biocentric philosophic perspectives (Borden, 1985). Borden found people who are ecologically concerned derive pleasure from experiencing the intrinsic values of nature. As a result, they may experience shift in ethical perspective through each experience feelings of renewal or being "at one with" the environment (i.e. sense of place).

9. Post course activities specific to environmental ethics will sustain transference of ethical behaviors. WEA can provide numerous activities and suggestions relating to effectively incorporating LNT activities in other wilderness travel and to their home environment. As part of WEA course requirements students can systematically report on their accomplishments in this endeavor.

Effects of Wilderness Education Programs

There is a lack of research exploring the overall effects of wilderness education programs on wilderness purism, ethical perspectives, and behavior. Researchers Born and Wieters (1978) compared change in environmental attitudes in adolescent participants who participated in nine-weeks of wilderness expedition. They used the Hendee et al. (1968) wilderness purism (Wildernism) scale and a test of their own, the Natural Environment Awareness Word Association Test. They found a significant increase in environmental awareness and purism with the greatest change occurring in individuals who initially were at a relatively low level of environmental awareness. Perdue and Warder (1981) concluded that a 17-day backcountry trip, part of a University of Wyoming wilderness survival course, resulted in more favorable environmental attitudes six weeks following the class. Although there was no assessment for changes in environmental behavior, a majority of the participants experienced a slight negative attitude change during the on-site activity, almost all participants experienced a substantial change toward more favorable attitudes six weeks later. Other researchers found favorable shifts in student's attitudes following extended outdoor adventure-

education programs but no support for environmental attitude changes (Andrews, 1978; Gillett, Thomas, Skok., and McLaughlin, 1991; Hartung, 1973; Shepard and Speelman, 1986). McRae (1986) examined four high school student wilderness camping trips in Australia (N=49). Minimum impact camping practices were used but not discussed. Student attitudes were assessed by observation and through interviews before the trips, one week after, and one year after the class. McRae indicates participants showed greater commitment in three areas both immediately and long after the trips: a) minimum-impact camping techniques, b) wildland ethics, and c) interest in environmental concerns and issues.

Hammitt (1995) used the New Environmental Paradigm (Dunlap, 1992) to quantify the effects of a NOLS course on student's behavior, intentions, and attitudes as they pertain to the environment. He hypothesized an increase in these concerns would result in a metaphoric transference of minimum-impact ideology to daily life. Although he did not have control groups, he concluded that the course had significant positive attitudinal changes and student's self-reported behavior was significantly more environmentally responsible after NOLS. He indicated, although positive attitudes remained four to eight months after the course, reported intentions of appropriate behaviors did not.

Hanna (1995) quantified and compared shifts in wilderness knowledge, attitudes, intentions, and behavior due to outdoor-adventure based (Outward Bound) and ecology-education (Audubon Field Ecology) programs. Her longitudinal study found a relatively weak link between wilderness-related intentions and related self-reported to behavior six-month following the program. Hanna's results indicate people exposed to either field ecology or adventure-education programs increase their knowledge about the natural environment and how to travel in it, and their attitudes towards wilderness preservation. She suggests physical and affective adventure-education programs can have substantial impacts on participants' ethical perspectives because the Outward Bound students exhibited the most significant gains in ecocentric attitudes. Hanna concludes though, without a concomitant understanding of wilderness systems and a demonstrated reasons behind appropriate minimum impact behavior, these student's motivation to act on behalf of wilderness dissipated quickly.

Mapping and Planning

Both public opinion and place identification have played roles in pro-active resource management planning. Sample (1994a) stated "many public concerns expressed during resource management planning are motivated by a sense of place, a concern over what the consequences will be for a particular location [that is] of special value or interest"(p. 8). Williams (1995), claimed that the time for management to be concerned with the public's regard for place identification is now. Resource managers must recognize ecosystems and resources are as much a social and individual construct as they are scientific. Therefore, public input regarding personal meanings and values of place have become increasingly more substantial. Bader (personal communication, September, 1994) declared that public input may guarantee compliance with the Wilderness Acts' "recreational use and enjoyment clause" and in the process, secure a means for ecosystem protection .

According to the literature, the public's ideas, perceptions, and conceptions can be spatially operationalized within the management planning process. By incorporating the public's opinions and beliefs into resource planning, managers can both interpret previously indeterminate factors and insure that all stake-holders embrace the decisions made. The ability to spatially represent "those resources and elements of the environment that are relevant to the decision making context" is an essential aspect of resource management planning (Kliskey, 1995). Geographic information systems (GIS) technology is an effective tool in wilderness management, planning, and decision-making. GIS can provide resource managers with the mechanism to develop a spatial framework for planning strategies to achieve a "spatial conceptualization of solutions" (Fagence, 1990, p.6).

Public Involvement

Friedmann (1979), wrote that an active society is one with a stake in its own future and the desire to create, out of that future, a better place or "good society." The precedence has been set for using recreationists' perceptions of wilderness as a model for preservation. This is demonstrated in two areas of planning and management that resource managers: (a) support of public input for planning and management, and (b) recognition of the value of place meanings and their mapping for planning and management. Resource planners have recognized the need for public input into the planning process. This is especially true through the transactive planning process which

evolved as a response to traditional forms of planning (Friedmann, 1989; McCool, et al., 1985). Its application in recreation management has proven effective in meeting citizen needs and enabling mangers to implement new programs. The transactive planning process can be employed with success in recreation and land management. It is premised on citizen initiative and participation in both the planning and action phases of resource management.

As early as the 1960s, one of the authors of the first LAC documents used public involvement and a map exercise to identify perceptions of wilderness based on different recreational activity groups (Lucas, 1964). The proportion of recreationists perceiving a given place as wilderness by combining individual's responses was determined. In the Boundary Waters Canoe Area, a distinction could be made between paddle canoeists and motor boaters.

In 1982 a planning team was called upon to develop a recreation management plan for the Bob Marshall Wilderness Complex (BMWC). Management determined the primary reason BMWC wilderness conditions were so degraded was because of the "poor implementation of past plans" (Ashor, McCool, and Stokes, 1985). They decided to employ a transactive planning approach in concert with a nine step LAC planning system. They believed that the transactive planning process was required to make LAC more effective and responsive to citizens' needs. A task force was formed consisting of managers, planners, researchers, specialists, users, and concerned citizens to compare the transactive planning process to the more traditional approach. The analysis compared transactive planning with the more traditional approach as used in the Rattlesnake National Recreation Area and Wilderness (RNRAW). In the RNRAW, public opinion was solicited in a reactive capacity. The public was asked to comment only on proposed alternatives. No working groups were formed to formulate ideas or alternatives.

Findings of the task force showed that transactive planning in the BMWC process was "more effective in promoting dialogue and mutual learning than the synoptic approach utilized in the RNRAW effort" (Ashor, et al., 1985). It was deemed beneficial in providing the necessary framework of participation to successfully implement the LAC decision making process.

Roggenbuck et al. (1993) obtained recreationists' opinions in an attempt to define acceptable LAC standards for wilderness conditions. This was one of the first attempts to include as many as four wilderness areas in a simultaneous survey of recreationists' opinions of LAC applications. Recreationist's attitudes and standards of acceptable

conditions were remarkably similar across the four diverse wilderness areas. Based on these results, the Roggenbuck et al. study suggested a few wilderness areas with diversity in use patterns and user characteristics be polled. Managers could use this information to provide a wider range of wilderness experiences if results indicated this was appropriate. Wilderness areas could also be mapped and zoned for different experience opportunity classes with different condition standards established in each zone. Managers could work towards shaping recreationist behavior, rather than limiting use or access. "Through [an] appropriate application of education, persuasion, and rewards and incentives" managers could reduce behavior problems as well as help recreationists locate the specific zone, or an alternative wilderness area, which would meet their experience requirements and desired conditions. (Roggenbuck, et al., 1993, p. 196).

The early work of Lucas (1964) is substantiated in recent literature. Resource managers can use transactive planning to help identify ecosystem components and assess their various values (Williams, 1995, p.4). Managers definitely should "look at the public's sense of place as a resource." According to Williams et al. (1992) "natural resources are not just raw materials to be inventoried and managed as a commodity, but also places with a history, places that people care about, places that embody a sense of belonging and purpose that give meaning to life" (p.44). Values of natural resources reflect the non-market values of: (a) a functioning ecosystem, (b) a local or national heritage, (c) an ancestral lifeway, (d) a recreation opportunity, (e) scenic views, (f) a rare habitat, (g) valued commodities (e.g. clean air and water, or (h) a sacred rite. These values intersect and thus compete in the non-cash 'public' marketplace.

Williams (1995) identified studies showing how a variety of public involvement efforts can be structured to identify and map areas that can accommodate development while preserving areas that are symbolic of community and individual identity. Distinguishing spatially generalized values regarding public lands policy from place specific meanings and values is very important. "These efforts demonstrate that the public can identify and classify land units that hold varied and often intangible meanings" (Williams, p. 24).

Hester (1985) provided an early example of Williams' work. He attempted to map the sacred structure of a small North Carolina coastal community that was considering tourism development. A variety of techniques were used to determine places within the community that residents deemed sacred or special. After completing a community goals survey, behavioral mapping, and interviews. A list of "important places" was assembled.

The townspeople were then asked to rank and identify the places where modification could be tolerated. A map became the basis for two zoning ordinances and a land-use plan.

Since the behavioral mapping values represent areas located in space, they are capable of being mapped or referenced in a GIS system (Williams, Patterson, Roggenbuck, and Watson, 1992). A GIS transforms abstracts into concrete expressions. The publics' ranked-valued areas can be expressed as polygons of various colors and sizes on a map along with physical features. Decision-making and predicting can be made with public input because impacts and even synergistic effects can be displayed rapidly and inexpensively. The potential use of GIS could revolutionize transactive wilderness resource planning and management.

GIS Technology

Geographic information systems is a powerful tool capable of organizing, analyzing, and displaying spatially explicit data, yet it is not being extensively used in wilderness land management. GIS offers advantages over conventional approaches to planning and management. The technology can accommodate large spatial data sets with speed and accuracy.

GIS is an "organized collection of computer hardware, software, and geographic data, designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information" (ESRI, 1990). A GIS stores sets of attributes in a series of records and links attribute sets to geographically referenced objects. Similar objects are organized in layers, also referred to as *themes* or *coverages*. Examples include roads, stream networks, and topographic contours. A GIS graphically display layers, combines layers, and conducts spatial analyses within a layer or among the elements of two or more layers (ESRI, 1990). GIS can answer four types of questions: a) attributes associated with a particular location (e.g., date, location coordinate, vegetative type); b) areas meeting specific criteria (e.g., impacted campsites beyond five miles from a trailhead and those within five miles); c) existing spatial patterns (e.g., informal campsite locations above 5,000 feet on south facing slopes); and d) impacts of change (e.g., improved trail, bridges, purist habitat lost).

A GIS allows the user to increase the accuracy and speed of a response allowing decision makers to evaluate various management scenarios and make more informed decisions. It provides new opportunities for wilderness managers who can make

predictions of impacted areas, user distributions, locations of special places, or classify boundaries of given habitats at spatial scales depending only on the limitations of input data.

GIS and Wilderness Management

A GIS is a valuable management tool for spatial representation of ecological and perceptual components (Carroll and Hinrichsen, 1993; Carver, 1996; Hendee, et al., 1990; Kliskey, 1994; Lesslie, Mackey, and Preece, 1988; Merrill, Wright, and Scott, 1995; Ouren, Hummel, Eley, Sestak, and Riebau, 1994). Mitchell, Force, Carroll, and McLaughlin (1993) described how several planning technologies and frameworks are amenable to incorporating both utilitarian and place perspectives. They explained, with examples from the Tongass National Forest's Environmental Impact Statement, how GIS was used to record areas with special meanings of attachment and how it was used to evaluate the impact to these sites on forest planing alternatives.

Cornett (1994) used public involvement in what he termed a "near interactive GIS process" in resource planing and decision making in Cooper Landing, Alaska. He described how in a public workshop, residents attempted to define the conditions they desired in the landscape surrounding their community. Cornett explained that with GIS the communication inherent in visualization went beyond just having a picture; with GIS *pictures* represent *real places* on the ground. He discovered that with GIS management he had a new ability to deal with planning suggestions or alternatives. The public could discuss the desired condition of a specific piece of ground and then their suggestions or "what if" questions could be answered immediately. The public's planning ideas and suggestions could be spatially displayed upon maps of real places about which they were truly concerned. Similarly, management could use these ideas in their planning, assured of public ownership and support.

Studies by the National Wilderness Inventory (NWI) in Australia have used GIS to successfully identify wilderness areas on the basis of four factors: (a) remoteness from settlement, (b) remoteness from access, (c) apparent naturalness, and (d) biophysical naturalness (Lesslie and Taylor, 1985). These were mapped according to specified criteria and overlaid to define the boundaries of wilderness areas. Minimum indicator thresholds were applied in the NWI to exclude areas which do not meet minimum levels of remoteness and naturalness, thus making an absolute distinction between wilderness and non-wilderness land use.

> Lesslie and Taylor explained the reasons for using these four indicators:
> Both remoteness and primitiveness (naturalness) are composite attributes which cannot be assessed by any single indicator. Remoteness is a function of proximity to settlement and accessibility for settled people, but these need not be coincidental. For example, an area may be remote from settlement yet relatively accessible to settled people due to the presence of a road. Primitiveness (natural) due to the perceived absence of any aesthetic disturbance by settled people, but the area may, in fact, be significantly degraded by such influences of settled people as the introduction of exotic plants and animals. Conversely, an area aesthetically disturbed by structures such as vehicular tracks, bores, power transmission lines, or scientific monitoring stations need not have suffered any significant biophysical damage (p. 18).

Lesslie, Mackey, and Preece (1988) used the wilderness continuum process with a spatially-referenced and numerical analysis GIS data base. Appropriate wilderness assessments can be derived for wilderness managerial decision-making. Their process identified factors that contribute to or detract from wilderness quality, and the influence each factor exerts. Maps, displaying the distribution of wilderness indices can be generated rapidly and inexpensively with GIS. Lesslie, et al. also illustrated how a GIS based evaluation procedure could be readily applied to a wide range of environments subject to varying degrees of remoteness and modification by human activity.

Kliskey (1992) defined and mapped recreationists' perceptions of wilderness with GIS. He accomplished this through a four-stage methodology he called wilderness perception mapping (WPM) that: (a) distinguished varying "levels" of wilderness perception; (b) applied backcountry users' perceptions of wilderness settings as educed through a purism scale; (c) translated the purism data into spatial indicators; and, (d) mapped the spatial extent of these perceptions using GIS.

After determining the public's diverse wilderness perception levels, Kliskey identified four general properties of wilderness which were correlated with Lesslie and Carver's four wilderness factors and expanded to: (a) absence of human impact (i.e. artifactualism); (b) aspects of forest and vegetation (i.e. naturalness); (c) isolation or remoteness; and (d) solitude. Each factor was then matched with associated indicators identified from his 14 item purism scale. These were then expressed in spatial terms which allowed incorporation within a GIS environment for each level of perception. Kliskey's resultant map coverages for each of the four perception levels were

successively overlaid to produce a composite map coverage of all four levels of wilderness perception (Kliskey, 1994).

GIS based multi-criteria evaluation (MCE) routines were developed in the planning and operations research fields. MCE was used for evaluating discrete decision choices between a limited number of choice alternatives on the basis of multiple criteria and objectives. It has been adapted for use with GIS (Carver, 1991; Carver, 1996; Eastman, Kyem, Toledano, and Weigen, 1993; Jankowski and Richard, 1994; Pereira and Duckstein, 1993). Carver (1996) used a MCE framework in an exploratory investigation for wilderness in Britain. He applied numerical and qualitative criteria to the four wilderness factors as identified by Lesslie and Taylor (1985). MCE techniques were used to map the wilderness continuum on these factors. Carver argued that the key issue reflected in Nash's (1982, p. 1) statement "one man's wilderness is anothers' roadside picnic ground," is that this "not only refers to that point along the continuum at which a person considers that wilderness begins, but also to the relative importance a person may place on particular factors affecting the wildness of the landscape"(p. 3). According to Carter it is essential to use a weighted linear summation model and standardization to analyze each of the four factors of wildness.

MCE can be used to evaluate the suitability of wilderness falling within the feasible areas identified using standard GIS overlay procedures. His resulting maps described: (a) remoteness from population, (b) remoteness from access, (c) apparent naturalness, and (d) biophysical naturalness for the whole of Britain. These were combined with user specified factor weights and simple weighted linear summation models. Different continuum maps were produced by applying different factor weights reflecting the various publics' perceptions of wilderness (Carver, 1996).

The literature illustrates how public input can be compiled, analyzed, and mapped to elucidate meaning for special places and special wilderness experiences. The rationale for adopting spatial information to support management strategies is derived from functional attributes of the planning process which are enhanced by invoking a spatial framework. GIS, as a spatial decision tool, provides relevant spatial framework for natural resource management. Many of the individuals and organizations that seek involvement in resource and wilderness planning:

> ...do so out of a concern for a special place--a watershed important for high quality water for municipal needs, a riparian area along a quiet trout stream, a

> picturesque mountainside in view of a popular hiking and recreation area, a favorite elk-hunting spot visited year after year" (Sample, 1994, p. 347).

Public participation is not just input of ideas; it includes the discovery of meaning and value and a component in the negotiation of meaning. Resource managers must recognize that they are both facilitators of and participants in a process of negotiating the meaning and use of specific places in the landscape best achieved through a collaborative transactive process (Williams, 1995).

CHAPTER FOUR
METHODS

The purpose of this study was to increase understanding of wilderness perception; explain how perceptions might be affected by education programs, and explore a method of application for management and planning. The three questions that guided this research were:

1. What are the dimensions of the "wilderness experience" and wilderness purism (wildernism); how can they be described in ways that yield indicators of limits of unacceptable change in wilderness?

2. How are these indicators affected by wilderness educational experiences?

3. How can these findings be applied to aid wilderness management and planning?

This chapter is divided into three sections. The first explores the multi-dimensions of the wilderness experience. The dimensions are identified and assessed. Respondents are grouped to survey tests according to their standards of wildernism. The responses are correlated to other scales and data which describe wildernism. The second section addresses the hypotheses that a wilderness education experience will make a significant positive change in each indicator of the wilderness experience. The third section describes a geospatial application employing the results from the Wildernism Scale and the Sense of Space Scale, and development of a Wilderness Typology with results of the three perception scales.

Survey-Tests and Sampling

This investigation evolved from a search to discover the impacts of wilderness education. Therefore, students in wilderness education courses, with venues either indoors or in the backcountry, as well as participants in recreational trips were assessed for change in subjects' standards of wilderness purism. It seemed logical that if wilderness purism changes because of wilderness education it would most likely transpire in a wilderness leadership education course where students practice wildland ethics and leadership throughout an extended field expedition class. A control groups of individuals who showed interest but did not attend wilderness leadership school were part of the research.

Both Wilderness Education Association (WEA) and National Outdoor Leadership School (NOLS) were perfect candidates as subjects for this study. WEA's national office offered to participate; they copied and distributed the survey-tests to the instructors as well as returned them for analysis. NOLS's national office opted not to take part. Each WEA course follow an 18-point curriculum which emphasizes developing leadership and judgment and decision-making skills above and beyond the mastery of technical skills (e.g. rock-climbing, kayaking). It incorporates Leave No Trace principles of wilderness ethics, along with land stewardship, effective group dynamics, and technical travel skills sufficient to move a group through the wilderness safely, enjoyably, and with minimum environmental and social impact. The student and instructor evaluations, and the national certification standards for courses are predicated upon mastery of skills and understandings delineated in the curriculum. Students are expected to demonstrate a comprehensive understanding of all components of the curriculum through their behavior and written and verbal exams.

Two recreation-oriented backpack trips were part of the research. The clients carried their own personal gear, but re-rationing of food and gear caching was provided. Cooking and all decision making was done by the leader-guides. All camping, travel, food storage, and sanitation techniques were taught as "wilderness rules."

College students from five semester courses participated. These were lower and upper division courses: Natural Resource Conservation and Policy; Alaska Environmental Education; Outdoor Recreation Management; Wilderness Concepts; and Wilderness Management.

A national sample of individuals who indicated interest but did not participate in wilderness leadership school were participated in the research. They did not attend courses or engage in a wilderness trip.

The five treatment-groups ($N = 111$) cover a spectrum of variables (Table 2) currently used to increase an understanding of recreational impacts to wilderness.

1. *National Standard Program* (NSP) treatment-group consisted of students who completed a month-long field portion of WEA courses ($n = 33$);

2. *Wilderness Steward Program* (WSP) treatment-group consisted of students who completed WEA's shorter (10 - 12 day field portion) courses ($n = 22$).

3. *Recreation Trip* (RT) treatment-group consisted of individuals who participated in a 10-day guided recreational/non-instructional wilderness trip either in Alaska's Brooks Range or California's Desolation Wilderness ($n = 9$).

4. *College Course* (CC) treatment-group consisted of students who were enrolled in Natural Resource Management classroom courses at the University of Alaska Fairbanks during the Spring 1996, Fall 1996, and Spring 1997 semesters (n = 36).

5. *Non-Participants* (NP) treatment-group consisted of individuals who showed an interest in but did not participate in a WEA wilderness leadership education course because of factors beyond their control (n = 11).

Table 2. Five Treatments categorized by four variables to help identify factors responsible for changes to wilderness purism

Treatment	Variable A Interest in Wilderness	Variable B Wilderness Course Curriculum	Variable C Field Course Venue	Variable D Interest in Wilderness Leadership
1. NSP	X	X	X	X
2. WSP	X	X	X	X
3. RT	X		X	
4. CC	X	X		
5. NP	X			X

Five universities and colleges, a non-profit organization and two private recreational guide services participated. The field courses and trips had a minimum of two instructors (lead and assistant) for a class size of six to eight participants. All groups represented an incidental self-selected sample. All were college students, professional educators, or moderately experienced outdoor recreationists who were either a) interested in the wilderness leadership education venue, skills and course content and who chose to take the course, or b) were self-selected for their interest in resource management issues, environmental education, or in actively perusing a ten-day or longer wilderness recreational trip. All subjects were of ages, ranging from 18-45 years; 54 are male, 57 are female. The 56 WEA students were from 36 different states, representing the various regions of the United States. Overall, the study had representatives from five countries in addition to Alaskans and contiguous US individuals; seven international students from Canada, New Zealand, France, and Russia participated in the research.

Sampling Procedures

The sampling plan was for each of the treatment-groups to be survey-tested before and immediately after their treatment. The survey-test was in two parts (Appendix B). The first included a Wilderness Perception Test with three scales: Wildernism Scale; Sense of Space Scale; and Wilderness Management Scale. The second part of the survey-test consisted of the Environmental Literacy Test. Treatment-group leaders were given instructions to administer a survey-test to their respected students or clients prior to and immediately after the treatment. The pre-treatment survey-test instrument was sent to the NP treatment, the prospective WEA students who did not attend a course or backpack. They were then sent the post-treatment test one month later.

The intent was for the Environmental Literacy Test to employ a Solomon four-group experimental design (Campbell, 1957). A random half-sample of the treatment-groups (identified as Test Group A) would be survey-tested prior to their treatment. The same document was to be given to the other sample-half of treatment-groups (identified as Test Group B) following treatment. There were problems employing this design. The Environmental Literacy Test takes an hour and instructors/guides had limited time, especially following treatment. Only one of Test Group B completed the Environmental Literacy test. Some administered the test prior to treatment, or not at all. Therefore the experimental design was modified. Only pre-treatment Environmental Literacy Test responses from entire treatment-groups were used ($n = 66$). Neither RT nor NP Treatment-Groups returned an adequate number of responses to be employed for analysis.

WEA Treatments

Affiliates in attendance at a WEA National Conference in March 1996 and those contacted by the WEA National Office communicated interest in participating in the research. Research packets containing all the survey-test instruments and sampling instructions were sent to the WEA National Office in May 1996. Reorganization within the administrative staff at the National Office contributed to unavoidable delays in distribution to affiliates. Complete packets did not arrive to affiliates until mid June; by this time some courses had already begun. It was decided that the one-year sampling period would run roughly from June 1996 through June 1997. This investigation encompassed all WEA affiliates offering WSP and NSP courses during this period.

Of the 38 WEA affiliates during the 1996-1997 investigation, 18 did not offer NSP/WSP courses or they had been canceled. Instructors of 11 other courses either did not receive materials in time or did not have the opportunity to complete the survey-test in their entirety. Others did not offer the appropriate courses for this investigation.

The WEA courses sampled were NSP or the introductory WSP. Five universities and colleges, and a non-profit organization participated. The length of the three NSP courses ranged from 21 days to a full semester. This latter course had a three to four week "expedition" in the field. The four WSP courses averaged 14 days with a ten-day expedition. There was a minimum of two instructors (lead and assistant) for a field class size of six to ten students. Sampling consisted of six courses with 56 subjects. To lesson impacts on wilderness, classes of nine or more students were separated into two expedition groups totaling 5-8 students each. The eight groups (five NSP and three WSP) from the five WEA affiliate organizations whose courses were sampled, completed the survey instruments in full, and returned them. These were: Colorado State University in Fort Collins, Colorado; Western State College in Gunnison, Colorado; Denali Foundation/University of Alaska, Fairbanks; State University of New York, in Postdam, New York; and Western Illinois University.

Recreation Treatment

Nine subjects were in the RT treatment-group, i.e., guided recreational based expeditions with from four to six clients per trip. Five were backpack clients on a guided wilderness trip in Alaska and four were clients in California. The subjects were sampled during the summer of 1996 and 1997 respectively. The clients carried their own personal gear, but some re-rationing of food and gear caching was provided. Cooking and all decision making was done by the leader-guides. All camping, travel, food storage, and sanitation techniques were offered as "wilderness rules" not instructed using a decision making or problem solving process.

Subjects went on a 12-day trip guided wilderness trip in Alaska's Brooks Range or a 10-day guided wilderness trip in California's northern Sierra Nevada near Lake Tahoe. Their guides administered the Wilderness Perception portion of the survey-tests before and immediately following the backpack trip treatment. The guides did not return the Environmental Literacy Test.

College Course Treatment

The CC treatment-group represented five University of Alaska Fairbanks (UAF) Natural Resource Management (NRM) three credit semester classes during the Spring 1996, Fall 1996, and Spring 1997 semesters. All courses were held on the Fairbanks campus (Table 3). These courses included:

- NRM 101; Natural Resource Conservation and Policy; 18 students
- NRM 462; Alaska Environmental Education; 11 students
- NRM 365; Outdoor Recreation Management; 3 students
- NRM 463; Wilderness Concepts; 2 students
- NRM 464; Wilderness Management; 2 students

The Wilderness Perception Test and Environmental Literacy portions of the survey-tests were administered during the first weeks. The students completed the post-treatment Wilderness Perception Test at the end of the semester, 12 to 15 weeks later.

Table 3. CC treatment-group wilderness management course descriptions

Natural Resources Conservation and Policy — Fall 1996. The UAF undergraduate catalog described NRM 101 as: Concepts, management practices and issues/concerns associated with the conservation of natural resources; natural and social science aspects of resources conservation and policy; resource commentaries and discussion sessions; providing opportunities for developing a personal philosophy related to natural resources.
Alaskan Environmental Education — Fall 1995 and Fall 1996. The NRM 462 course is described as: Designed to introduce educators and natural resource management personnel in the role education must play in ecological literacy and environmental sustainability. Students will be introduced to methods that will aid others to live consciously with the natural world and to increase their understanding of and connection with the earth and its inhabitants. They will have opportunities for developing a personal philosophy related to natural resources. They will be able to evaluate and create educational programs that help people understand the processes and limitations of earth's systems and how to achieve an appropriate sustainable way of life.
Outdoor Recreation Management — The UAF catalog described NRM 365 as: Theories, practices, economics, philosophies, and problems fundamental to the use of wildland and related natural resources for recreation.
Wilderness Concepts — The UAF catalog described NRM 463 as: Discovery of wilderness concepts including history of evolution of wilderness thought, contemporary meaning of wilderness and survey of economic and non-economic values for individuals and society with discussion session opportunities for developing a personal philosophy related to wilderness.
Wilderness Management — The UAF catalog described NRM 464 as: Wilderness ecology and management practices on lands designated as wilderness, plus, visitor management regimes are analyzed with discussion sessions opportunities for developing a personal philosophy related to wilderness management.

Non Participant Treatment

The NP treatment-group was composed of 11 "prospective WEA students." They were individuals who did not participate in a WEA course, who did not recreate for an extended (eight or more day) wilderness trip, who did not take related college courses, and who responded to a request to be sampled. The sample was generated from a list of individuals who showed interest in a WEA course but because of factors beyond their control, could not participate. Throughout the year the WEA national office receives many inquiries regarding its programs. Some scheduled courses are canceled or fill-up and students can not attend. In other cases, individuals interested in a course may not be able to attend the dates offered. The WEA national office and individual affiliates provided a listing of over 700 individuals from across the United States who had made requests for application for a wilderness leadership education course. Individuals were randomly chosen and contacted by telephone from this list. They were questioned whether they had taken a wilderness leadership education course and their reasons if they had not. Seventeen individuals indicated they had applied but circumstances prevented them from attending such as: complication with course schedules, course cancellation, or the class was full. They were asked to take part in this investigation. They were sent the Wilderness Perception part of the survey-tests; after 30 days, they were sent the post-treatment survey-test. Twelve individuals returned survey-tests. Eleven of these individuals had completed the entire pre and post-treatment Wilderness Perception Test portion of the survey-test but not the Environmental Literacy Test. These 11 responses were included in this investigation.

Defining the Wilderness Experience

The entire survey-test instrument consists of two parts. The first part of the instrument was called *Wilderness Perception.* It consisted of a demographics section and three scales: Wildernism Scale, Sense of Space Scale, and Wilderness Management Scale. Each scales' scores were calculated separately.

The second part of the instrument, called the *Environmental Literacy Test,* was composed of four sections: Issue Awareness; Ecological Foundations; Evaluation of Issue Analysis and Action, and Issue Analysis and Citizenship Action. The scores of each section of the Environmental Literacy test were combined for a total score, and were analyzed separately as well.

The Wildernism Scale

The Wildernism Scale (Table 4) provides a means to differentiate between various types of recreationists through eliciting perception data and rating expectations towards wilderness conditions and managerial programs. Previous studies indicated that since legislation served as a constraint, as well as a guide to management of wilderness, attitudes should be defined in the context of such legislation (Stankey and Schreyer, 1989, pg. 260). Therefore, the Wildernism Scale includes items representing the basic dimensions of wilderness, as defined by the US Wilderness Act (US Congress, 1964), and by ANILCA, the Alaska National Interest Lands Conservation Act (US Congress, 1980). The Wildernism Scale's 33 indicator items measure recreationists attitudes towards the desirability or acceptance of various activities in what the respondents considered to be wilderness. The first 16 items are identical to those used by Kliskey (1994). He adapted his items from Stankey's (1972) purism scale but modified it to reflect elements of an international wilderness policy instead of the 1964 Wilderness Act. Jaakson and Shin (1992) suggested expanding Stankey's scale to add indicator items to measure the multidimensional complexity of wilderness. Therefore, also included were items from Clark and Kozacek's (1997) Wilderness Values Test. Clark and Kozacek developed 35 questions that could be answered "yes" or "no." These questions measure personal wilderness values, not the 1964 Wilderness Act or interpretation of any particular land agency policy. As an example, if a response to their question: "Do you feel we should be suppressing any fires in wilderness?" is "yes," it places a person on the anthropocentric end of the wilderness values scale, a "no" would reflect a biocentric philosophy.

The Wildernism Scale respondents were asked to indicate an item's desirability, in the context of what they considered to be a wilderness, on a five-point affective scale, ranging from strongly desirable to strongly undesirable. Four points translated to a strong wildernism response, zero points a low response. A total Wildernism Standard summed for each respondent, gave a possible range of scores from 0 to 132, although these extremes were not encountered. Wildernism standards provide an indication of recreationists' attitudes towards wilderness (the higher the score, the purer the attitude) and subsequently, their perception of a wilderness as well.

Table 4. The Wilderness Scale

How Do You Feel About Different Wilderness Conditions? The following list of features, opportunities, and restrictions might be found in wilderness areas. Please (√) how desirable each item is in what *you* consider to be wilderness.

1. Developed campsites (firepits, outhouse, food containers)
2. Stocking of fish & wildlife species not native
3. Road access to wilderness boundary
4. Commercial recreation (e.g. guided trips)
5. Maintained trails
6. Bridges or walkwires over rivers or streams
7. Motorized travel by visitors
8. Hunting (sport-trophy)
9. Logging (e.g. for timber, fire, or pest control)
10. Maintained huts, shelters, cabins (public use)
11. Hydroelectric development
12. Commercial mining
13. Solitude: not seeing many people
14. Remote from cities, towns, railroad & major roadways
15. No evidence of human impact
16. Big enough to take at least two days to cross
17. Subsistence use (consumptive hunting, fishing, gathering)
18. Airplane access (landings)
19. No airplanes overhead
20. Natural obstructions or hazard removal/elimination
21. Restrictions & closures to preserve wildlife & vegetation
22. Livestock grazing
23. Lakes behind small human-made dams
24. Trail signs, cairns, or blazes
25. Native predators or dangerous animal removal/elimination
26. Small commercial lodge or private cabins
27. Restrictions on group size (more than 10 people)
28. Map & guidebook with tips, hazards, or points of interest
29. Absence of all human-made features
30. Area size of at least 64,000 acres (100 sq.miles)
31. No wildfire suppression
32. Roadways or fire-breaks
33 Communication system & services for visitor aid & rescue

Analysis

The Wildernism Scale was tested for reliability with an Item Analysis program module in *Statistica*. The internal consistency reliability (Cronbach's alpha) for the 33 indicator items is estimated at 0.937 (Table 5). That means that about 94% of the variability in the sum score is *true score* variability between respondents concerning the wildernism concept common in all indicator items (StatSoft, 1994). The first draft of the Wildernism Scale included 39 indicator items, and has gone through many revisions both in numbers of indicator items as well as specific wording. The Scale was pilot tested with students at UAF to test for the survey's optimum difficulty and floor or ceiling effects. A basic principle of test design is that the more items there are in a scale designed to measure a particular concept, the more reliable the measurement (sum scale) will be. The final step of the reliability test estimated the number of indicator items that should be added to the scale if a higher internal consistency was desired. Reliability testing disclosed that a minimum of 37 more items would be needed to raise the internal consistency to more than 96%. Since 90% reliability is considered adequate for such questionnaires and 70 items may make the scale excessively long to complete, the scale was held to 33 indicator items.

Table 5. Cronbach Alpha measurement for Wildernism Scale reliability

Size: 56 * 73 MISS=-9999.00	STATISTICA Summary for scale: Mean=89.885 Std.Dv.=18.476	
RELIABILITY	Cronbach alpha: ---	Standardized alpha: .937
STATISTICS	Average inter-item corr.:	.326 (Ill cond. corr. matrix)

Properties of the Wilderness Experience

The wilderness experience is a multidimensional one, shaped by a diversity of wilderness attributes (Stankey, et al., 1985). Manfredo, Driver, and Brown (1983) found that recreationists seeking different experiences varied in the importance they assigned to clusters of resource, social, and managerial attributes representing perceptual and expected physical conditions in wilderness. If the items of a wilderness purism scale are subjectively combined, the various dimensions of the wilderness experience are forced into a single variable that is assumed to measure one construct (Watson and Niccolucci, 1992). While variable items that are highly correlated can be combined, variables that are not correlated should not be combined. Kliskey (1994) found that principal components analysis of his purism scale identified four wilderness property categories that reflect the quality of the wilderness condition or experiential opportunities for a range of recreationists.

Analysis

The dimensions of the wilderness experience are defined by identifying the variation contained in recreationists' ratings of Wildernism indicators through principal-components factor analysis of pre-treatment Wildernism Standards (Roggenbuck, Williams, and Watson, 1993; Stankey, Cole, Lucas, Peterson, and Frissell, 1985, Watson and Niccolucci, 1992). The selection of the wilderness experience properties were validated with bivariate correlation (Pearson *r*) compared to the key property indicators (Table 1) that were determined with principal components by Kliskey (1994) and Jaakson and Shinn (1992) as well as with Clark and Kozacek's 33 item Values Test (ethical perspective). These wilderness experience properties provide the means for isolating main treatment effects. Two additional wilderness experience properties were evident as

treatment effects: a) ethical orientation, 20 factors gleaned from Clark and Kozacek's (1997) Wilderness Values Test; and b) managerial allowances permitted in wilderness by the 1980 Alaska National Interest Lands Claims Act (ANILCA).

Classifying Wildernism Species

The Wildernism Standards represent a gradient of perception levels based on respondents' personal concepts of what each constitutes as wilderness. The process of clustering Wildernism Standards identifies and categorizes respondents into Wildernism groups or "Species." This grouping is based on how acceptable or unacceptable the wilderness experience indicator items appear to fit into a person's concept of wilderness and how adamant his or her attitudes; Wildernism Species reflect the clustered levels of perception and expectations i.e., experiential typologies. The importance of the Specie groupings lies in the variation or gradient of perception levels they portray.

Analysis

This investigation used the *natural groupings* process to calculate and determine species as did Hendee et al. (1968), Stankey (1972), Kliskey (1994), and Higham (1997), shown in Table 6. With this process, the species divisions reflect clusters within the frequency data for total Wildernism Standards of all the treatments combined. They were subjectively derived, rather than being regular numerical divisions of the range of values recorded. Hendee et al. classified into five groups, while Stankey, Kliskey, and Higham classified their samples into four. These were Non purist, Neutralist, Moderate Purist, and Strong purist. This investigation entitled its four classifications: Camper Specie, Backpacker Specie, Mountaineer Specie, and Wildernist Specie. The Wildernist and Mountaineer Specie represent those with higher scores, the Backpackers are centered on midpoint of the scale, and Campers are clustered on the low-scored end of the scale.

Grouping was accomplished with k-means cluster analysis. This technique is analogous to "ANOVA in reverse" in the sense that the significance test in ANOVA evaluates the between-group variability against the within-group variability when computing the significance test for the hypothesis that the means in the groups are different from each other (Statsoft, 1994 pg. 529). The Specie group-clustering process was corroborated with three techniques. The first used the "natural clustering technique" as used by Hendee et al. (1968), Stankey (1972), Kliskey (1994), and Higham (1997).

Table 6. A comparison of four wilderness purism scale studies and their classification of "purism species"

STUDY	Strong purist	Moderate purist	Neutralist	Non purist	Range	Total *N*
Higham	70 (21.9%) 75-105	144 (45%) 60-74	92-(28.7%) 45-59	14 (4.4%) 21-44	21-105	336
Kliskey	42 (18%) 66-80	79 (34%) 56-65	86 (37%) 45-55	26 (11%) 16-45	16-80	233
Stankey	248 (40%) 60-70	256 (41%) 50-59	102 (16%) 40-49	18 (3%) <40	0-70	624

Hendee et al.	Strong wildernist	Moderate wildernist	Weak wildernist	Neutralist	Urbanists		
(Note 5 categories)	290 (21.9%) 85-90	504 (38.1%) 75-84	415 (31.4%) 65-74	105 (7.9%) 55-64	9 (.7%) 10-54	0-90	1,323

Note: Higham (1997), *Classification of international tourists within the purism scale*; Kliskey (1994), *Analysis of visitors to North-West Nelson Ecological Region, New Zealand*; Stankey (1973), *Visitor perceptions to Boundary Waters, Bridger, Bob Marshall, and High Uintas Wilderness Areas*; Hendee et al. (1968) *Wilderness users in the Pacific Northwest.* Hendee used the term *wildernist* and divided into five classes rather than four. (%) indicates percent of Total *N* in each category.

The second verification was with a Kruskal-Wallis Test, a nonparametric ANOVA. It compared Specie groupings with total Wildernism Standards to validate if the means of each Specie were different. The third confirmation employed *Gamma* correlation. It analyzed the range of scores of each species with each individual Wildernism Scale item to distinguish if they were correlated.

The Kruskal-Wallis test is a nonparametric alternatives to between-the-groups one-way analysis of variance. It assumes that the data (e.g., Wildernism Standards) are continuous and ordinal ranked. The interpretation of the Kruskal-Wallis test is basically identical to that of the parametric one-way ANOVA, except that it is based on ranks rather than means.

Gamma indicates the proportional reduction in error that could be achieved in predicting rank order variation in response to the statements (strongly desirable to strongly undesirable) from a subject's Wildernism Standard over the errors that might be

derived if these were random predictions. *Gamma* ranges in values from –1.0 to +1.0, with the algebraic sign indicating the direction of association. *Gamma* is preferable to Kendall's *Tau* when the data contains many tied observations since with *Gamma*, ties are explicitly taken into account. It is computed as the difference between the probability that the rank ordering of the two variables agree, minus the probability that they disagree, divided by 1 minus the probability of ties.

Sense of Space Scale

The Sense of Space Scale was devised to identify the critical buffer distance one requires from various human impacts on wilderness to insure conditions are acceptable for a wilderness experience. Quantifiable indicators were identified from properties determined by Kliskey (1994) to express wilderness perception into a geospatial wilderness database (Table 7). These indicators categorized into two wilderness properties: Wildness perspective (self-sufficiency/anti-facility features); and Experiential factors (features affecting remoteness and solitude).

Respondents were asked to indicate desired minimum and maximum buffer distances for each indicator feature (Table 8). They had the opportunity to write-in a greater distance or indicate if the feature had no affect on their wilderness experience. Since distances vary according to vegetation, topography, climate, and substrate respondents used the formula: one day of travel equals 8-12 trail miles or, 3-7 cross country miles.

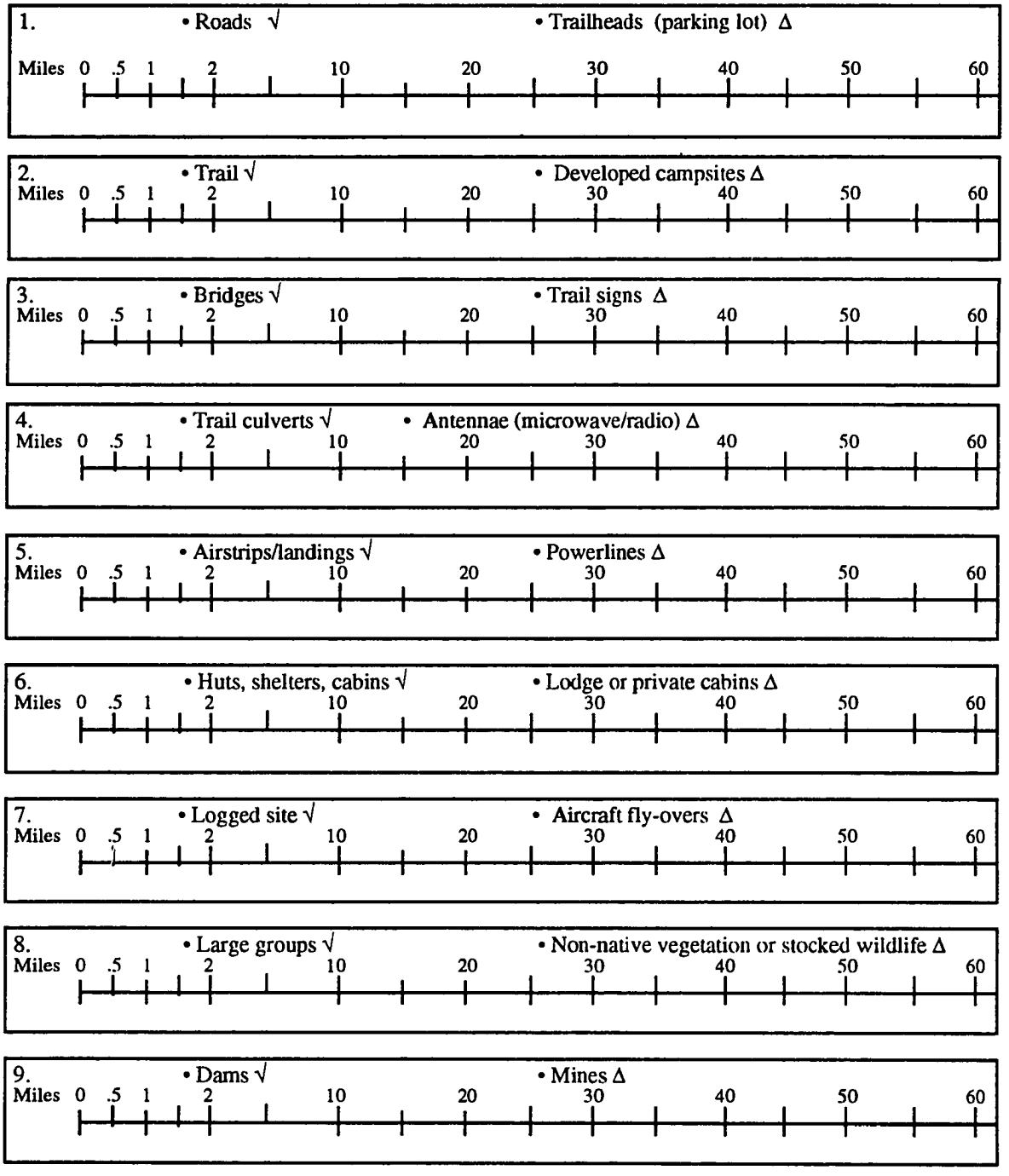
The reliability of the four Wildernism Species' Sense of Space buffer distances was tested with the nonparametric Kruskal-Wallis Test. Kruskal-Wallis tested whether the Sense of Space distances were significantly different for each Wildernism Specie. *Gamma* statistics correlated Sense of Space buffer distances with individual Wildernism Standards.

Table 7. Wilderness properties and indicators for spatial determination of Wildernism Sense of Space Scale (from Kliskey 1994)

WILDERNESS EXPERIENCE PROPERTY	INDICATOR FOR SENSE OF SPACE SCALE
Facility Oriented	trail; campsites; bridges; airstrips/landings; huts
Experiential	road; trailheads; trails, airstrips/landings; aircraft fly-overs; large groups; huts; trails; campsites
Anti- Development	logged site; roads; mines; culverts; powerlines; antennae/microwave towers; dams; lodges
Naturalness	logged site; non-native vegetation/stocked wildlife

Table 8. Sense of Space Scale

How far from and near to the following features do you prefer to be for a "true" wilderness experience?



Analysis

Responses from the Sense of Space Scale provided four buffer distances: a) pre-treatment minimum, b) pre-treatment maximum, c) post-treatment minimum, and d) post-treatment maximum. The Sense of Space Scale was analyzed to determine if distances were significantly different for each Wildernism Specie, and if distances are appropriately scaled for the four Species. The reliability of the four Wildernism Species' Sense of Space distances was tested with the nonparametric Kruskal-Wallis Test. Kruskal-Wallis tested whether the Sense of Space distances were significantly different for each Wildernism Specie. It assessed whether samples in the comparison were drawn from the same distribution or from distributions with the same median. The assumption was that each Wildernist Specie's required Sense of Space buffer distance would be ordered to greater distances.

The Wilderness Management Scale

The Wilderness Management Scale (Table 9 and Appendix B), measures respondents' acceptance of wilderness management strategies. It is organized as a typology of wilderness management strategies. The scale provides a spectrum of managerial strategies for a specific wilderness impacting activity: (a) ground access; (b) travel; (c) information systems and services; (d) camping; (e) aircraft access. Each managerial strategy group's five managerial levels corresponds to a typology of intensities of the wilderness opportunity spectrum (WOS). Each activity question and the corresponding strategy choices were based on a wilderness classification system typology described by Nash (1981), Foreman (1991), Marshall (1935), Hardin (1969), and Sax (1980). The Wilderness Management Scale was based on responses of a panel of experts method. The panel consisted of wilderness managers, researchers, and wilderness users at a poster-session at the 1996 National Wilderness Conference in Santa Fe, New Mexico. The conference was chosen because it provided opportunity to obtain input from many researchers and wilderness advocates cited in this study as well as from a representative national sample of NWPS managers. The Wilderness Management Scale reflects the responses and comments obtained at the Wilderness Conference.

The scale measures both ideal and realistic preferences. The assumption was that two preferences, (e.g., first an ideal choice, then a realistic choice) encourages more exact responses. The total score for the five categories renders respondents' realistic and ideal "Acceptance Standard."

Table 9. Example questions from The Wilderness Management Scale

People appreciate wilderness conditions at different times for different reasons and situations. DIRECTIONS: For each of the following, you may choose one which represents your ideal choice and also choose another which represents a more practical alternative. In some or all cases both choices may be the same. Please draw a circle O around your ideal (model choice) and a square around your realistic (or more realistic) choice. O = ideal ❑ = realistic
For the type of wilderness experience you desire which area/zone would you choose? One which has:
a. easy-to-follow trails, well constructed bridges, clear directional and information signs.
b. trails well marked but rugged at times, signs at intersections and confusing locations; footbridges.
c. few constructed trails, rock cairns or blazes on trees at confusing locations; natural bridges only.
d. extremely inaccessible; challenging travel, some bushwhacking; can be precarious to hazardous.

Analysis

The correlation of both realistic and ideal Wilderness Management Scale Acceptance Standards *with* Wildernism Species' mean standard tests two interests. It verifies that wilderness experience perceptions and ethical perspectives (measured as Wildernism Standards by the Wildernism Scale) correlate with wilderness management strategies (measured as "Acceptable Standards" by the Wilderness Management Scale. It also verifies which decision-making preference (i.e., realistic or ideal) correlates with Wildernism Scale responses.

Environmental Literacy Test

Environmental literacy is defined by variables which have been shown to be precursors to responsible environmental behavior (Bluhm, et al., 1995). An environmental literacy test was chosen to assess if correlations could be made between purism, wilderness ethics and environmental literacy. It could also be used to assess wilderness educators' claims that ethics and behavior are transferred back to student's home environs. The Environmental Literacy Test is an adaptation of The *Middle School Environmental Literacy Instrument 7th edition © March 1995* (MSELI). The instrument was based on the objectives outlined at the 1978 Tbilisi Declaration and on research into the precursors of responsible environmental behavior (Hungerford and Volk, 1990;

UNESCO, 1978). The MSELI was validated following extensive test structures, modifications, pilot trials, revisions, and numerous national field studies of public school students (Bluhm, et al., 1995; Hungerford, Ramsey, Volk, and Bluhm, 1990).

The Environmental Literacy Test used in this research is composed of four sections (Table 10): Issue Awareness; Ecological Foundations; Evaluation for Issue Analysis and Action; and Issue Analysis and Citizenship Action. The Issue Analysis and Citizenship Action section is in three parts. The first part measures student's perceived knowledge of environmental action strategies; the second, their perceived skill in the use of action strategies, and the third part, their self-reported six-month history of taking environmental actions.

The MSELI was altered slightly for this project. It was modified by adding seven questions related to wilderness recreation ecology and Minimum impact skills to the Ecological Foundations section. In addition, the Issue Analysis section was modified with a wilderness oriented issue scenario that was written for Project Learning Tree's Secondary Level Module. The scenario was reviewed by Hungerford for its capacity to measure student's ability to analyze an issue and appropriate action skills (PLT, 1997).

Analysis

The Environmental Literacy Test was scored and analyzed following Hungerford et al. (1990) and Bluhm et al. (1995). The total Environmental Literacy Test score represents the sum of all four parts of the test. Each component was analyzed separately and as a total Environmental Literacy Test score. Nonparametric *Gamma* statistics were used to assess if there was a positive correlation between Environmental Literacy and Wildernism Standards.

Table 10. Components of the Environmental Literacy Test

1. Issue awareness
The underlying assumption is that there is a definite skill associated with this task (Bluhm, et al., 1995). This item measures the environmental issue identification skills of the respondent. The respondent is asked to list up to six environmental issues, three of which are related to natural wild areas. The scoring is based on a four-point scale. One point is given for a legitimate environmental or wilderness problem /issue; two points are given if the issue statement contains a cause and an non-specific effect; three points are given if the issue statement contains a cause and a specific effect; and an additional point is given if a specific location is identified in the statement.

2. Ecological foundations and minimum impact knowledge
This section is a basic foundation component, which measured knowledge of ecological and minimum impact concepts. It consisted of 27 multiple choice questions of which 20 were directly from the Middle School Environmental Literacy Instrument. These were adapted from an instrument which was "developed under stringent research protocols by the Wisconsin Environmental Literacy Assessment Project at the Wisconsin Center for Environmental Education" (Bluhm, et al., 1995).

3. Evaluation of Issue Analysis and Action Skills
This section measured respondent's ability to identify an issue statement for a wilderness issue-related scenario, his or her ability to perform an issue analysis of a given issue scenario, and evaluates his or her ability to select the best citizen action choices for the remediation of the issue scenario.

4. Issue Analysis and Citizenship Action
This was measured by three components: perceived knowledge of environmental action strategies, perceived skill in the use of action strategies, and a self-reported six-month history of taking environmental actions. Five areas were surveyed. These were:
(a) Ecomanagement, (b) Consumer Action and Economic Action, (c) Persuasion, (d) Political Action, and (e) Legal Action.

A. The term *Ecomanagement* refers to those environmental actions in which people work directly with the natural world to help prevent or resolve environmental issues. An example would be taking steps to mitigate recreational damage in wilderness areas.

B. The terms *Consumer Action* and *Economic Action* refer to those environmental actions in which people use monetary support or financial pressure to help prevent or resolve environmental issues. Example would be to avoid purchasing products with excessive packaging, or paid membership fees to or donated money to conservation or environmental groups.

C. The term *Persuasion* refers to those environmental actions in which individuals or groups appeal to others to help prevent or resolve environmental issues. An example would be talking to other wilderness users regarding minimum impact actions.

D. The term *Political Action* refers to those environmental actions in which people use political means such as political processes, organizations, or offices to help prevent or resolve environmental issues. An example would be supporting or voting for "pro" environmental laws or programs.

E. The term *Legal Action* refers to those environmental actions in which people use to support or enforce existing laws, which are designed to help prevent or resolve environmental issues. An example is to report the illegal collection of plants or taking of animals in a preserve or to inform others about LNT ethics or to comply with wilderness rules.

Previous Wilderness Experience and Perceived Wilderness Skills

A demographics section of background informational questions was included in the survey-test administered to all respondents prior to treatment. Recreation researchers hypothesized that increasing experience and skills leads to increased specificity and differentiation of recreational environments. Two questions were analyzed: a) amount of experience in wilderness areas, and b) to what extent do you feel proficient in wilderness skills (Schreyer and Beaulieu, 1986; Watson, Roggenbuck, and Williams, 1991; Williams, 1985).

Analysis

This analysis was to determine if amount of experience in wilderness and associated wilderness skills are related to Wildernism Standards and Environmental Literacy scores. A means analysis and *Gamma* statistics compared Wildernism Species' Wildernism Standards with extent of confidence in their wilderness skill which were ordinal: a) no extent, b) a little, c) moderate, d) large extent, e) great extent. Experience data was ordinal and covered the following categories: a) 0= never; b) 1= one year; c) 2= two-five years; d) 6= six-ten years; e) 11= more than ten years.

Effects of Wilderness Education

A goal of this study was to determine if wilderness education had an affect upon respondents' perception of wilderness and the experience they seek in it. This research hypothesized that respondents' scores on the dependent variables will be higher after each of the five different educational experiences as they were before exposure to these educational experiences. The independent variables tested under the following hypotheses included participation in the five treatment-groups. The dependent variables tested under the hypothesis were: Wildernism Scale including: a) Wildernism Standards, b) five wilderness properties, and c) Wildernism Species; Sense of Space Scale buffer distances, e) Wilderness Management Acceptance Standards.

Analysis

The 111 respondents' pre-treatment and post-treatment survey-test scores on each of the wilderness perception scales. Differences in post-treatment survey-test scores were analyzed with nonparametric statistics using the Wilcoxon Matched Pairs Test. The Wilcoxon Matched Pairs test was used to compare every subject's pre and post-treatment scores for significant change. This test is a nonparametric alternative to the pared sample test customarily used for comparing two variables measured in the same sample. Since the data was measured on an *ordered metric scale*, even without assumption of normal distribution of variables, this procedure should indicate any differences between the pre and post wildernism standards almost as powerfully (i.e. 95%) as the *t* test (Conover, 1980).

Wildernism Scale

The Wildernism Scale (Table 4) was the first part of Wilderness Perception Instrument. Each item of the Wildernism Scale was scored from zero to four points. Each subject's totaled responses for the 33 indicator items are called his or her Wildernism Standard. The pre-treatment (Pre-Wildernism Standard) was subtracted from the post-treatment score (Post-Wildernism Standard), which produced the difference or, amount of Wildernism Standard change after treatment.

Sense of Space Scale.

The Sense of Space Scale (Table 8), was devised to identify the critical buffer distance one requires from various human impacts in order to insure conditions are acceptable for a wilderness experience. Respondents' minimum and maximum pre-treatment Sense of Space distances, obtained from the Sense of Space Scale, were compared to minimum and maximum post-treatment distances with the nonparametric Wilcoxon Matched Pairs Test. The ten items analyzed represent the Wildness and Experiential wilderness properties used in the GIS mapping application process.

Wilderness Management Scale

The Wilderness Management Scale (Table 9) measured respondents' acceptance of wilderness management strategies. An analysis of the effects of educational experience compared pre-treatment and post-treatment Acceptance Standards of the Wilderness

Management Scale. The Wilcoxon Match Pairs test analyzed if a change occurred between the pre-treatment and post-treatment Acceptance Standards for each of the Ideal and Realistic responses.

Application

Two applications were employed to produce a Wildernism Mapping Typology. First, the impacts of wilderness education on respondents' purism scores were displayed using Geographic Information System (GIS) software following a process known as Wilderness Perception Mapping (WPM) pioneered by Andrew Kliskey (1994) in New Zealand. The Sense of Space habitats identified by each Wildernism Specie were examined and displayed as polygons on maps in the context of Kliskey's case-study area, the North West Nelson Ecological Region on New Zealand's South Island (Figure 7). Then, the validated Wilderness Management Scale was aligned with corresponding Wildernism Species' required wilderness conditions and Sense of Space responses. The Wildernism Typology is structured with four defined segments representing a) Wildernism Species, b) wilderness opportunities, c) buffering distances, and d) management strategies.

Geospatial Application

The case-study database components were obtained from Kliskey (personal communication, May 1997) and adjusted to align with results from the Sense of Space Scale. The geospatial database was developed from 1:250,000 digital terrain map data. Each of the map components were represented by a GIS coverage which contained the geographic feature, as a geospatial entity, and attributes associated with the feature, and was organized by the two wilderness properties (Kliskey, 1994).

The geospatial data was displayed and manipulated with Environmental Systems Research Institute's ARC/INFO and Arcview program. Distances in miles were converted to meters in order to compare buffering distances and Wildernism Species' habitats with Kliskey's (1994) results in New Zealand. The WPM procedure produced a spatial compilation of perceived wilderness settings (Sense of Space buffer distances), for each of the Wildernism Species. The spatial criteria for each of the chosen Sense of Space indicator features, organized by Wildernism Specie, delineate the physical area that would be influenced by that feature. In theory, the degree or amount of influence is considered to be represented by a buffer zone around the geographic manifestation of the item.

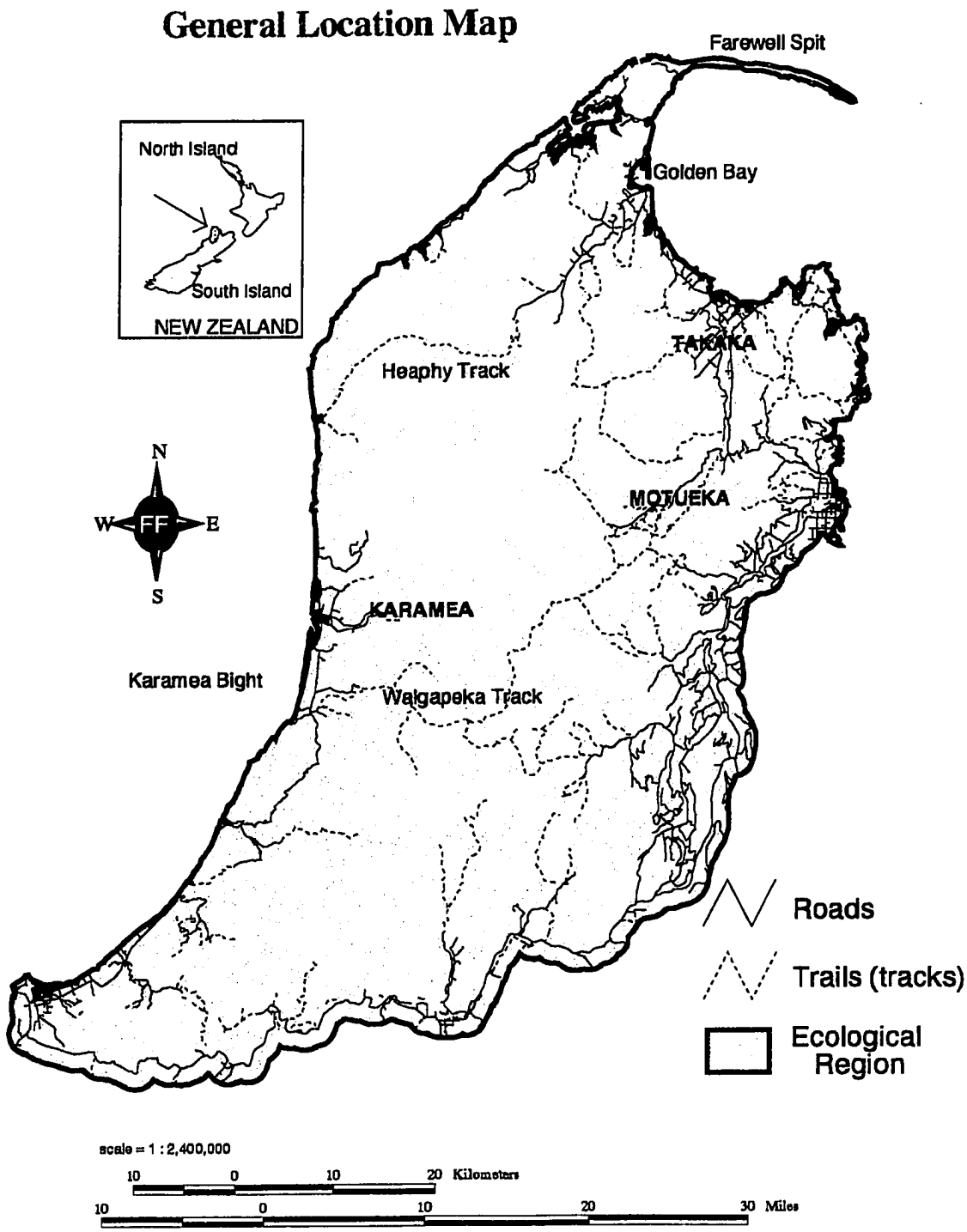


Figure 7. Location map of North West Nelson Ecological Reserve of New Zealand.

The Sense of Space buffer distance reflects a linear scale which increases according to the extent of desirability or undesirability for the item. This was accomplished by first inputting each Wildernism Specie's identified maximum buffer distances; inputting their minimum buffer distance; then, appending the minimum coverage and maximum coverage for each Wildernism Specie to derive the desired buffer strip or polygon habitat.

Wildernism maps are based on two wilderness properties: Wildness Perspective features indicating recreational aids (huts, campsites, signs); and Experiential Factor features indicating access (roads, airstrips trailheads). Maintained trails (tracks) are elements of both wilderness properties. Attributes for the feature "bridges" were not available. Each of the features are presented together, organized by their appropriate wilderness property in Figure 8 and Figure 9.

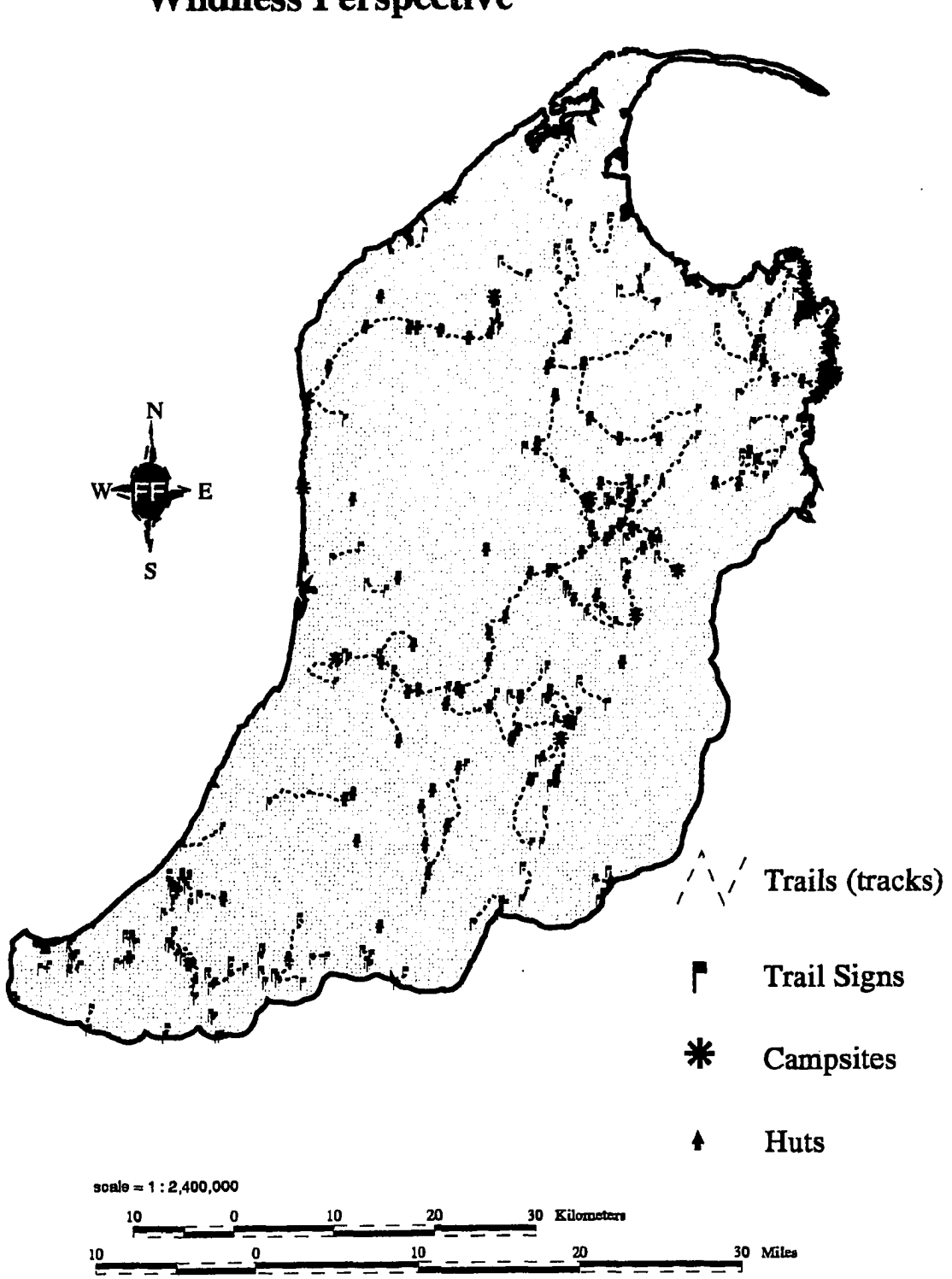


Figure 8. Map of Wildness Perspective Features.

Experiential Factors

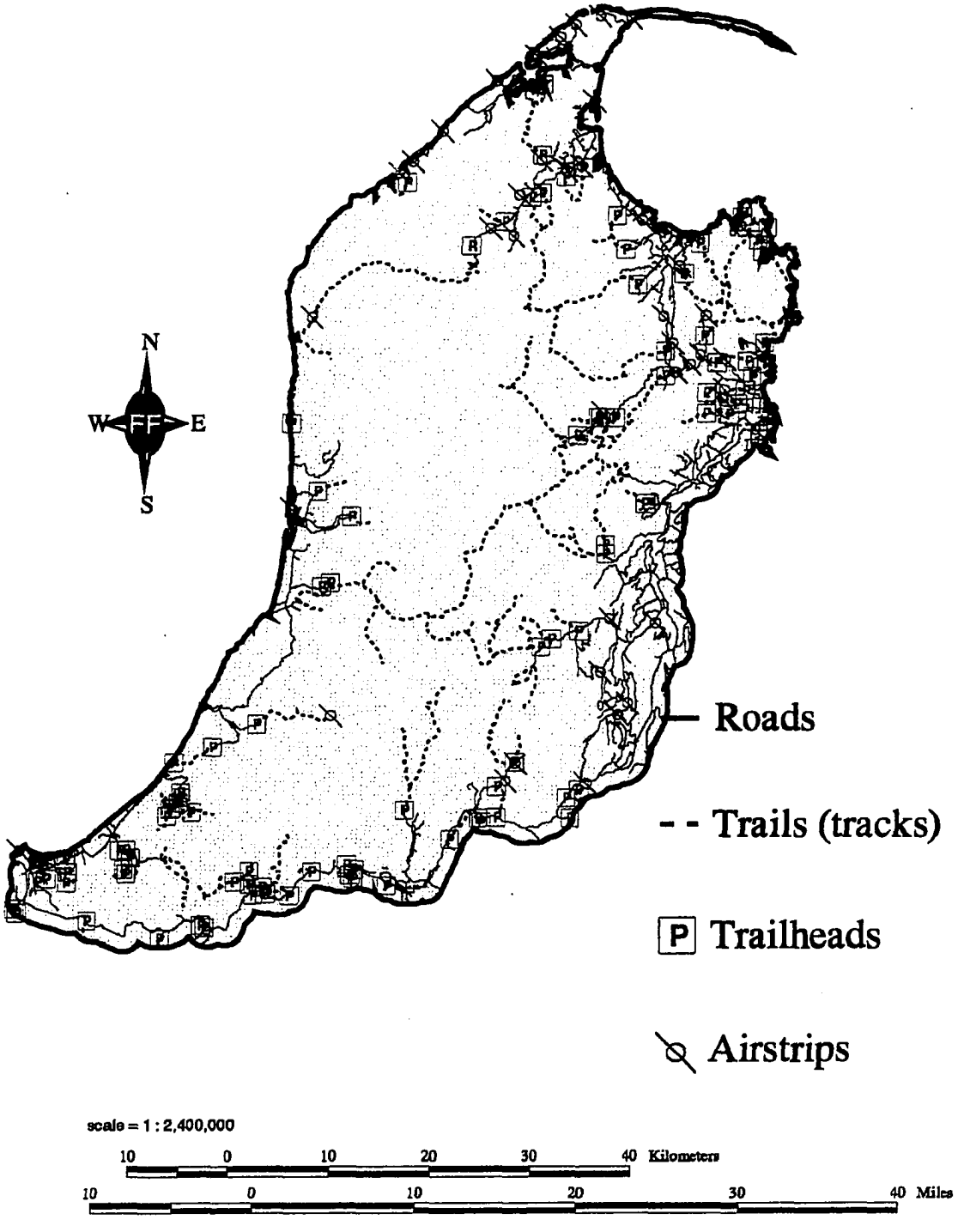


Figure 9. Map of Experiential Factor features.

Wildernism Typology

The Wildernism Typology will provide the opportunity for proactive wilderness management. The roadless portion of the Recreation Opportunity Spectrum (ROS) from Figure 4 was classified into segments with specific criteria and management guidelines developed for each Specie. It offers wilderness managers specific guidelines for classifying or even zoning individual areas. The Wildernism Typology in conjunction with the geospatial application will enable wilderness areas to be classified to maintain their specific wilderness qualities while systematically offering Wildernism Species their requisite conditions and recreational options.

The Wildernism Typology may be viewed as akin to frets on a guitar's finger board. It is difficult to consistently play in tune on a stringed instrument without frets; pitch is likely to vary and slide down the scale. Similarly wilderness areas managed as a monolith progress down the ROS toward the developed end. As the divisions of the fingerboard provide the tool for the musician to maintain a consistent tone, the Wildernism Typology will provide managers with standardized frets on the ROS for proactive management. An example Wildemism Typology was formed following the systematic Wildemism Analysis (Part One); and the Geospatial Application process (Figure 10).

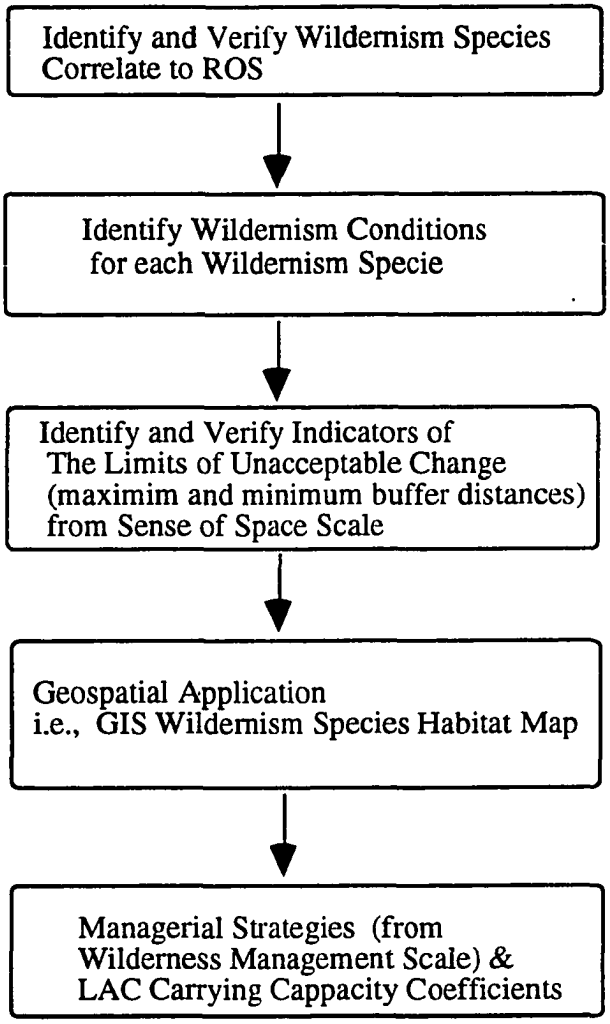


Figure 10. Schema for assembling a Wildernism Typology.

The first step was to identify and validate Wildernism Species obtained from the Wildernism Scale. Wildernism Species were correlated with the ROS and include the ROS label, e.g. primeval, pristine as in Figure 11. The second level of the Wildernism Typology identified the managerial conditions required for each Wildernism Specie, obtained from the Wildernism Scale and correlated with each Wildernism Specie. The third level of the Typology incorporated the physical indicators of Limits of Unacceptable Change (i.e., maximum and minimum Sense of Space buffer distances) identified for each Wildernism Specie for each indicator. This could be described as actual "on the ground distances" for GIS use; and/or descriptive statements specifying the standards which provide a basis for judging whether a particular condition is acceptable or not. These are obtained from the Wildernism Scale's wilderness experience properties and indicator items, and the Sense of Space Scale. The GIS generated habitat map for each specie comprises the fourth step (i.e., Aggregate Map, Figure 12). It includes a descriptive statement from the Wilderness Management Scale describing the environmental conditions of the habitat. The fifth step identified specific managerial strategies that are necessary to protect each habitat on the Wilderness Management Scale.

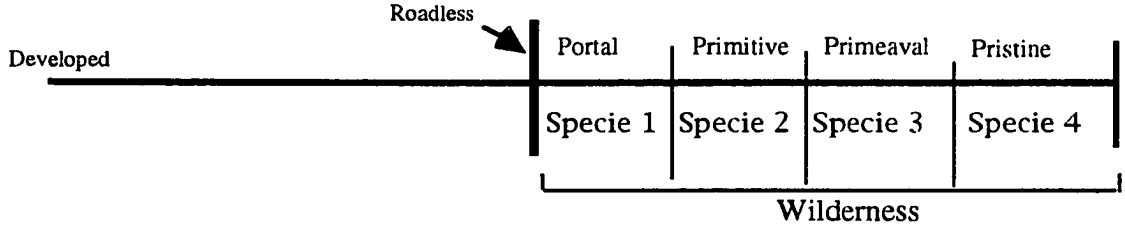


Figure 11. Step One of a Wildernism Typology on the wilderness end of the ROS.

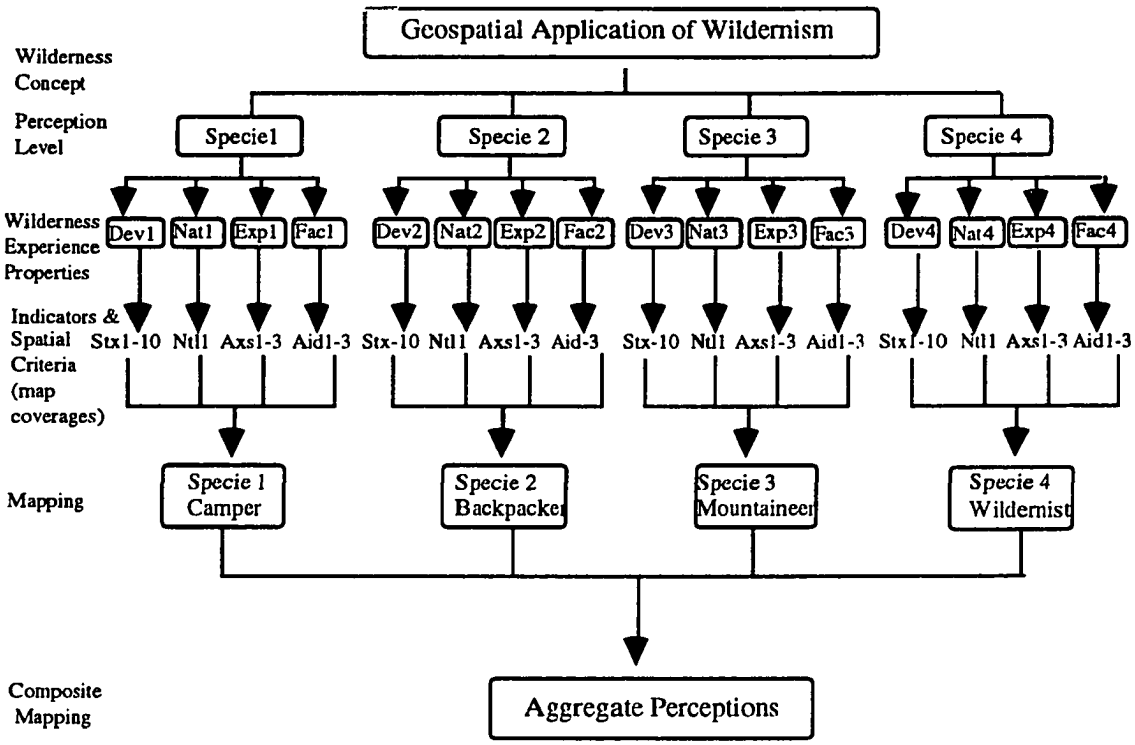


Figure12. WPM schema for the translation of multiple perception (based on Kliskey, 1994).

CHAPTER FIVE
ANALYSIS

This investigation explored the effects of wilderness education on multiple perceptions of wilderness, specific to particular groups. It organized wilderness purism groups in Wildernism species; delineated acceptable physical buffer distance to and from facilities and access for each group (sense of space); compared these distances for change following education treatments; and mapped these "habitats" in a wilderness area using GIS.

Five universities and colleges, a non-profit organization and two private recreational guide services participated. The field courses and trips had a minimum of two instructors (lead and assistant) for a class size of six to eight students. All groups represented an incidental self-selected sample. All were college students, professional educators, or moderately experienced outdoor recreationists who were either a) interested in the wilderness leadership education venue, skills and course content, or b) were interested in resource management issues, environmental education, or in actively perusing a ten-day or longer wilderness recreational trip. All subjects were of ages, ranging from 18-45 years; 54 are male, 57 are female. The 56 WEA students were from 36 different states, representing the various regions of the United States. Many respondents lived in a college community during this study, thus 49 respondents gave Alaska (UAF) as their residence while 62 identified other states or countries. Overall, the study had representatives from five countries in addition to Alaskans and contiguous US individuals; seven international students from Canada, New Zealand, France, and Russia participated in the research. Demographics indicated respondents' wilderness visitation experience ranged from: a) 4% never; b) 7% one year; c) 27% two to five years; d) 16% six to ten years; and e) 46% more than ten years. Their perceived knowledge of wilderness skills ranged from: a) 0% none; b) 6% little; c) 18% moderate; d) 51% high ; e) 25% extreme.

Defining the Wilderness Experience

The wilderness experience is described by five properties consisting of grouped indicator items from the Wildernism Scale. Three were defined from principal components factor analysis on the Wildernism Scale, two originated from items defining

ethical perspective and items relating to conditions, human-made features, or activities allowed in Alaskan Wilderness.

Principal component factor analysis identified three factors with eigenvalues greater than one (loadings of > .50) accounting for 50% of the total variance in the scale. This is not high however, given the sample size ($N = 111$), number of original variables (33), and the qualitative nature of the data, it is reasonable for preliminary analysis (Kliskey 1994). The varimax rotated eigenvectors and corresponding eigenvalues are shown in Table 11. Factor One, Wildness Perspective, accounted for 38% of the variation, the highest of the three factors. Thirteen items represent a polarity towards recreational facilities on one end and a propensity for self-sufficiency and naturalness on the other. Factor Two, Experiential Factors, accounted for 6.6% of the total variance. It's seven items characterize experiential perceptions of remoteness and solitude. Factor Three, Economic Development, (5.6% of total variance) consisted of eight items related acceptability of the minimum level of human-made structures and economic developments in wilderness areas. These properties were validated (Table 12) using bivariate correlation (Pearson *r*) with properties identified by Kliskey (1994); Jaakson and Shinn (1992); and Clark and Kozacek (1997).

Principal components factor analysis identified three dimensions of the wilderness experience: Wildness Perspective, Experiential Factors, and Economic Development. Two additional wilderness experience properties were evident as treatment effects: Ethical Orientation, 20 Wilderness Values Test factors developed by Clark and Kozacek (1997) ; and managerial allowances permitted in wilderness by the 1980 Alaska National Interest Lands Claims Act (ANILCA). The five wilderness experience properties and indicators delineating them are shown in Table 13. Delineation of these properties clarify the effects of wilderness education. Individual and interactive effects define the multi-dimensional aspect of wilderness education and Wildernism Standards.

Table 11. Eigenvectors and factor loadings (varimax rotated solution) from principal component factor analysis of a Wildernism Scale (N = 111)

WILDERNISM ITEM	FACTOR LOADINGS FACTOR 1	FACTOR 2	FACTOR 3
	Wildness Perspective	Experiential Factors	Economic Development
1. Developed campsites	.66 *	-.35	.17
2. Stocking of fish & wildlife species not native to area	.51 *	-.30	.33
3. Road access to wilderness boundary	.62 *	-.30	.09
4. Commercial recreation (e.g. guided trips)	.39	-.12	.10
5. Maintained trails	.72 *	-.17	.16
6. Bridges or walkwires over rivers or streams	.71 *	-.33	.17
7. Motorized travel by visitors	.22	-.39	.68 *
8. Hunting (sport-trophy)	.21	.06	.17
9. Logging (e.g. for timber, fire, or pest control)	.18	-.08	.61 *
10. Maintained huts, shelters, cabins (public use)	.56 *	-.29	.40
11. Hydroelectric development	.10	-.37	.69 *
12. Commercial mining	.13	-.35	.75 *
13. Solitude: not seeing many people	.17	-.73 *	.41
14. Remote from cities, towns, & major roadways	.34	-.75 *	.16
15. No evidence of human impact	.20	-.73 *	.22
16. Big enough to take at least two days to cross	.18	-.77 *	.23
17. Subsistence use	.42	-.06	-.16
18. Airplane access	.30	-.31	.34
19. No airplanes overhead	.10	-.58 *	.28
20. Natural obstructions removal/elimination	.65 *	-.18	.32
21. Restrictions to preserve wildlife & vegetation	.50 *	-.26	.36
22. Livestock grazing	.09	-.06	.75 *
23. Lakes behind small human-made dams	.37	-.17	.56 *
24. Trail signs, cairns, or blazes	.74 *	-.17	.15
25. Native predators removal/elimination	.56 *	-.47	.10
26. Small commercial lodge or private cabins	.28	-.33	.50 *
27. Restrictions on group size	.33	-.58 *	.06
28. Map & guidebook	.53 *	-.06	.27
29. Absence of all human-made features	.47	-.20	.51 *
30. Area size of at least 64,000 acres	.12	-.71 *	.06
31. No wildfire suppression	.57 *	-.28	.41
32. Roadways or fire-breaks	.56 *	-.21	.41
33 Communication system & rescue services	.60 *	-.07	.31
Variance	0.20	0.16	0.15
Eigenvalue	12.52	2.18	1.83
% Explained	37.93	6.60	5.56
Cumulative % Explained	37.93	44.53	50.08

Note. Indicator items with a high loading (> .50) on a factor are starred (*).

Table 12. Statistical correlation of the three key wilderness experience properties with those from Kliskey (1994), Jaakson and Shin (1992), and Clark and Kozacek (1997)

WILDERNESS EXPERIENCE PROPERTY	SIZE & REMOTENESS JAAKSON & SHIN	MIN. HUMAN INFLUENCE JAAKSON & SHIN	NATURAL SYSTEMS JAAKSON & SHIN	HUMAN INFRASTRUCTURE JAAKSON & SHIN
Wildness	-------	.913	.913	-------
Experiential	.913	-------	-------	-------
Economic Development	-------	-------		.912

WILDERNESS EXPERIENCE PROPERTY	ANTI ARTIFACTUAL KLISKEY 94	ANTI DEVELOPMENT KLISKEY 94	EXPERIENTIAL KLISKEY 94	ETHICS CLARK AND KOZACEK
Wildness	.901	-------		.972
Experiential	-------		.948	-------
Economic Development	-------	.900	-------	-------

Note. Pearson's product-moment correlation Rho, $p < .001$, (-----) indicates correlation values $p < .90$.

Table 13. Indicators from principal-components factor analysis of the Wildernism Scale used to denote wilderness experience properties

WILDERNESS PROPERTIES	INDICATORS
1. Wildness Perspective	(1) campsites; (2) stocking exotic fish or wildlife; (3) road access; (5) trails; (6) bridges; (10) huts; (20) natural hazards removed; (21) restrictions and closures; (24) signs; (25) predators removed; (28) map and guidebook; (31) wildfire suppression; (32) roads; (33) Search and Rescue and communication
2. Experiential Factors	(13) solitude; (14) remote; (15) no evidence of humans; (16) big size; (19) aircraft overhead (27) group size; (30) size >100m^2
3. Economic Development	(7) motorized travel; (9) logging; (11) hydroelectric; (12) mining; (22) grazing; (23) lakes/dam; (26) commercial lodge/cabins; (29) absence of human features
5. Ethical Perspective	(1) campsites; (2) stocking of exotics; fish and wildlife; (4) commercial recreation; (5) trails; (6) bridges; (7) motorized travel; (9) logging; (10) huts; (18) airplane landings; (19) aircraft overhead; (20) natural hazards removed; (21) restrictions and closures; (22) livestock; (24) signs; (25) predator; (27) group size; (28) map and guidebook; (31) wildfire suppression; (32) roads; (33) Search and Rescue and communication services.
6. ANILCA	(4) commercial recreation; (7) motorized travel; (17) subsistence; (19) air access; (20) airplanes overhead; (26) cabins; (27) group size

Note. Numbers in parenthesis correspond to item number in Wildernism Scale (Table 11).

Wildernism Species

Grouping of Wildernism Species was accomplished with k-means cluster analysis. The Specie clustering process was corroborated with three techniques: the "natural clustering technique" Hendee et al. (1968), Stankey (1972), Kliskey (1994), and Higham (1997); the Kruskal-Wallis Test, a nonparametric ANOVA, to compare Specie groupings with total Wildernism Standards; and visual comparison of post-treatment means of each specie.

Subjects were categorized into four Wildernism Species based on their Wildernism Standards: *Camper* (Wildernism Standard ≤ 65, $N = 20$); *Backpacker* (Wildernism standard range from 66 to 89, $n = 51$); *Mountaineer* (Wildernism standard range from 90 to 103, $n = 31$); and *Wildernist* (Wildernism standard range from 104 to 132, $n = 9$). The Wildernist and Mountaineer specie represent those with higher scores, the Backpackers are centered on midpoint of the scale, and Campers are clustered on the low-scored end of the scale. The five treatment-groups ($N = 111$) were distributed within the four Species with the exception of RT which were not represented in the Wildernist group (Figure 13).

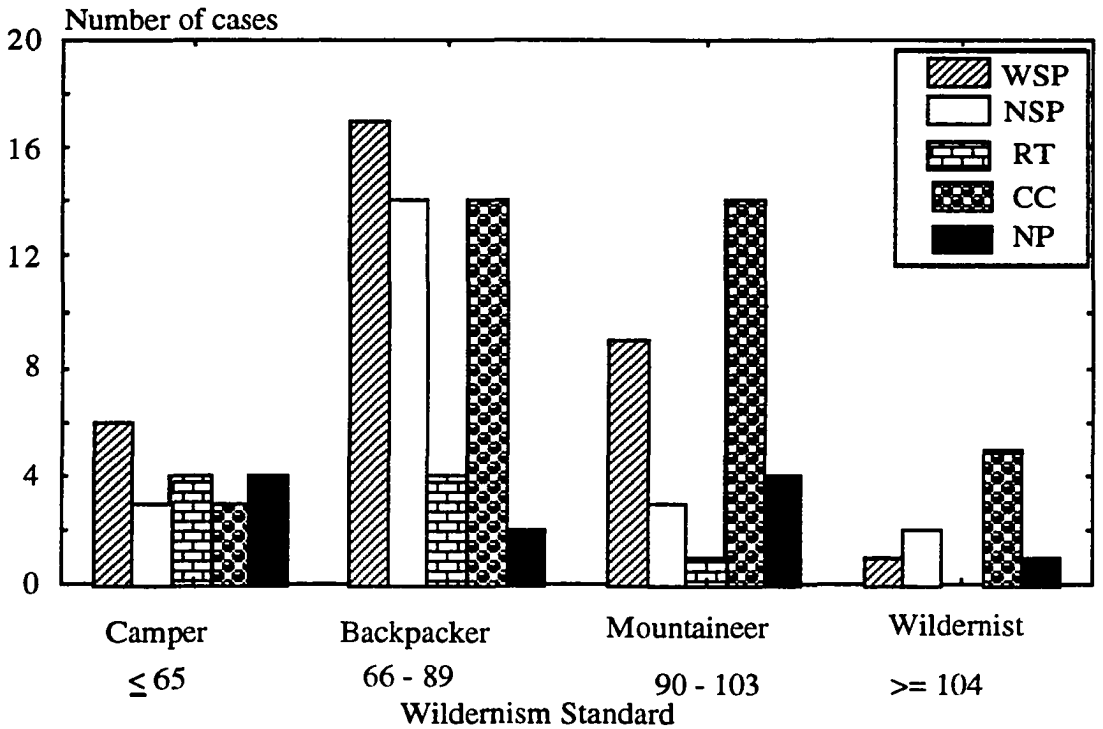


Figure 13. Pre-treatment Wildernism Species organized by treatment. Note absence of RT in Wildernist Species.

The four methods of analysis produced similar findings to Kliskey's (1994) *Spatial-Perceptual Approach* in which he used contingency table analyses to determine which items are desirable for each purism group (Specie), for each purism level, and how these items differ between groups. Kliskey compared his respondents' purism group and their purism scale responses to each purism item. He determined inter-group differences and showed that each purism group displayed strong internal /cohesion. Results in Table 14 and Table 15 show, as Kliskey found, each of the four Wildernism Species are scaled corresponding with Wildernism Standards from low to high.

Table 14. Verification with Kruskal-Wallis testing alignment of subject's Species classification with pre- treatment Wilderness Standards ($N = 111$)

ANOVA By Ranks	H (3, N= 111) = 96.3	p =.000
	N	Sum Of Ranks
Camper	20	210
Backpacker	51	2346
Mountaineer	31	2697
Wildernist	9	963

Note: Kruskal-Wallis is valid at $p < .001$ level.

Table 15. Validation of Specie classifications with means analysis of four species for each item in the Wildernism Scale ($N = 111$)

SPECIE	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Camper	0.9	1.8	1.1	1.4	0.5	0.4	2.1	1.8	2.5	0.6	2.3
SD	0.9	1.4	1.0	1.2	0.6	0.5	1.3	1.5	1.1	0.7	1.1
Backpak	2.1	2.6	2.0	1.9	1.3	1.9	3.3	2.0	2.9	2.0	3.2
SD	1.1	1.0	1.0	0.9	0.9	0.9	0.8	1.2	0.8	0.9	0.8
Mtneer	2.8	3.4	2.5	2.1	1.7	2.2	3.9	2.6	3.4	2.5	3.7
SD	0.9	0.7	0.9	0.9	0.9	0.9	0.3	1.4	0.7	1.0	0.4
Wildnst	3.3	3.4	3.3	2.4	3.0	3.1	3.9	3.3	3.9	3.7	4.0
SD	0.7	1.0	0.9	1.5	0.9	0.9	0.3	1.3	0.3	0.7	0.0

SPECIE	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.
Camper	2.5	2.2	2.0	2.6	2.3	2.2	1.5	2.3	1.2	1.0	2.3
SD	0.8	1.1	1.1	1.0	0.7	1.1	1.1	1.0	0.9	0.8	0.8
Backpak	3.4	3.4	3.2	3.4	3.3	2.7	2.2	2.7	2.3	1.8	3.0
SD	0.7	0.7	0.9	0.7	0.7	0.8	1.0	0.9	0.8	0.8	0.9
Mtneer	3.8	3.7	3.5	3.7	3.5	2.4	2.6	**3.1**	2.8	2.5	3.6
SD	0.4	0.5	0.6	0.5	0.7	0.8	1.0	0.7	0.6	0.9	0.7
Wildnst	4.0	3.9	3.7	3.8	3.4	3.6	3.2	**3.0**	3.4	3.0	3.8
SD	0.0	0.3	0.5	0.7	0.7	0.5	1.4	1.3	0.7	1.0	0.4

SPECIE	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.
Camper	1.4	0.7	1.6	1.6	1.8	0.6	1.2	2.2	1.2	1.3	0.7
SD	0.9	1.0	1.3	1.0	0.9	0.6	0.8	0.8	0.8	0.8	0.7
Backpak	2.4	1.7	2.6	2.7	2.7	0.9	2.0	3.0	2.0	2.3	1.0
SD	0.9	0.8	0.9	0.9	1.0	0.8	1.1	0.9	0.8	0.8	0.8
Mtneer	3.0	2.2	3.1	3.3	3.0	1.6	2.8	3.0	2.7	3.0	1.8
SD	0.8	1.1	0.9	0.6	0.8	1.0	0.9	0.8	0.7	0.7	0.9
Wildnst	3.8	3.4	3.8	3.7	3.6	2.2	3.9	3.4	3.3	3.6	2.8
SD	0.4	0.7	0.7	0.7	0.5	1.2	0.3	0.7	0.7	0.5	1.0

Note. Numbers correspond to item number in Wildernism Scale (Table 10). Wildernism Standards range is from zero to four possible points. Discrepancy (in bold typeface) in items 16 and item 19 with Mountaineer higher than Wildernist. Camper ($n = 20$); Backpacker ($n = 51$); Mountaineer ($n = 31$); Wildernist ($n = 9$).

Sense of Space Scale

The reliability of the four Wildernism Species' Sense of Space distances was tested with the nonparametric Kruskal-Wallis Test. Kruskal-Wallis tested whether the Sense of Space distances were or were not significantly different for each Wildernism Specie. It assessed whether the samples in the comparison were drawn from the same distribution, or from distributions with the same median. The assumption is that each

Wildernist Specie's required Sense of Space distance would be ordered showing Camper Specie prefer a closer distance to each of the items than the Backpackers, Mountaineers would desire more distance, and finally the Wildernists would require the farthest buffering distances. Multiple comparisons testing difference of variances are valid only if the sampled populations are normal or very close to normal, and are severely affected if this assumption is not satisfied (Zar, 1996). Therefore, visual comparison of the mean distances can be used.

The Kruskal-Wallis test (Table 16) validated that groupings have significantly different means ($p < .05$). Table 17 shows that all of the buffer distances for each indicator item were different and appeared aligned to appropriate Species.

Table 16. Analysis of similarities between Specie and individual's Sense of Space buffer distances with Kruskal-Wallis ANOVA By Ranks (N = 111)

1. ROADS:		
Pre-treatment Minimum: H (3, N= 111) = 35.63 p =.00	*N*	Sum of Ranks
Camper	20	527.0
Backpacker	51	2675.0
Mountaineer	31	2203.0
Wildernist	9	811.0
Pre-treatment Maximum: H (3, N= 111) = 51.51 p =.00	*N*	Sum of Ranks
Camper	20	437.5
Backpacker	51	2587.5
Mountaineer	31	2281.5
Wildernist	9	909.5
Post-treatment Minimum: H (3, N= 111) = 67.54 p =.00	*N*	Sum of Ranks
Camper	12	176.5
Backpacker	30	1001.0
Mountaineer	43	2681.5
Wildernist	26	2357.0
Post-treatment Maximum: H (3, N= 111) = 92.92 p =.00	*N*	Sum of Ranks
Camper	12	160.0
Backpacker	30	768.5
Mountaineer	43	2798.5
Wildernist	26	2489.0
2. TRAILHEADS:		
Pre-treatment Minimum : H (3, N= 111) = 44.63 p =.00	*N*	Sum of Ranks
Camper	20	444.5
Backpacker	51	2605.9
Mountaineer	31	2460.0
Wildernist	9	706.5
Pre-treatment Maximum: H (3, N= 111) = 14.53 p =.00	*N*	Sum of Ranks
Camper	20	697.5
Backpacker	51	2820.5
Mountaineer	31	2065.5
Wildernist	9	632.5
Post-treatment Minimum: H (3, N= 111) = 84.85 p =.00	*N*	Sum of Ranks
Camper	12	146.5
Backpacker	30	769.0
Mountaineer	43	2980.0
Wildernist	26	2320.5
Post-treatment Maximum: H (3, N= 111) = 72.72 p =.00	*N*	Sum of Ranks
Camper	12	207.5
Backpacker	30	783.0
Mountaineer	43	3329.5
Wildernist	26	1896.0

Table 16 continued; Kruskal-Wallis ANOVA By Ranks

3. TRAILS

Pre-treatment Minimum: H (3, N= 111) = 45.01 p =.00	*N*	Sum of Ranks
Camper	20	477.0
Backpacker	51	2624.5
Mountaineer	31	2319.0
Wildernist	9	795.5
Pre-treatment Maximum: H (3, N= 111) = 53.20 p =.00	***N***	**Sum of Ranks**
Camper	20	442
Backpacker	51	2545
Mountaineer	31	2327.5
Wildernist	9	901.5
Post-treatment Minimum: H (3, N= 111) = 84.71 p =.00	***N***	**Sum of Ranks**
Camper	12	266.5
Backpacker	30	718.5
Mountaineer	43	2852.0
Wildernist	26	2379.0
Post-treatment Maximum: H (3, N= 111) = 96.44 p =.00	***N***	**Sum of Ranks**
Camper	12	219.0
Backpacker	30	684.0
Mountaineer	43	2798.0
Wildernist	26	2515.0

4. CAMPSITES

Pre-treatment Minimum: H (3, N= 111) = 35.77 p =.00	*N*	Sum of Ranks
Camper	20	513
Backpacker	51	2751
Mountaineer	31	2128.5
Wildernist	9	823.5
Pre-treatment Maximum: H (3, N= 111) = 47.63 p =.00	***N***	**Sum of Ranks**
Camper	20	411.0
Backpacker	51	2676.0
Mountaineer	31	2286.0
Wildernist	9	843.0
Post-treatment Minimum: H (3, N= 111) = 77.74 p =.00	***N***	**Sum of Ranks**
Camper	12	300.0
Backpacker	30	712.5
Mountaineer	43	2917.0
Wildernist	26	2286.5
Post-treatment Maximum: H (3, N= 111) = 97.29 p =.00	***N***	**Sum of Ranks**
Camper	12	176.0
Backpacker	30	734.0
Mountaineer	43	2766.0
Wildernist	26	2540.0

Table 16 continued; Kruskal-Wallis ANOVA By Ranks

5. BRIDGES		
Pre-treatment Minimum: H (3, N= 111) = 38.03 p =.00	*n*	Sum of Ranks
Camper	20	635.5
Backpacker	51	2511.0
Mountaineer	31	2188.5
Wildernist	9	881.0
Pre-treatment Maximum: H (3, N= 111) = 49.31 p =.00	*n*	Sum of Ranks
Camper	20	488.0
Backpacker	51	2486.0
Mountaineer	31	2383.0
Wildernist	9	859.0
Post-treatment Minimum: H (3, N= 111) = 90.36 p =.00	*n*	Sum of Ranks
Camper	12	241.0
Backpacker	30	727.5
Mountaineer	43	2777.5
Wildernist	26	2470.0
Post-treatment Maximum: H (3, N= 111) = 94.32 p =.00	*n*	Sum of Ranks
Camper	12	226.0
Backpacker	30	678.0
Mountaineer	43	2813.0
Wildernist	26	2499.0

6. SIGNS		
Pre-treatment Minimum: H (3, N= 111) = 49.92 p =.00	*n*	Sum of Ranks
Camper	20	557.5
Backpacker	51	2395
Mountaineer	31	2472.5
Wildernist	9	791
Pre-treatment Maximum: H (3, N= 111) = 45.29 p =.00	*n*	Sum of Ranks
Camper	20	541.0
Backpacker	51	2453.0
Mountaineer	31	2379.5
Wildernist	9	842.5
Post-treatment Minimum: H (3, N= 111) = 86.08 p =.00	*n*	Sum of Ranks
Camper	12	204.0
Backpacker	30	751.5
Mountaineer	43	2876.0
Wildernist	26	2384.5
Post-treatment Maximum: H (3, N= 111) = 94.88 p =.00	*n*	Sum of Ranks
Camper	12	250.0
Backpacker	30	679.0
Mountaineer	43	2750.5
Wildernist	26	2536.5

Table 16. continued; Kruskal-Wallis ANOVA By Ranks

7. AIRSTRIPS		
Pre-treatment Minimum: H (3, N= 111) = 21.23 p =.00	*N*	Sum of Ranks
Camper	20	580.0
Backpacker	51	2882.5
Mountaineer	31	2159.5
Wildernist	9	594.0
Pre-treatment Maximum: H (3, N= 111) = 18.16 p =.00	*N*	Sum of Ranks
Camper	20	622.0
Backpacker	51	2995.0
Mountaineer	31	1904.0
Wildernist	9	695.0
Post-treatment Minimum: H (3, N= 111) = 55.93 p =.00	*N*	Sum of Ranks
Camper	12	80.0
Backpacker	30	1168.0
Mountaineer	43	2977.0
Wildernist	26	1991.0
Post-treatment Maximum: H (3, N= 111) = 38.73 p =.00	*N*	Sum of Ranks
Camper	12	80.5
Backpacker	30	1574.5
Mountaineer	43	2618.0
Wildernist	26	1943.0

8. HUTS		
Pre-treatment Minimum: H (3, N= 111) = 31.72 p =.00	*N*	Sum of Ranks
Camper	20	564.5
Backpacker	51	2636.0
Mountaineer	31	2327.5
Wildernist	9	688.0
Pre-treatment Maximum: H (3, N= 111) = 49.70 p =.00	*N*	Sum of Ranks
Camper	20	425.5
Backpacker	51	2652.5
Mountaineer	31	2233.5
Wildernist	9	904.5
Post-treatment Minimum: H (3, N= 111) = 82.53 p =.00	*N*	Sum of Ranks
Camper	12	275.0
Backpacker	30	675.5
Mountaineer	43	2974.5
Wildernist	26	2291.0
Post-treatment Maximum: H (3, N= 111) = 97.24 p =.00	*N*	Sum of Ranks
Camper	12	91.5
Backpacker	30	840.5
Mountaineer	43	2737.5
Wildernist	26	2546.5

Table 17. Pre-treatment and Post-treatment mean Sense of Space buffer distances (maximum and minimum) of each Wildernism Specie

SPECIE PRE	Roads Pre	Trailhd Pre	Trail Pre	Campst Pre	Bridge Pre	Signs Pre	Airstrip Pre	Huts Pre	AirOvr Pre	Dams Pre
Camper										
Min.	1.0	0.5	1.0	1.0	0.0	1.5	2.0	1.0	1.3	0.0
Max.	6.0	15.0	4.0	2.0	4.0	3.0	11.00	2.0	3.0	11.0
Backpk										
Min.	4.0	4.0	0.0	0.0	0.0	0.5	9.0	1.0	0.6	11.0
Max.	9.0	42.0	0.5	2.0	0.5	2.4	55.0	5.0	5.0	51.0
Mtneer										
Min.	14.0	29.0	6.0	8.0	7.0	5.0	14.0	13.0	6.0	14.0
Max.	34.0	≥58.0	34.0	19.0	33.0	14.0	≥60.0	31.0	33.0	≥60.0
Wildnst										
Min.	33.0	25.0	10.0	13.0	15.0	10.0	22.0	12.0	15.0	20.0
Max.	53.0	56.0	58.0	58.0	56.0	44.0	≥60.0	≥60.0	56.0	≥60

SPECIE POST	Road Post	Trailhd Post	Trail Post	Campst Post	Bridge Post	Signs Post	Airstrip Post	Huts Post	AirOvr Post	Dams Post
Camper										
Min.	1.0	1.0	0.0	0.0	0.0	0.0	2.0	0.0	2.5	0.0
Max.	5.0	15.0	0.0	1.0	0.3	0.0	11.0	0.5	6.0	11.0
Backpk										
Min.	5.0	5.0	0.0	0.0	0.0	1.0	18.0	0.1	3.5	15.0
Max.	9.0	41.0	0.5	2.0	1.0	2.0	≥60.0	3.0	12.0	≥60.0
Mtneer										
Min.	15.0	28.0	7.0	9.0	7.0	8.0	27.0	16.0	7.0	17.0
Max.	35.0	≥60.0	35.0	20.0	35.0	17.0	≥60.0	31.0	36.0	≥60
Wildnst										
Min.	35.0	38.0	14.0	14.0	17.0	16.0	29.0	20.0	17.0	34.0
Max.	≥60.0	≥60.0	≥60.0	≥60.0	≥60.0	≥60.0	≥60.0	≥60.0	≥60.0	≥60.0

Note. All distances are in miles. ≥60.0 indicates 60 or more miles. Abbreviations correspond to items in the Sense of Space Scale in Table 7.

The Wilderness Management Scale

Analysis of response to the Wilderness Management Scale determined if either one or both of the Wilderness Management Acceptance Standard responses (realistic or ideal) correlate with respondents' Wildernism Standards; and if Wilderness Species mean scores for Wilderness Management Acceptance Standards are aligned accordingly. Next, each of the Scale's spectrum of managerial strategy questions (i.e., regarding #1. ground access; #2. travel; #3. information systems and services; #4. camping; and #5. aircraft access) of the Wilderness Management Scale were analyzed individually. Finally, the

means of each Wildernism Specie's Acceptance Standards were analyzed to see if they were significantly different and aligned in the predicted manner. *Gamma* statistics were used to analyze if correlations exist and a visual comparison of the mean scores was used to determine if they were aligned.

Table 18 shows that Wilderness Standards and Wilderness Management Acceptance Standards are moderately correlated (*Gamma* ranges from .376 to .581, $p < .05$); for all five sections and for the totaled Wilderness Management Scores for both realistic and ideal preferences. The responses indicating ideal circumstances are more highly correlated than the realistic situations with the exception of the fifth section where both responses are moderately low (and the ideal response is less correlated than the realistic response). Table 3 (Appendix A) shows the Kruskal-Wallis test of Management Acceptance Standards with Wildernism Species.

Table 18. *Gamma* Statistics correlation of post Wildernism Standards and Wilderness Management Acceptance Standards

VARIABLE	*N*	*Gamma*	p-level
Realistic Acceptance Standard Total (1-5)	111	0.45	.00 ***
Ideal Acceptance Standard Total (1-5)	111	0.50 *	.00 ***
#1 Realistic Acceptance Standard	111	0.46	.00 ***
#1 Ideal Acceptance Standard	111	0.50 *	.00 ***
#2 Realistic Acceptance Standard	111	0.41	.00 ***
#2 Ideal Acceptance Standard	111	0.58 *	.00 ***
#3 Realistic Acceptance Standard	111	0.44	.00***
#3 Ideal Acceptance Standard	111	0.46 *	.00 ***
#4 Realistic Acceptance Standard	111	0.49	.00 ***
#4 Ideal Acceptance Standard	111	0.63 *	.00 ***
#5 Realistic Acceptance Standard	111	0.38 *	.00 ***
#5 Ideal Acceptance Standard	111	0.38	.00 ***

Note. Symbol (1-5) indicates all questions. Numbers preceding indicates which question (#1, #2, #3, #4, or #5) was analyzed. *Gamma* is significant (***) at $p < .05$ level. The symbol (*) indicates the higher correlation for each section.

Table 19 illustrates that all the means of the "Ideal response" scores are correlated to the appropriate Specie with the exception of *#1. Realistic* and *Total Realistic* in which Mountaineer and Wildernist Species are miss-aligned.

Table 19. Mean Wilderness Management Acceptance Standards by Wildernism Species (N=111)

SPECIE	TOTAL REAL	TOTAL IDEAL
Camp	6.9	10.6
Backpk	11.2	15.6
Mount	12.5	16.4
Wild	**12.8**	17.2

SPECIE	#1. REAL	#1. IDEAL	#2. REAL	#2. IDEAL	#3 .REAL	#3. IDEAL
Camp	1.1	2.1	1.3	1.9	1.4	2.1
Backpk	2.0	3.1	2.2	2.9	2.2	2.9
Mount	2.3	3.3	2.4	3.1	2.5	3.4
Wild	**2.2**	3.5	2.0	3.3	2.7	3.5

SPECIE	#4. REAL	#4. IDEAL	#5. REAL	#5. IDEAL
Camp	1.5	2.6	1.6	2.3
Backpk	2.6	3.3	2.3	3.1
Mount	2.9	3.8	2.5	3.2
Wild	2.7	3.5	2.7	3.3

Note. Discrepancy in alignment of mean scores are in bold typeface.

The Environmental Literacy Test

Environmental Literacy is a knowledge of ecological systems skills, commitment, and behavior in solving environmental problems and self-reported practice of a environmentally sustainable lifeway. These have been shown to be precursors to responsible environmental behavior (Bluhm et al. 1995). Therefore positive correlation between Wildernism Standards and Environmental Literacy scores should be observed. *Gamma* was used to verify this correlation.

The four sections in the Environmental Literacy Test are: Issue Awareness (awareness and knowledge about issues); Ecological Foundations; Evaluation of Issue Analysis and Action Skills; and Issue Analysis and Citizenship Action (knowledge about responsible environmental actions and measurement of action). The action component

also measures specific behavior with a self reported account in five areas of environmental behavior. The Environmental Literacy Test was scored and analyzed following Hungerford et al. (1990) and Bluhm et al. (1995). Each component was analyzed separately as well as in total.

The Environmental Literacy Test is very long. The Environmental Literacy Test takes an hour and instructors/guides had limited time, especially following treatment. Half of the subjects completed it (neither RT nor NP Treatment-Groups returned an adequate number of responses to be employed for analysis) and only pre-treatment Environmental Literacy Test responses were used ($n = 66$). The total Environmental Literacy score was moderately correlated (Gamma =.381; $p < .05$) with pre-treatment Wildernism Standards for all respondents (Table 20). Students' knowledge of ecological foundations (gamma > .31), and the action component, consisted of a three part section measuring student's perceived knowledge of environmental action strategies, their perceived skill in the use of action strategies, and their self-reported six-month history of taking environmental actions (gamma > .28) were high. An insufficient number of subjects returned the post-treatment survey-test ($n = 8$) following their treatment to assess for change.

Table 20. *Gamma* correlation of Pre Wildernism Standards with Environmental Literacy Scores (n = 66)

VARIABLES	*Gamma*	p-level
Wildernism Standard & Environmental Literacy Test Total	**0.38**	.00
1. Wildernism Standard & Issue Awareness	0.23	.02
2. Wildernism Standard & Ecological Foundations	**0.32**	.00
3. Wildernism Standard & Evaluation of Issue Analysis and Action Skills	0.19	.03
4. Wildernism Standard & Issue Analysis and Citizenship Action	**0.28**	.00

Note. Gamma is significant at $p < .05$ level. Highest correlation in bold typeface.

Bluhm et al. (1995) measured reliability of the Environmental Literacy Test in a test-retest dimension. The scores for the participants in this study indicate an acceptable level of reliability (Issue Awareness: r = 0.76; Ecological Foundations: r = 0.88; Issue Analysis: r = 0.79; Action: r = 0.88. Table 21 shows the means for each Wildernism Specie for each of the four sections of the Environmental Literacy Test. With few anomalies, the Environmental Literacy scores were correlated with Wildernism Species. Campers had the lower scores and Wildernists had the highest scores. Wilderness perception is related to ecological knowledge and to students' perceived knowledge of environmental action strategies, their perceived skill in the use of action strategies, and their self-reported six-month history of taking environmental actions.

Table 21. Means analysis of Environmental Literacy Scores by Wildernism Specie

SPECIE	ENV. LITERACY TOTAL	ISSUE AWARENESS	ECOLOGICAL FOUNDATIONS	ISSUE ANALYSIS & ACTION SKILLS	ISSUE ANALYSIS & CITIZENSHIP ACTION
Camper					
Mean	116	3	21	20	74
Min.	97	0	17	7	44
Max.	163	6	24	42	110
Backpacker					
Mean	121	3	22	26	**71**
Min.	23	0	17	0	0
Max.	161	6	27	38	114
Mountaineer					
Mean	158	5	24	**27**	103
Min.	107	0	20	0	46
Max.	202	6	27	42	133
Wildernist					
Mean	184	1	23	24	137
Min.	169	1	23	21	119
Max.	199	1	23	26	134

Note. There is a miss-alignment (in bold typeface) of Issue Analysis with Mountaineer and Wildernist Species and with Action with Camper and Backpacker Species

Previous Wilderness Experience and Perceived Wilderness Skills

A section of demographic questions was included in the survey-test that was administered to all respondents prior to treatment. The questions included those related to experience in wilderness areas, wilderness skills and descriptive data and questions regarding size of participants' community and location, and managerial preferences.

This analysis determined if amount of experience in wilderness and associated wilderness skills were related to Wildernism Standards and Environmental Literacy scores. A means analysis and *Gamma* statistics compared Wildernism Species' Wildernism Standards with extent of confidence in their wilderness skills.

Table 22 shows that as categories move from Camper to Wildernist more skill and experience is reported. There is a strong correlation of perceived wilderness skills with Wildernism Species. There is a moderate correlation between Wildernism Specie and self-reported years of experience. Additional demographics are shown in Table 23 and Table 24 including Kruskal-Wallis test results comparing Alaskan and Non-Alaskan residents with two indicators: managerial priority, and with ANILCA Wilderness Property.

Table 22. Means analysis and *Gamma* statistic of Wildernism Specie with a) background of perceived proficiency with wilderness skills; and b) years experience in wilderness

VARIABLES	*Gamma*	p-level
Wildernism Specie & Wilderness Skills	.88	.00***
Wildernism Specie & Past Experience	.23	.02***
SPECIE	WILDERNESS SKILLS *M*	PAST EXPERIENCE *M*
Camper	1.50	5.50
Backpacker	2.73	5.90
Mountaineer	3.05	6.44
Wildernist	3.77	7.38

Note. Gamma is significant (***) at $p < .05$ level.

Table 23. Demographics data from the "About You" section of the Wilderness Perception Survey-Test

Type of community in which you live	
major metro area (over 500,000)	53
medium city (50,000 - 500,000)	16
small city (10,000 - 50,000)	40
rural or small town (1,000 - 10,000	1
village (up to 1,000)	0
farm, ranch, or homestead	1

Note. The majority of respondents came from cities. The NSP. WSP, RT, and NP came from major metropolitan areas. Since CC students were from University of Alaska Fairbanks, most responded that they were from a small city e.g., Fairbanks.

Table 24. Kruskal-Wallis comparison of Alaskans and Non Alaskans : a) on Wilderness management priorities, and b) ANILCA wilderness experience property

DEPENDENT VARIABLE: WILDERNESS MANAGEMENT PRIORITIES		
H (1, N = 111) = 21.81 p =.00		
INDEPENDENT VARIABLE	*N*	Sum Of Ranks
Alaska	49	3467.5
Outside Alaska	62	2637.5

DEPENDENT VARIABLE: ANILCA WILDERNESS PROPERTY		
H (1, N= 111) = 6.14 p =.01		
INDEPENDENT VARIABLE	*N*	Sum Of Ranks
Alaska	49	3159.00
Outside Alaska	62	3057.50

Note. Kruskal-Wallis is significant at $p < .001$ level.

Effects of Wilderness Education

The participants' pre-treatment and post-treatment wilderness perception scores should be higher following treatment. The 111 respondents' pre-treatment and post-treatment survey-test scores were compared on the Wildernism Scale, Sense of Space Scale, and the Wilderness Management Scale. Differences in post-treatment survey-test scores were analyzed with nonparametric statistics using the Wilcoxon Matched Pairs Test.

Wildernism Scale

Responses to the Wildernism Scale showed that students who participated in the NSP and WSP and CC course had a significant change ($p < .05$) in Wildernism Standards following treatment (Table 25). As predicted, NSP and WSP treatment groups had greater changes following treatment than any other group (Figure 14). The 11 NP respondents

had no change in their Wilderness Standards as was anticipated. Instead of increasing, the RT group's post-treatment scores dropped following treatment (Table 26).

Table 25. Wilcoxon Matched Pairs Test of change in pre-treatment and post-treatment Wildernism Standards for each treatment-group

Treatment	*N*	*T*	p-level
NSP	33	0.0	.00 ***
WSP	22	0.00	.00 ***
RT	9	0.77	.44
CC	36	2.77	.00***
NP	11	0.00	.11

Note: the Wilcoxon test is significant (***) at the .05 level.

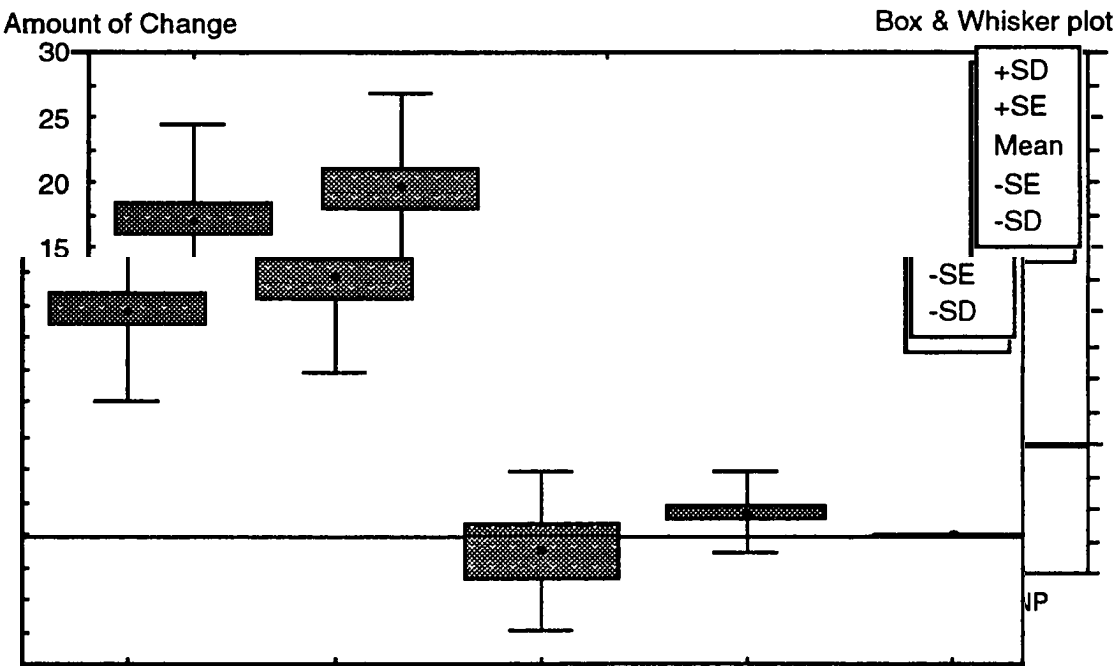


Figure 14. Comparison of change in Wildernism Standards following treatment

Table 26. Change in pre-treatment and post-treatment Wildernism Standards for the five treatment-groups

TREATMENT	*N*	MIN. CHANGE	MAX. CHANGE	MEAN CHANGE	*SE*	*SD*
ALL Groups	111	- 9	41	9.4	0.98	10.37
NSP	33	5	41	17.2	1.23	7.07
WSP	22	7	37	19.6	1.54	7.20
RT	9	- 9	11	- 1.3	2.01	6.02
CC	36	- 3	9	· 1.6	0.00	0.00
NP	11	- 1	1	0	0.14	0.45

Wilderness Experience Properties

There was a significant change ($p < .05$) in NSP and WSP treatment-group's post-treatment Wildernism Standards for all five of the wilderness experience properties (Table 27). There was a significant change in the CC group's post Wildernism Standards for two of the wilderness properties: Ethical perspective, and ANILCA. The mean difference for the three treatment-groups in Table 28 and Figure 15 show that the NSP and WSP treatments induced a greater change than the CC. This seems to show that educational experiences do indeed produce change in wilderness perception. There was no significant change in the NP group. The RT group participants had lower Wildernism Standards following treatment and were significantly lower in the ANILCA category.

Table 27. Wilcoxon Matched Pairs Test comparing pre and post Wildernism Standards for change, by wilderness properties for all treatment-groups

Treatment	*N*	*T*	p-level
1. Wildness Perspective			
NSP	33	0.00	.00 ***
WSP	22	0.00	.00 ***
RT	9	6.50	.75
CC	36	38.00	.18
NP	11	7.50	.11
2. Experiential Factors			
NSP	33	0.00	.00 ***
WSP	22	0.00	.00 ***
RT	9	14.50	.62
CC	36	23.00	.12
NP	11	7.50	.11
3. Economic Development			
NSP	33	0.00	.00***
WSP	22	0.00	.00***
RT	9	11.00	.17
CC	36	43.00	.06
NP	11	7.50	.11
4. Ethical Perspective			
NSP	33	0.00	.00 ***
WSP	22	0.00	.00 ***
RT	9	9.00	.20
CC	36	68.00	.00 ***
NP	11	7.50	.59
5. ANILCA			
NSP	33	0.00	.00 ***
WSP	22	3.00	.00 ***
RT	9	0.00	.01 ***
CC	36	21.00	.00 ***
NP	11	2.00	.90

Note. Wilcoxon test is significant (***) at the $p < .05$ level.

Table 28. Mean change in Wildernism Standards following treatment in the wilderness experience properties categorized by each treatment-group

WILDERNISM PROPERTY	NSP	WSP	RT	CC	NP
Wildness Perspective	10.8	12.6	- 2.0	0.8	0.0
Economic Development	4.4	3.2	2.2	0.6	0.0
Experiential factors	1.5	2.8	- 0.3	- 0.2	0.0
Ethical	11.3	13.2	- 1.3	1.4	0.1
ANILCA	2.5	3.1	- 2.4	0.8	0.1

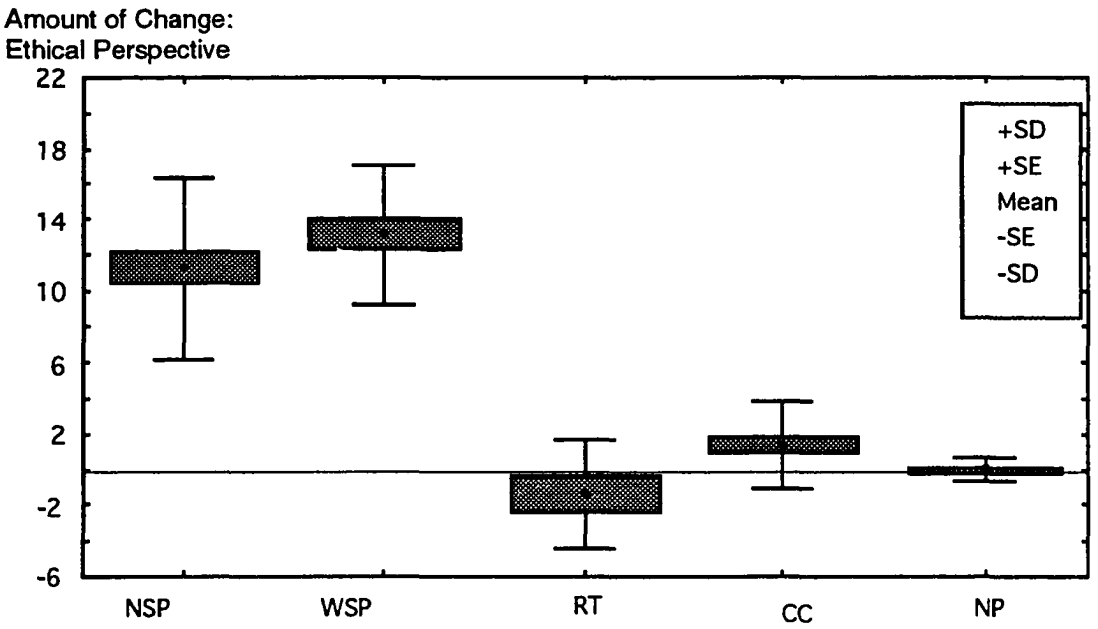


Figure 15. Comparision of mean change in Wildernism Standards following treatment, focusing on Ethical Perspective wilderness experience property.

Wildernism Species

Significant changes in Wildernism Standards for NSP and WSP treatment-groups raised the question whether Wildernism Species should be re-categorized. The Wilcoxon analysis of pre-treatment and post-treatment Wildernism Species confirmed that NSP and WSP students' specie classification changed significantly ($p < .05$) while the RT, CC and N Participant treatment-groups did not (Table 29). Figure 16 illustrates how much each treatment-group changed following treatment. Note that 20 NSP and 14 WSP treatment-groups changed at least one Specie-level, and nine changed two Specie-levels. Only three of the CC group students changed one Specie-level while one RT participant actually dropped one Specie-level. Figure 17 shows there was an increase in the number of "higher purism" individuals following treatment; the Camper and Backpacker population decreased, while the Mountaineer and Wildernist Specie increased in size.

Table 29. Wilcoxon Matched Pairs Test of change in Wildernism Species following treatment for each treatment-group

Treatment	*N*	*T*	p-level
NSP	33	0.00	.00 ***
WSP	22	0.00	.00 ***
RT	9	0.00	.11
CC	36	0.00	.11
NP	11	0.00	.11

Note. Wilcoxon test is significant (***) at the .05 level.

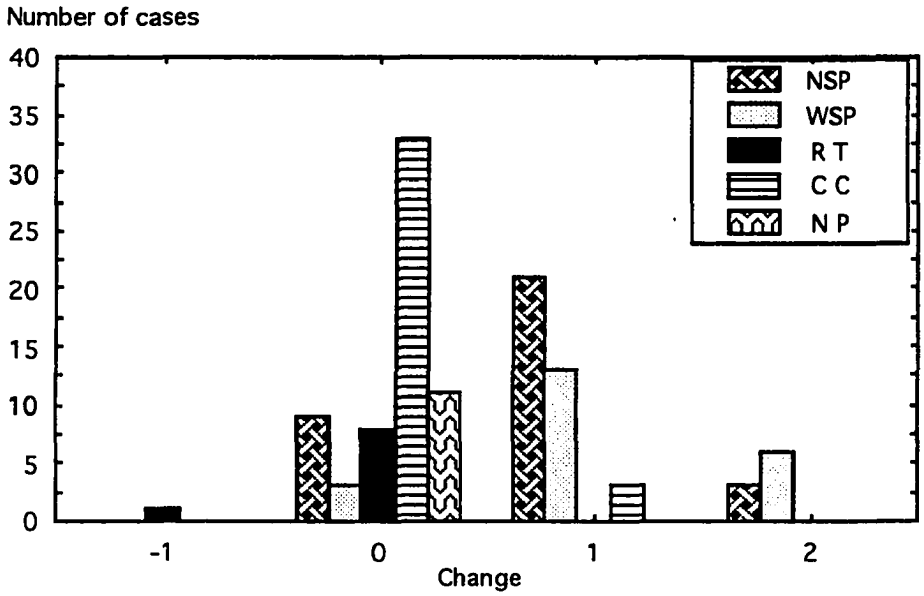


Figure 16. Wildernism Species change following treatment, grouped by treatment.

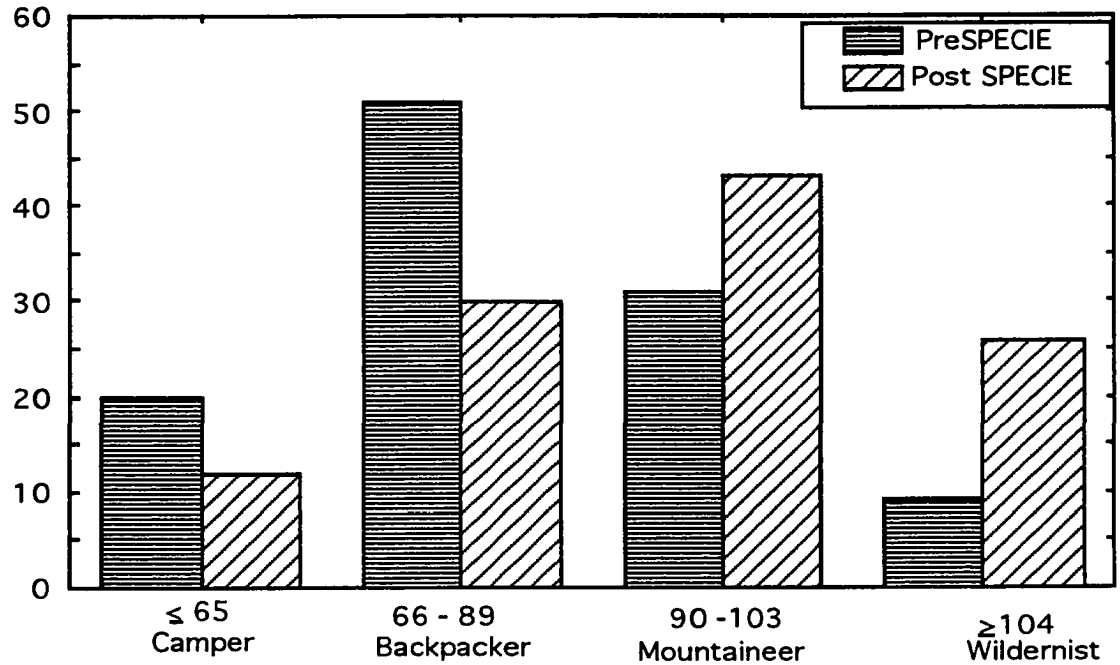


Figure 17. Population size of Wildernism Species before and following treatment.

Sense of Space Scale

Respondents' minimum and maximum pre-treatment Sense of Space distances were compared to minimum and maximum post-treatment distances with the nonparametric Wilcoxon Matched Pairs Test. Sense of Space minimum and maximum buffer distances were significantly different ($p < .05$) following treatment (Appendix A). Minimum distance changes were significant for all groups except NP. Minimum distance changes were significant for all ten items tested for participants in the NSP group, seven for the WSP, and three for the RT and CC groups. The maximum distance change was also significant for nine items for participants in the NSP group, ten for the WSP group, one for the RT group. Table 30 shows the NSP and WSP treatment groups' changes were greater while RT and CC groups' changes were less and quite often negative. A 4 x 5 between groups ANOVA test was not possible because of the very small sample size within some of the specie/treatment-groups.

Table 30. Mean change in minimum and maximum Sense of Space buffer distances for each Wildernism Specie

Specie Min.	Roads Min.	Trailhd Min.	Trail Min.	Campst Min.	Bridge Min.	Signs Min.	Airstrip Min.	Huts Min.	Airovr Min.	Dams Min.
NSP	2.6*	7.1*	1.3*	1.2*	2.2*	15.7*	9.7*	3.8*	3.8*	9.2*
WSP	2.5	12.0*	5.3*	0.9	0.7	16.4*	11.8*	6.1*	1.1*	7.5*
RT	- 0.3	0.5*	- 2.1	- 0.7	- 3.2*	- 24.3*	- 4.0	- 1.7	2.6	0.0
CC.	- 0.3	- 4.7	- 0.1	- 0.2	0.1	- 18.8	12.4*	1.7*	0.4	2.5*
NP.	0.0	- 0.0	0.7	0.0	- 0.9	- 20.8	2.4	0.0	- 0 .9	0.9
Specie Max.	**Road Max.**	**Trailhd Max.**	**Trail Max.**	**Campst Max.**	**Bridge Max.**	**Signs Max.**	**Airstrip Max.**	**Huts Max.**	**AirOvr Max.**	**Dams Max.**
NSP	5.1*	10.8*	3.2*	1.6	6.2*	5.7*	9.5*	3.8*	9.8*	6.8*
WSP	10.9*	19.1*	3.6*	6.6*	5.4*	10.9*	11.6*	4.2*	9.5*	5.9*
RT.	- 1.1	1.3	- 5.0	- 3.1	- 5.0	- 2.7	4.4	- 3.3*	5.6	0.1
CC.	0.2	- 4.3	0.4	0.2	0.0	1.9	4.2	- 0.4	0.6	2.1
NP	- 1.8	2.3	0.9	0.2	0.0	2.7	2.7	0.1	0.5	- 0.3

Note. * indicates significant change (< .05). Abbreviations correspond to items in the Sense of Space in Table 8. Distances are mean distance miles.

Wilderness Management Scale

The Wilderness Management Scale measured respondents' acceptance of wilderness management strategies. An analysis of the effects of educational experience compared pre-treatment and post-treatment scores. The Wilcoxon Match Pairs test analyzed if a change occurred between the pre-treatment and post-treatment scores for each of the Ideal and Realistic responses.

There was a change in Wilderness Management Acceptance Standards after educational experiences in the NSP and WSP groups (Table 31). The NSP and WSP treatment groups had a significant change ($p < .05$) in Wilderness Management Acceptance Standards following treatment. The other treatment-groups' changes were not statistically significant.

Table 31. Wilcoxon Matched Pairs Test of changes in pre-treatment and post-treatment Wilderness Management Scores for each treatment group. Realistic (R) and Ideal (I) responses are analyzed separately

VARIABLE	*N*	*T*	p-level
REALISTIC WILD MANAGEMENT			
NSP	33	0.00	.00***
WSP	22	0.00	.02***
Recreation	9	0.00	.11
College	36	16.00	.44
Non Participant	11	0.00	.11
IDEAL WILD MANAGEMENT			
WSP	22	0.00	.00 ***
NSP	33	0.00	.02 ***
Recreation	9	0.00	.11
College	36	11.00	.33
Non Participant	11	0.00	.11

Note: the Wilcoxon test is significant (***) at the .05 level.

Application

Geospatial Application

Wildernism Specie's sense of Space buffer distance for each indicator feature are shown in Table 32. Wildernism Species' habitat is delimited by buffer zone around each of the seven features individually in Figure 18 through Figure 24. For example, the Wildness perspective feature "huts" are buffered for each of the four Wildernism Species in Figure 18.

The respondents' limits of unacceptability, their Sense of Space buffer distances, were significantly greater than Kliskey's (1994). Some buffering distances considered unacceptable by certain Wildernism Species after wilderness education were far too vast for the extent of the 730,000 ha (30,000 acres) NWNER of New Zealand. Kliskey attributed zero to five kilometers distance from undesirable conditions. The Sense of Space buffer distances ranged from zero to over sixty miles for the same features. The Sense of Space Scale provided minimum and maximum distances, Kliskey's process did not. Therefore with some features, all four Wildernism Species do not have sufficient wilderness habitats in the extent of the NWNER. Their acceptable Sense of Space buffering distances for some features were too vast to fit within the wilderness area. Examination of the aggregate map, with features representing both Wildness perspective and Experiential factors, shows the spatial extent of all Wildernism Species is limited. The aggregate buffering process eliminated two species (Figure 25). The proximity of trailheads and trail signs eliminated Wildernists' habitats from NWNER while roads alone exclude both Wildernists and Mountaineers. The presence of Airstrips abolish all but the Camper Specie. This may be because either the amount and distribution of these features made the NWNER unacceptable as a wilderness to these Species; or the size of the NWNER is not large enough to meet the expectations of Campers and Wildernists simultaneously.

Table 32. Geospatial database components From Kliskey (1994)

Coverage	Indicator	Spatial Entity	Camper	Backpk	Mountain	Wildernist
WILDNESS PERSPECTIVE (RECREATIONAL FACILITIES: AID)						
AID1	Trail	Arc	Min 0.0	0.0	7.0	14.0
			Max 0.0	0.5	35.0	≥60.0
AID2	Huts	Point	Min 0.0	0.1	16.0	20.0
			Max 0.5	3.0	31.0	≥60.0
AID3	Campsite	Point	Min 0.0	0.0	9.0	14.0
			Max 1.0	2.0	20.0	≥60.0
AID4	Signs	Point	Min 0.0	1.0	8.0	16.0
			Max 0.0	2.0	17.0	≥60.0
AID5	Bridges	Point	Min 0.0	0.0	7.0	17.0
			Max 0.3	1.0	35.0	≥60.0
EXPERIENTIAL FACTORS (ACCESS: AXS & PRIVACY: PRV)						
AXS 1	Roads	Arc	Min 1.0	5.0	15.0	35.0
			Max 5.0	9.0	35.0	≥60.0
AXS2	Trail	Arc	Min 0.0	0.0	7.0	14.0
			Max 0.0	0.5	35.0	≥60.0
AXS3	Airstrips	Point	Min 2.0	18.0	27.0	29.0
			Max 11.0	≥60.0	≥60.0	≥60.0
AXS4	Trailhead	Point	Min 1.0	5.0	28.0	38.0
			Max 15.0	41.0	60.0	≥60.0
PRV2	Huts	Point	Min 0.0	0.3	16.0	20.0
			Max 0.5	3.0	31.0	≥60.0
PRV3	Campsites	Point	Min 0.0	0.0	9.0	14.0
			Max 1.0	2.0	20.0	≥60.0
PRV 4	Aircraft fly-over	Polygon	Min 2.5	3.5	7.0	17.0
			Max 6.0	12.0	36.0	≥60.0
PRV 5	Native vegetation	Polygon	Min 0.0	0.5	22.0	32.0
	Native wildlife		Max 0.0	14.0	≥60.0	≥60.0
ECONOMIC DEVELOPMENT FEATURES (STRUCTURES: STX)						
STX1	Logging Site	Point	Min 42.0	34.0	40.0	42.0
			Max ≥60.0	60.0	≥60.0	≥60.0
STX2	Powerlines	Arc	Min 9.0	9.0	29.0	33.0
			Max ≥60.0	60.0	≥60.0	≥60.0
STX3	Airstrips	Point	Min 2.0	18.0	27.0	29.0
			Max 11.0	60.0	≥60.0	≥60.0
STX4	Trail Culverts	Point	Min 0.0	14.0	17.0	23.0
			Max 0.3	60.0	≥60.0	≥60.0
STX5	Dams	Point	Min 0.0	15.0	17.0	34.0
			Max 11.0	60.0	≥60.0	≥60.0
STX6	Mines	Point	Min 42.0	34.0	40.0	43.0
			Max ≥60.0	60.0	≥60.0	≥60.0
STX7	Antenna	Point	Min 4.8	7.0	12.0	31.0
			Max ≥60.0	60.0	≥60.0	≥60.0
STX8	Lighthouses	Point	Min 0.0	4.0	13.0	31.0
			Max ≥60.0	≥60.0	≥60.0	≥60.0

Note. All distances are in miles. ≥60.0 indicates 60 or more miles.

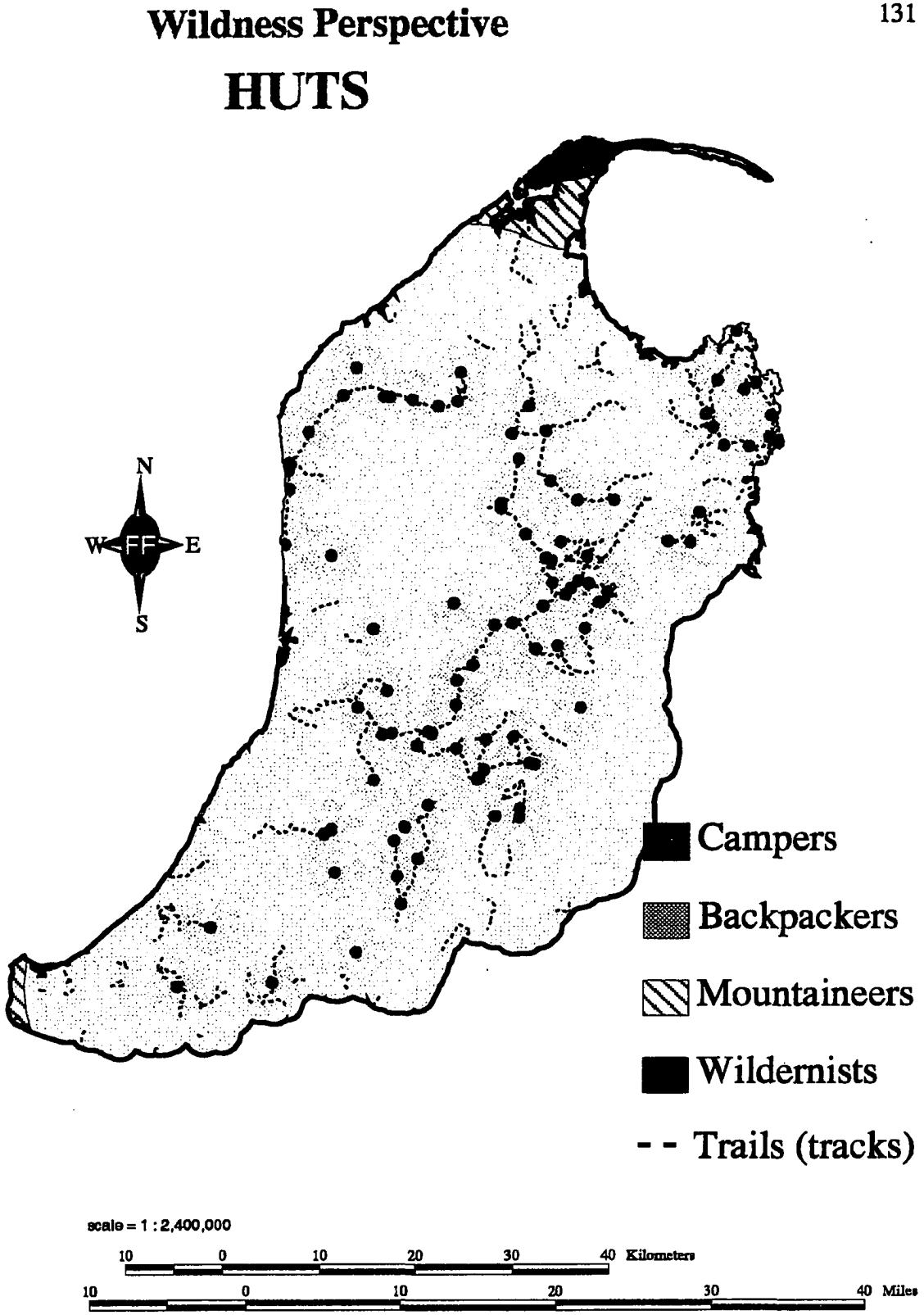


Figure 18. Map of all four Wildernism Species for huts showing perception differentials.

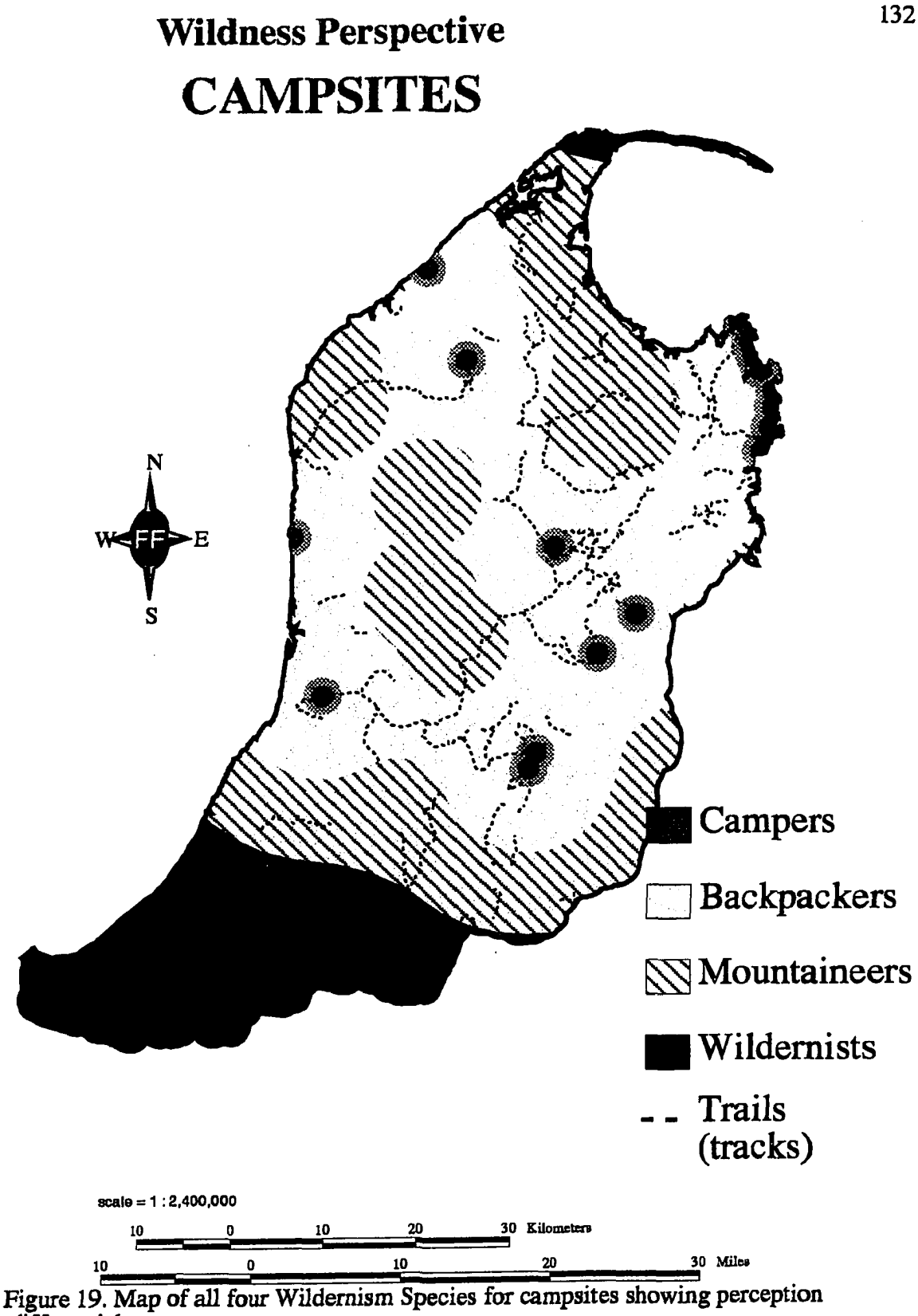


Figure 19. Map of all four Wildernism Species for campsites showing perception differentials.

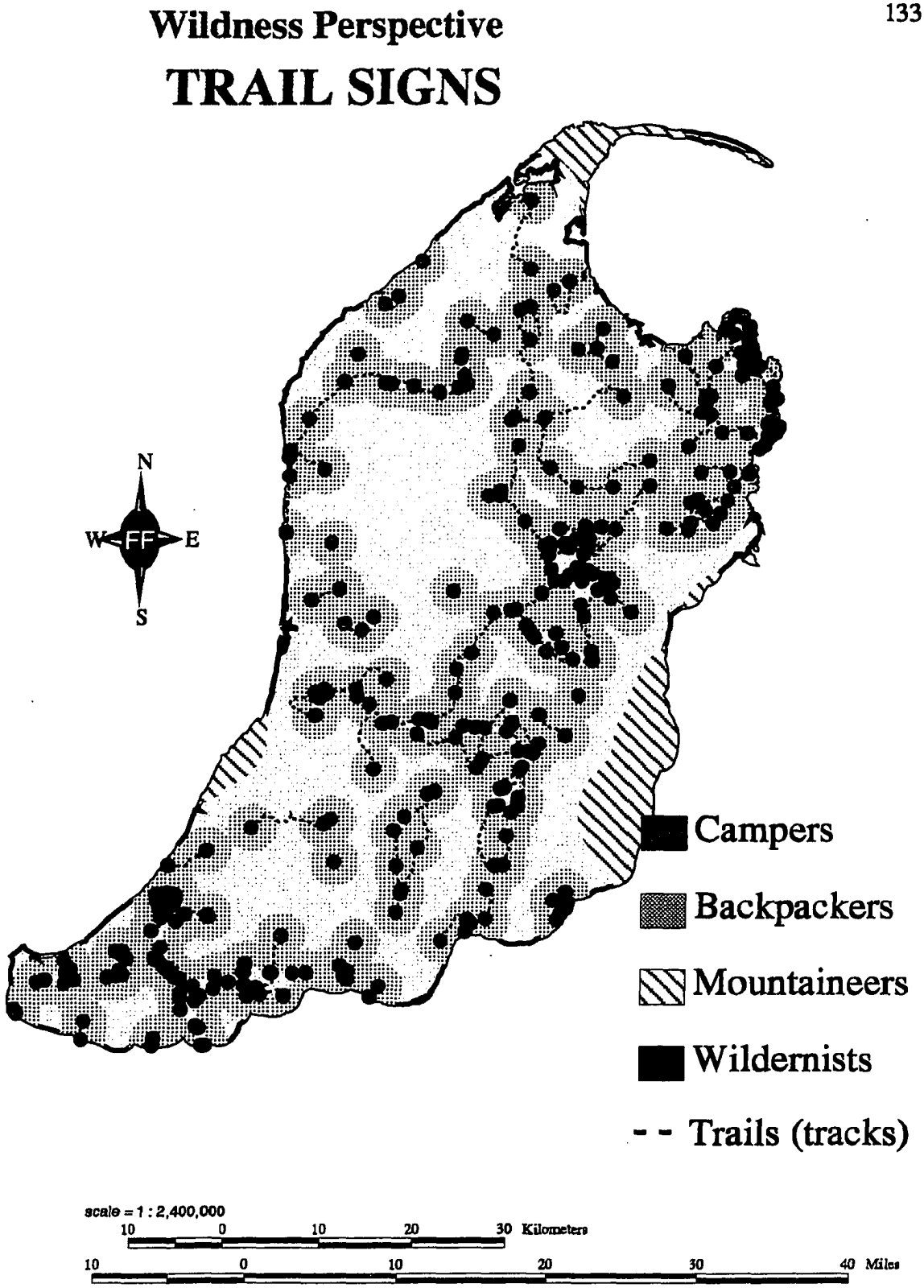


Figure 20. Map of all four Wildernism Species for trailsigns showing perception differentials.

Wildness Perspective & Experiential Factors

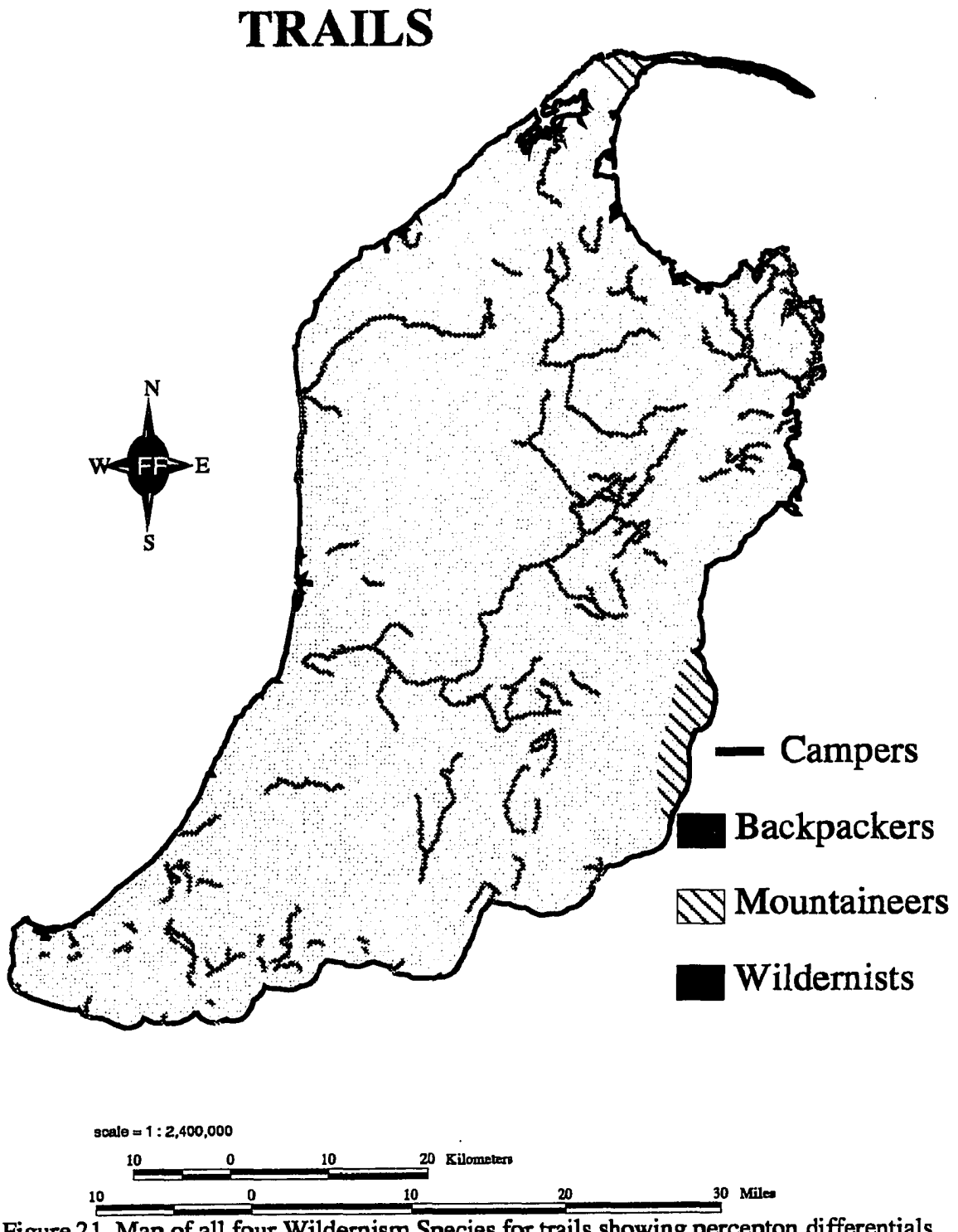


Figure 21. Map of all four Wildernism Species for trails showing percepton differentials.

Experiential Factors

ROADS

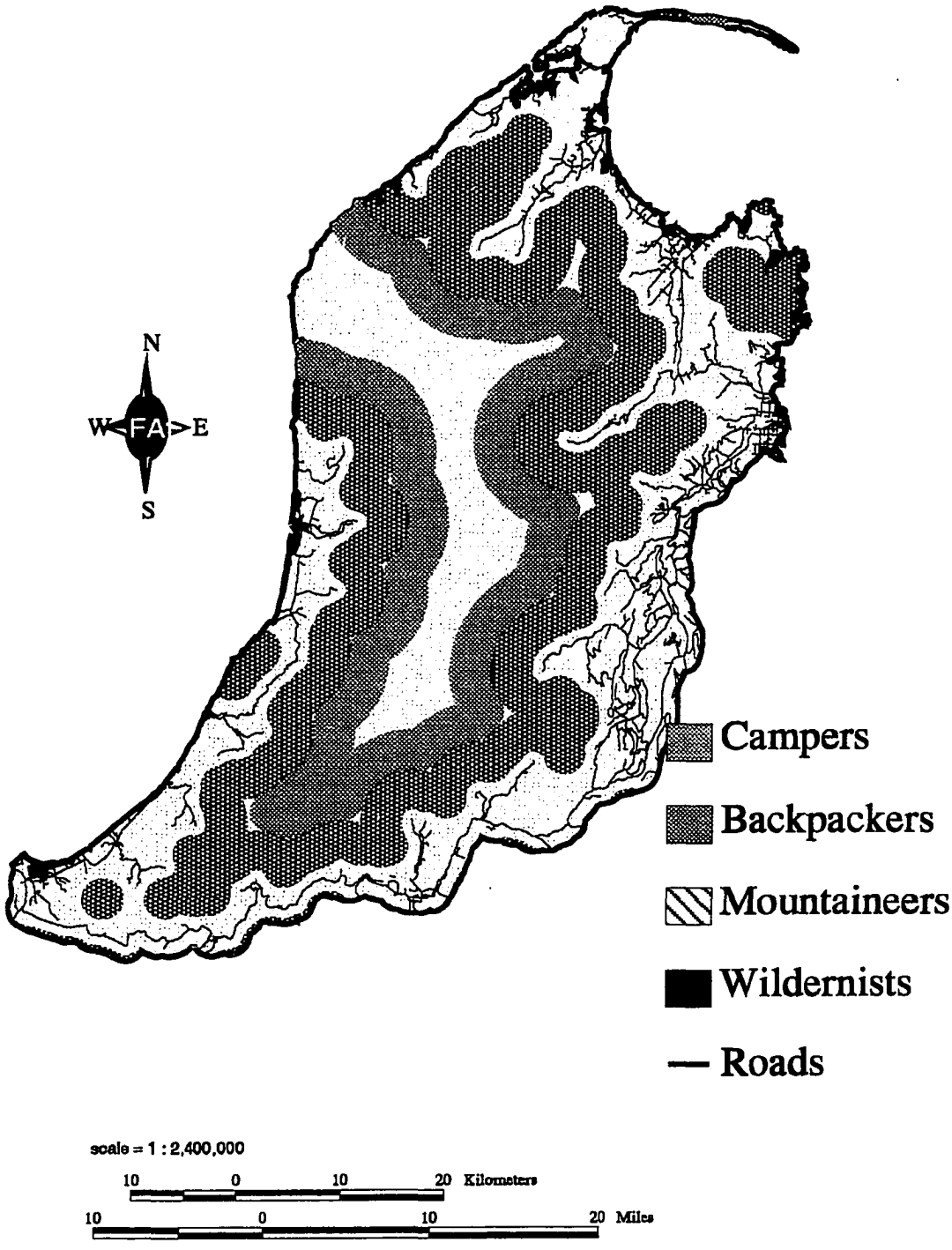


Figure 22. Map of all four Wildernism Species for roads showing perception differentials

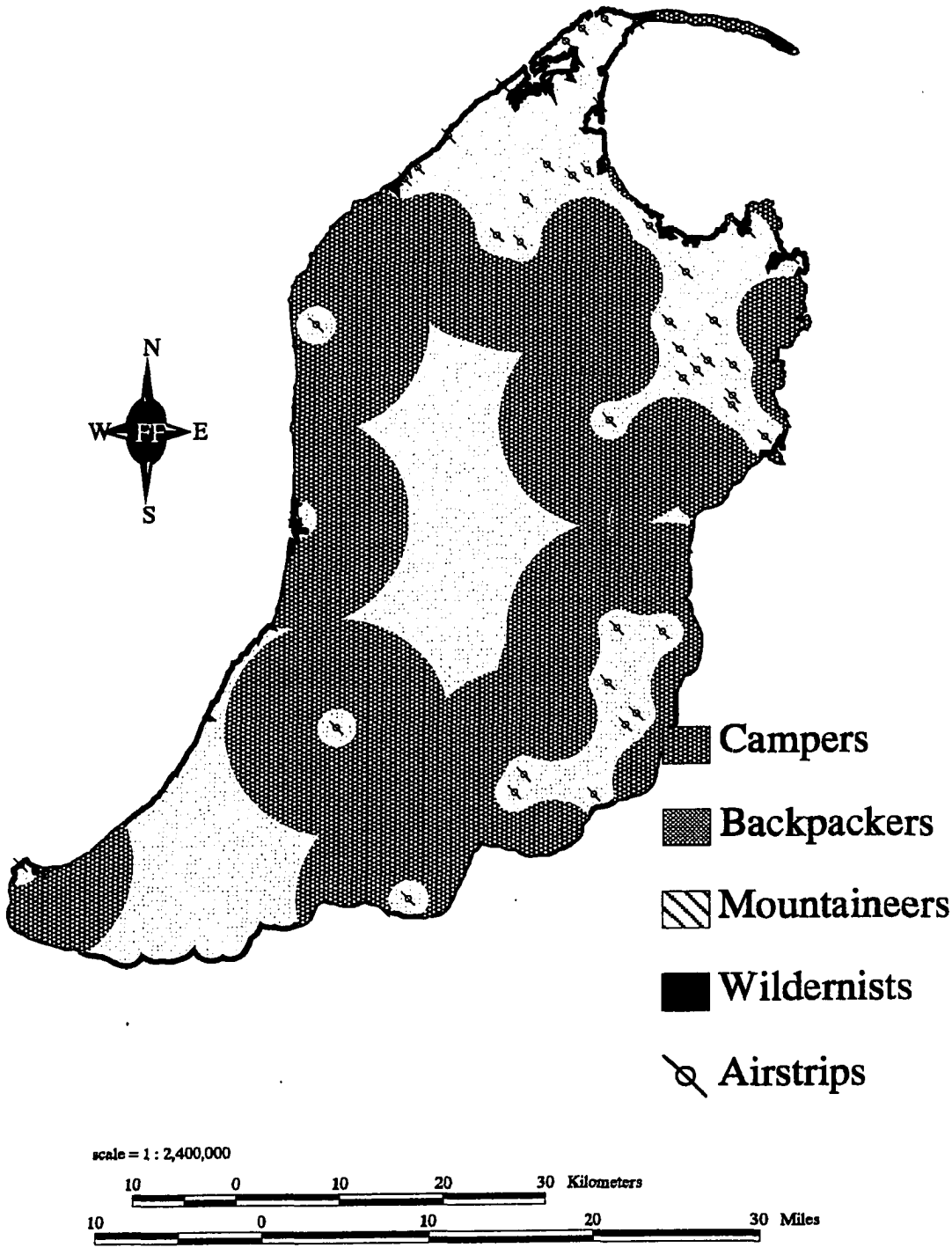


Figure 23. Map of all four Wildernism Species for airstrips showing perception differentials.

Experiential Factors

TRAILHEADS

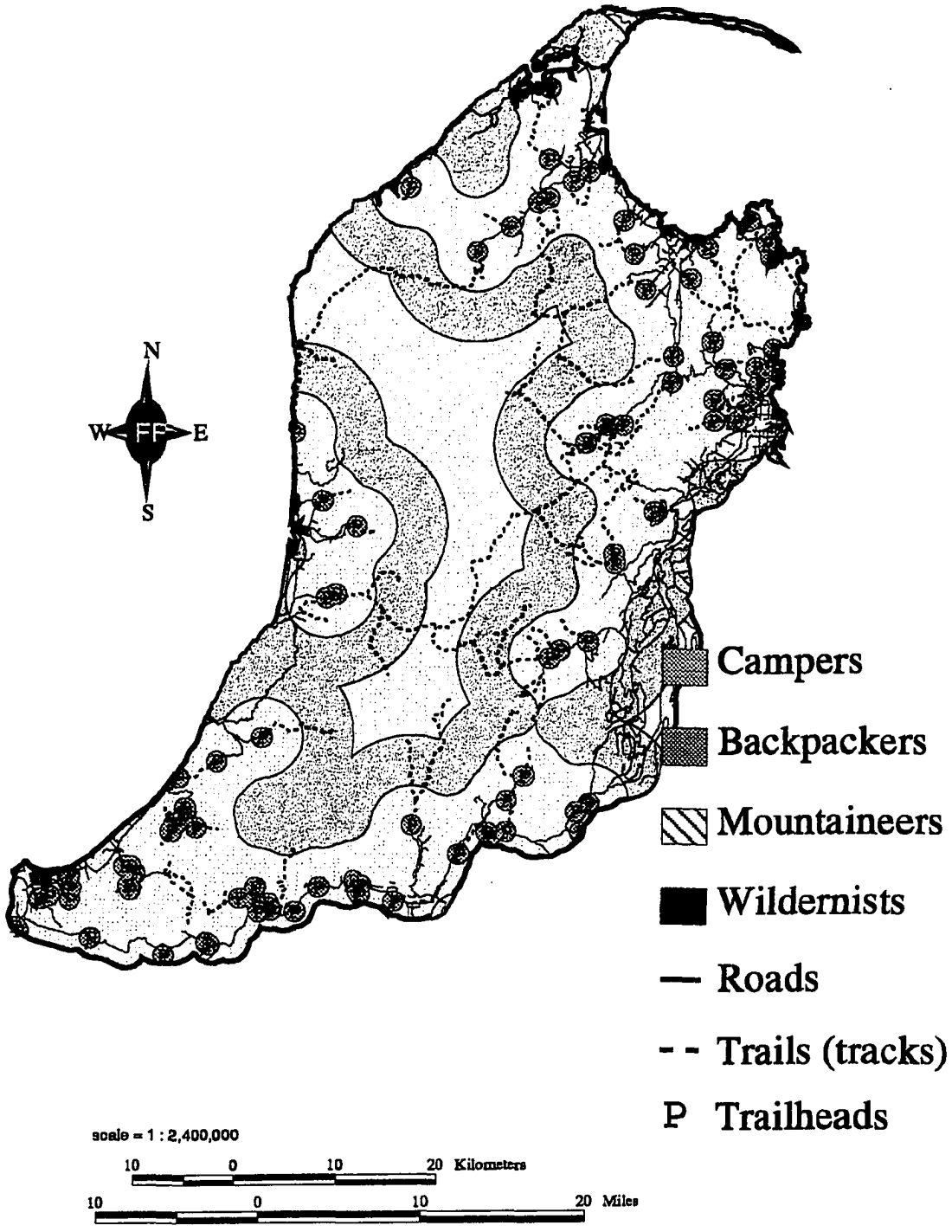


Figure 24. Map of all four Wildernism Species for trailheads showing perception differentials.

Wildness Perspective & Experiential Factors

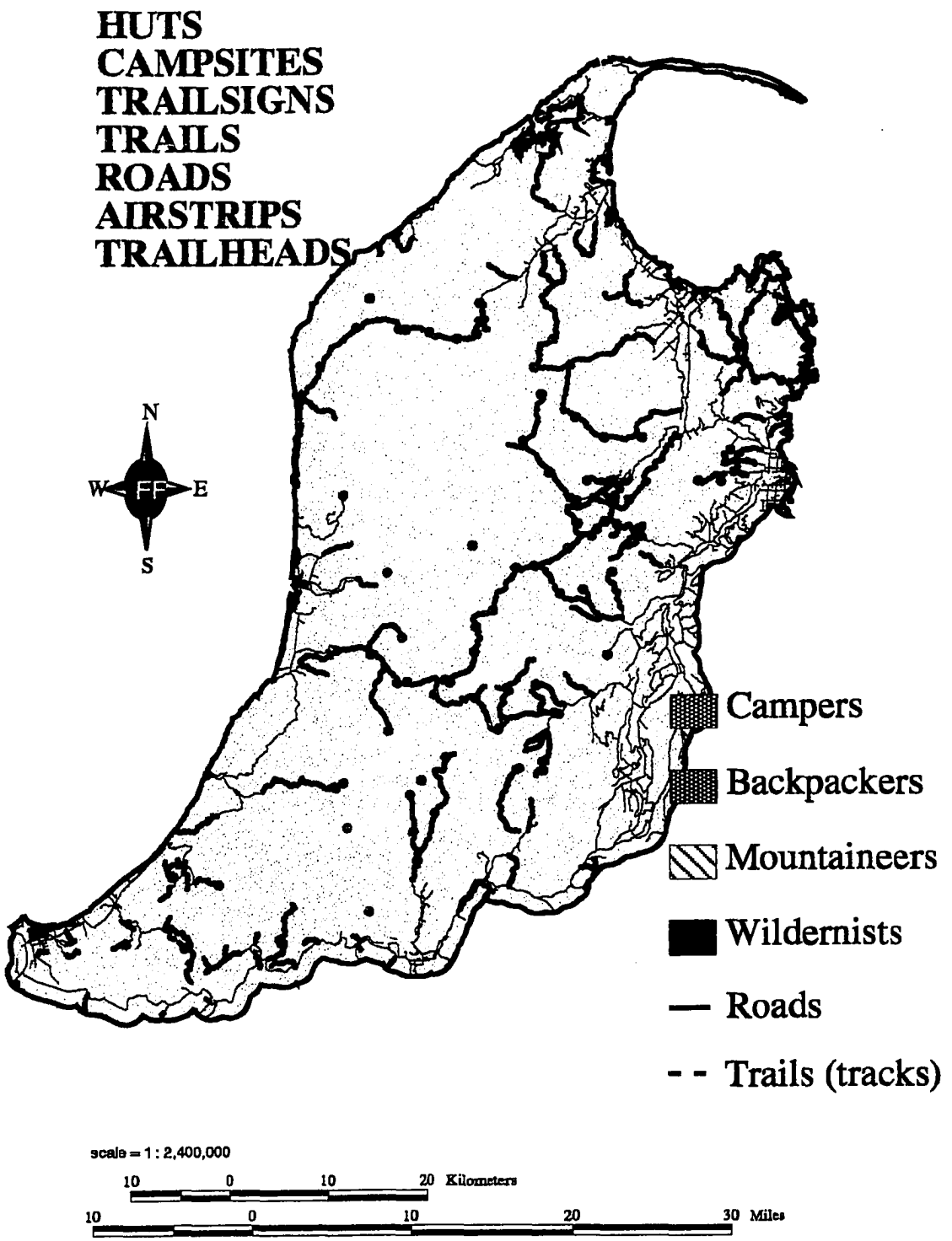


Figure 25. Aggregate wilderness for all Wildernism Species with Wildness Perception and Experiential Factor features showing perception differentials.

Wildernism Typology

A Wildernism Typology provides the opportunity for proactive wilderness management. The roadless portion of the ROS was classified into segments with specific criteria and management guidelines developed for each Specie.

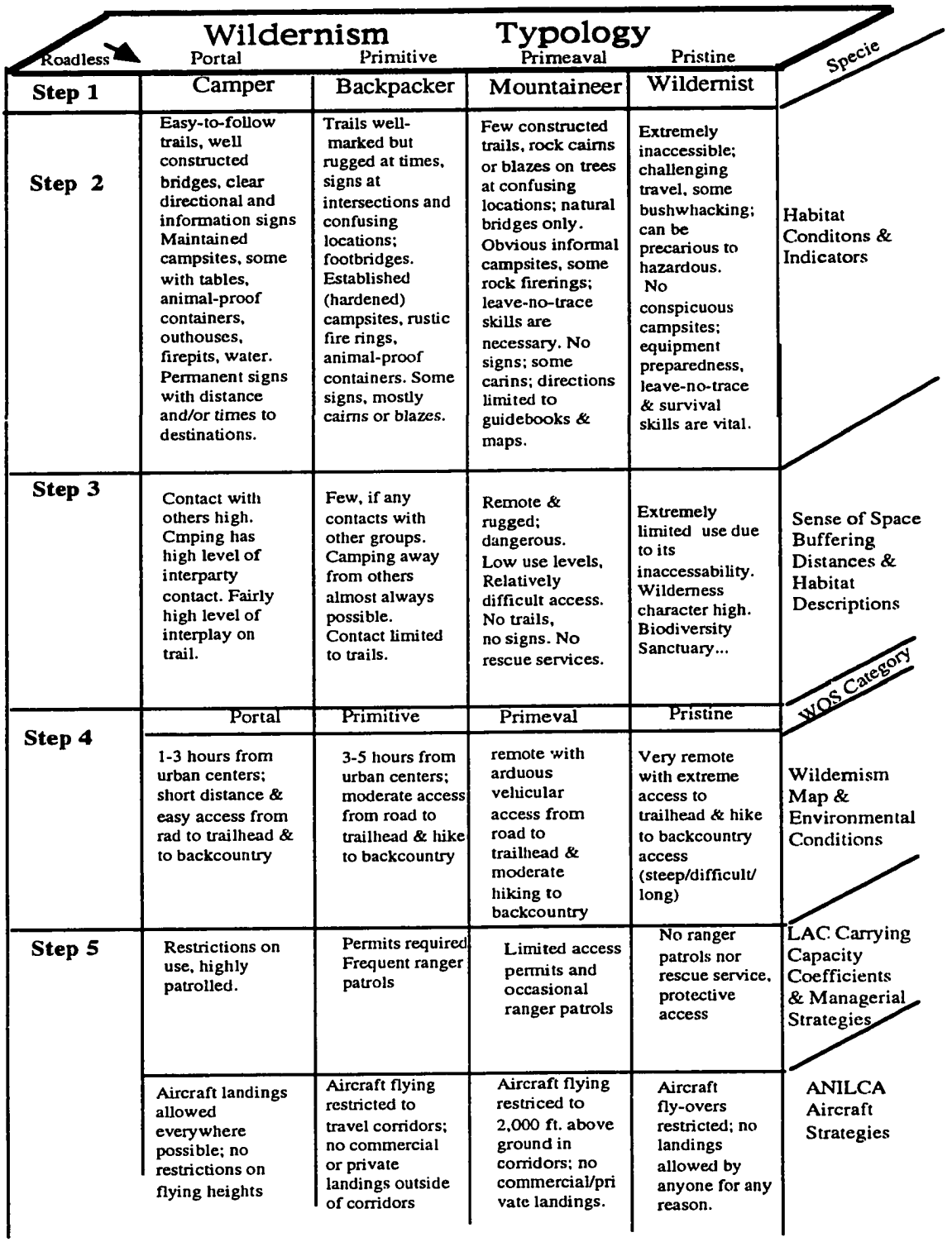
An example Wildernism Typology is shown in Figure 28. The first step identified Wildernism Species that were correlated with the ROS. In this step, managers should identify public issues and managerial concerns relating to distinctive features and characteristics of the wilderness area and neighboring areas, i.e., step one of the LAC process.

The second step in constructing the Wildernism Typology identifies the managerial conditions required for each Wildernism Specie that were obtained directly from the Wildernism Scale. The second step of the LAC process develops a series of wilderness opportunity classes for the area. These opportunity classes define the resource, social, and managerial conditions considered desirable and appropriate within the wilderness through which managers formally protect and maintain a diverse range of wilderness conditions. This is the locale to expand the Wildernism scale to include additional values of wilderness and other indicators.

The third step incorporated the maximum and minimum buffering distances identified for each Specie for each indicator. This was described in actual "on the ground distances" for GIS use and descriptive statements specifying the standards which provide a basis for judging whether a particular condition is acceptable or not.

The GIS generated habitat map for each Wildernism Specie provided input for step four. It includes a descriptive statement from the Wilderness Management Scale describing the environmental conditions of the habitat, and includes the ROS label, e.g. primeval, pristine.

The fifth step include the key indicators that will be measured in monitoring the physical, biological, and social conditions and the standards for each Wildernism Habitat. These carrying capacity coefficients, developed as part of the LAC planning process, are based on recreationist and managerial preferences combined. Specific managerial strategies that are necessary to protect and maintain the habitat qualities are a component of this step. These are obtained from the Wilderness Management Scale with pro-active strategies included.



Roadless	Wildernism Typology				Specie
	Portal	Primitive	Primeaval	Pristine	
Step 1	Camper	Backpacker	Mountaineer	Wildernist	
Step 2	Easy-to-follow trails, well constructed bridges, clear directional and information signs Maintained campsites, some with tables, animal-proof containers, outhouses, firepits, water. Permanent signs with distance and/or times to destinations.	Trails well-marked but rugged at times, signs at intersections and confusing locations; footbridges. Established (hardened) campsites, rustic fire rings, animal-proof containers. Some signs, mostly cairns or blazes.	Few constructed trails, rock cairns or blazes on trees at confusing locations; natural bridges only. Obvious informal campsites, some rock firerings; leave-no-trace skills are necessary. No signs; some carins; directions limited to guidebooks & maps.	Extremely inaccessible; challenging travel, some bushwhacking; can be precarious to hazardous. No conspicuous campsites; equipment preparedness, leave-no-trace & survival skills are vital.	Habitat Conditons & Indicators
Step 3	Contact with others high. Cmping has high level of interparty contact. Fairly high level of interplay on trail.	Few, if any contacts with other groups. Camping away from others almost always possible. Contact limited to trails.	Remote & rugged; dangerous. Low use levels, Relatively difficult access. No trails, no signs. No rescue services.	Extremely limited use due to its inaccessability. Wilderness character high. Biodiversity Sanctuary...	Sense of Space Buffering Distances & Habitat Descriptions
Step 4	Portal	Primitive	Primeval	Pristine	WQS Category
	1-3 hours from urban centers; short distance & easy access from rad to trailhead & to backcountry	3-5 hours from urban centers; moderate access from road to trailhead & hike to backcountry	remote with arduous vehicular access from road to trailhead & moderate hiking to backcountry	Very remote with extreme access to trailhead & hike to backcountry access (steep/difficult/ long)	Wildernism Map & Environmental Conditions
Step 5	Restrictions on use, highly patrolled.	Permits required Frequent ranger patrols	Limited access permits and occasional ranger patrols	No ranger patrols nor rescue service, protective access	LAC Carrying Capacity Coefficients & Managerial Strategies
	Aircraft landings allowed everywhere possible; no restrictions on flying heights	Aircraft flying restricted to travel corridors; no commercial or private landings outside of corridors	Aircraft flying restriced to 2,000 ft. above ground in corridors; no commercial/pri vate landings.	Aircraft fly-overs restricted; no landings allowed by anyone for any reason.	ANILCA Aircraft Strategies

Figure 26. Example Wildernism Typology.

CHAPTER SIX
SUMMARY and DISCUSSION

Wilderness and wilderness experiences are better understood because of this research. This study has fulfilled its objectives.

1. It determined the dimensions of the wilderness experience for quantifiable measurement (yielding indicators for limits of unacceptable change in wilderness):
   a. by investigating the acceptable and unacceptable physical conditions for a person's perception of wilderness and the wilderness experience;
   b. by identifying the critical buffer distance from various human impacts to protect opportunities for a wilderness experience;
   c. by determining that there is a positive correlation to a wilderness purism and wilderness (management strategy acceptance) typology framework.
2. It determined that wilderness education field experiences have an affect on these: Wildernism Standards (perceptions), buffer distances, and managerial strategies Acceptance Standards.
3. It demonstrated ways to apply this information:
   a. by displaying Sense of Space buffer distances geo-spatially on maps with GIS technology;
   b. by developing a model Wildernism Typology built with components derived from techniques analyzed in this study;
   c. by providing suggestions based on this study's finding for wilderness managers, planners, and educators.

Analysis of the Wilderness Experience

Wildernism Scale and Species

The Wildernism Scale is a valid instrument (Cronbach's alpha, 0.937). Wilderness experience properties correlated with those of Kliskey (1994) and Jaakson and Shinn (1992). Subjects were categorized into four Wildernism Species based on their Wildernism Standards: Campers, Backpackers, Mountaineers, and Wildernists. The mean Wildernism Standards for each Specie were significantly different. Their responses to each of the Wildernism items were scaled and correlated to appropriate Specie; lowest for Campers, highest for Wildernist. Even though all recreationists did not appreciate facilities such as maintained trails, bridges, or rescue services equally, most respondents were opposed to non-recreation based structures and intrusions. This was indicated in their responses to their Wildernism Standards and Sense of Space Scale.

Wildernism and Sense of Space Requirements

Respondents indicated the conditions they felt were necessary for them to perceive a favorable wilderness experience. They identified the appropriate buffer distances on the Sense of Space Scale. Sense of Space buffer distances were scaled to the appropriate Wildernism Specie; Campers closest, Wildernist, farthest).

Since the Sense of Space Scale included desires for both minimum and maximum buffer distances, results were notably different than those of Kliskey's (1994) wilderness perception mapping. Kliskey stated purists require a total absence of any human influence, while others accept, and indeed require, certain basic facilities. His geospatial display did not demonstrate this. It indicated the three "less purism types" (species) would find wilderness conditions of the most "purist type" acceptable. This is because Kliskey selected buffer distances for each purism group and did not include a maximum buffer distance in his calculations. My research concludes differently. Respondents provided minimum and maximum Sense of Space buffer distances. This enabled me to determine Campers and Backpackers were not comfortable with habitats of Mountaineers and Wildernists. This is not to say they would not consider these areas wilderness, but the former groups preferred to be close to trails, huts, bridges, and signs. Responses for all Species were significantly higher than any of Kliskey's groups . According to Kliskey, based on average New Zealand's steep-forested backcountry, one kilometer is a reasonable buffer distance, accounting for the need to exclude the presence of an

unacceptable factor in terms of sight, sound, or smell. The Sense of Space respondents' buffer distances in my research suggested they were concerned with more than the sight, sound, or smell of unacceptable features. Their vaster buffer distances indicate respondents consider merely knowing a feature exists also affects their wilderness experience.

Wildernism and Managerial Strategy Acceptance

Wildernism Standards were positively aligned with Managerial Acceptance Standards. Unlike the Wildernism Scale, the Wilderness Management Scale allowed the subjects to identify two preferences. Not only could they respond with their "realistic" practical answer, but also with a "idealistic" answer. Both were moderately correlated with Wildernism Standards.

Ideal preferences were more closely correlated with total Acceptance Standards and with each condition individually except for "aircraft access." This correlation was weakest of all conditions tested. These results lend credence to the claim that purism scales tend to measure ideal situations and not always realistic situations. It indicates that the wilderness purism scale is a sound gauge of what recreationists and vicarious users desire for ideal wilderness preservation.

The Wilderness Management Scale was designed using managerial strategies rather than describing conditions as did the Wildernism Scale. Since both scales were positively correlated, they can both be used in development of a Wildernism Typology.

Wildernism and Environmental Literacy

Wildernism Standards and Environmental Literacy Scores are moderately correlated. The highest correlation is with Ecological Foundations and Citizen Action components of the test. Although not conclusive, metaphoric transference of minimum-impact ideology to daily life is moderately correlated to Wildernism. Wilderness educators have proposed that students would transfer their newly-learned wilderness knowledge, ethical perspectives, and behaviors to their lifestyles at home. Assuming environmental literacy scores indicate a trend in this direction, then their proposal may be correct.

My study indicated possible positive interconnections between Wildernism and environmental literacy. An increase in wilderness purism may influence an increase in environmental literacy. Comparison of pre-treatment and post-treatment tests from all

respondents is necessary for analysis of impact. Only pre-treatment Environmental Literacy Test responses from entire treatment-groups were submitted because the length of time needed for the Environmental Literacy Test made it difficult for instructors/guides to administer the test following treatment.

Effects of Wilderness Education

When an educational program is structured along the environmental education guidelines (e.g., with specific components designed for behavioral change including experiential activities extended over a long period of time), the change in wilderness purism is positively enhanced to statistically significant levels. After treatment students desire opportunities for wilder experiences. This means fewer facilities and less encounters with people, especially large groups. Although all causes of change were not investigated fully, the five treatments covered a spectrum of techniques that can be used to increase the public's understanding of management's concerns towards recreational impacts to wilderness.

My research indicates that perception of wilderness is not fixed. It can be enhanced by educational experiences. Respondents in this study modified their perceptions of acceptable wilderness conditions. They gravitated toward the "strong purist" end of the spectrum following wilderness educational field experiences. Respondents modified their ethical perspective towards wilderness, became more biocentrically oriented. Following treatment, those who completed wilderness leadership education programs, with up to a month of experiential field travel have more positive change on the Wildernism Scale than any other form of treatment tested. The highest statistically significant increase in Wildernism Standards occurred in those students in the NSP and WSP groups.

My results were more revealing when the 33 Wildernism items were grouped according to wilderness experience properties. Change was expected for the NSP and WSP courses, but the CC treatment's Wildernism Standards also indicated significant change in ethical perspective and ANILCA characterized by opposition to aircraft landings, favoritism toward subsistence hunting and gathering, and opposition to use of motorized vehicles. This was understandable. The resource management course attended by those in the CC group, covers legal requirements and restrictions regarding construction and permanent intrusion within 1964 NWPS and those managed under ANILCA guidelines. The RT treatment's Wildernism Standards had a negative change in

three wilderness property areas following their treatment. These occurred in Experiential Factors, Ethical Perspective, and ANILCA. The change was significant. A majority of the RT group were tourists. They had no formal instruction in wildland ethics or ANILCA. Foot travel in Alaska's wet tundra, river valleys, and trail-less aspen-willow thickets can be perilous. They had no previous experience and may have discovered they preferred trails, bridges, and guided groups. They also might have found they were opposed to the presence of predators and hazards and consequently might have reacted negatively. Since ANILCA allows aircraft landings and no restrictions on commercial recreation or group sizes, subsistence trap lines, and motorized access, intuitively, these standards would be lower for tourists not prepared for Alaska's differences in wilderness management. The NP treatment-group did not have a significant change.

Not all participants in my research appreciated maintained trails, bridges, or rescue services equally (Wildness perspective). However, most were opposed to non-recreation based structures and intrusions (Economic development). There was also universal opposition to indicators denoting Experiential factors. Surprisingly, support for commercial guiding operations and large group sizes increased slightly for the RT and CC groups.

The demographics showed mean post-treatment response of all treatment-groups except RT considered encountering or camping near 4-7 individuals "too large." These same groups also regarded encountering four to five small groups (of three or four people) spread-out during each day more acceptable to one large group (of 12-15 people). Overall, study respondents with wilderness experience who perceived themselves highly or extremely proficient in wilderness skills were more opposed to backpacking facilities such as bridges, trails, and developed campsites. These respondents became more intolerant to encountering large groups in the wilderness. The higher the Wildernism Standard, the less these respondents tolerated people they wished to be with on their trips.

Wildernism and Sense of Space Requirements

Subjects identified their appropriate maximum and minimum acceptable buffer distances from facilities and development features. The post treatment distances for NSP and WSP subjects were significantly greater than their pre-treatment distances. Subjects increased their Wildernism Standards enough to change Wildernism Specie (i.e., Campers became Backpackers, who became Mountaineers, and who became Wildernist

Species). Twenty NSP and fourteen WSP treatment-groups changed at least one Specie-level, and nine changed two Specie-levels. Only three of the CC group changed one Specie-level. There was an increase in the number of "higher purism" individuals following treatment. The Camper and Backpacker population decreased, while the Mountaineer and Wildernist Specie increased in size. The new Backpacker Specie members were no longer comfortable with the habitats of Campers.

Application

Geospatial Application

Results of Wildernism mapping provide a foundation for use of spatial variables of wilderness perception in management of protected areas. The spatial information derived using my methodology can be applied to any land area in particular, to aid Limits of Acceptable Change (LAC) for wilderness planning.

It is enlightening to superimpose US standards of wilderness on New Zealand criteria. There was difficulty operationalizing my study's Sense of Space properties onto New Zealand's. Many recreationists accustomed to US wilderness find structures such as lighthouses, antennas, and most importantly, huts, trails, and signs unacceptable.

The Sense of Space buffer distances US respondents desire were beyond the limits of New Zealand wilderness. Where Kliskey (1994) attributed zero to five kilometers distance from undesirable conditions, my study's Sense of Space buffer distances ranged from zero to over sixty miles for the same features. Wildernist Species and Mountaineer Species had limited habitats. New Zealand wilderness recreationists traveled with less equipment. They choose not to be as self-sufficient as US wilderness visitors, using huts, trails, bridges, and signage extensively (DuFresne, 1982).

Wildernism Typology

A Wilderness classification system typology allows wilderness areas to be managed for specific user types and expectations. Nash (personal communication, September 8, 1994) indicated that the wilderness typology he theorized in *Wilderness and the American Mind* needed to be empirically verified. This study has accomplished this by "standing on the shoulders" of researchers Hendee (1968) Stankey (1973) and Kliskey (1994). My research validates that multiple perceptions of wilderness exist, they desire

specific habitats, and the population is likely to increase following wilderness educational experiences.

A Wildernism Typology can be constructed by following the methods validated in my research. The LAC indicator carrying capacity coefficients can be augmented with public input representing discrete facets of wilderness perception as mandated by the 1964 Wilderness Act. The Wildernism Typology insures protection of *all* wilderness values and fosters preventive, unobtrusive proactive management rather than a reactive, obtrusive approach. It offers the manager specific guidelines for zoning areas. The Wildernism Typology delineates Species of wilderness recreationist with identified descriptions of necessary habitat requirements. Appropriate management strategies are aligned for each class. With the general goal of stabilizing the wilderness resource value at the specific habitat, the identification of visitor skill levels and appropriate management strategies to sustain each is at hand.

Legal mandates aside, if Thereau's words are true, that "in wildness is the preservation of the world" then management must preserve a suitable habitat of wildness for each specie of recreationist for their health, and for the health of the world. The typology and results of this study will provide natural resource managers with a procedure that will allow them to protect a variety of levels of wildness and recreational development, accommodating a range of satisfactory wilderness experiences, while insuring preservation of natural wilderness values.

CHAPTER SEVEN
CONCLUSIONS

The results presented here describe a method of mapping impacts to wilderness perceptions induced by wilderness education experiences. Implications for wilderness managers and educators are clear. With the described Wildernism mapping and typology protocols wilderness areas are classified in order to maintain their specific wilderness qualities and opportunities for all recreationists' needs. It is a tool for managing wilderness areas for a range of wilderness experiences which will aid in insuring protection of wildlife, ecosystem integrity, and native biodiversity. It also provides data to help educators design effective wilderness education programs. There were limitations to this research which should impel future research in the field.

Management Implications

Recreationists' opinions about unacceptable wilderness conditions represent an important input to Limits of Acceptable Change (LAC) decision making. This study is one of the first efforts to include a non-regionalized survey of opinions related to limits of unacceptable change to wilderness. Managers have found defining wilderness and the wilderness experience very difficult because of the varying degrees of wilderness and many types of wilderness users. My research demonstrates a method to measure and statistically verify wilderness recreationists' perceptions and the values of wilderness.

The identification of four Wildernism Species and necessary habitat requirements demonstrates how varied recreational requisites and use patterns of visitors (and vicarious users) can be determined, clarified and quantified. Managers can begin to understand the wilderness values and associated problems of recreationists. Using the limits of unacceptable change protocol which I have demonstrated, management can identify and prioritize steps to preserve critical habitat for each Specie of recreationist. Multiple wilderness opportunities will be preserved, recreationists will not be permanently displaced, and naturalness and "wildness" will be protected. Managers and educators alike can predict changes and wilderness behaviors that will occur as a result of education programs. Mangers can subsequently protect necessary wilderness habitats for the increasing population of Mountaineer and Wildernist Species.

Implications to wilderness managers mandated to preserve wilderness conditions and recreational opportunities are clear. Managers can legally protect vast areas from

bio/physical impacts if they use the Wildernism process I proposed. They can buffer wildlife and vegetation from encroachment by using Wildernist Species as "umbrella species." This will protect native biodiversity which may in turn allow natural evolutionary processes to continue. It is the mandate of managers to insure protection of opportunities for wilderness users. Mountaineer and Wildernist Species desire extremes: extreme naturalness and extreme remoteness, untrammeled without facilities or managerial intrusions. The 1964 Wilderness Act mandates that wilderness managerial strategies *must* focus on providing experiential opportunities. Clearly the limits of unacceptable change of the extreme end of the ROS/WOS must be preserved. Managerial policy now has legal direction to protect native ecosystems, wildlife, and community types in their protecting for the purist recreationist. Wilderness managers can use my Wildernism Sense of Space technique to identify appropriate habitats.

Camper and Backpacker Species need protected habitat as well. Through development of a Wildernism Typology, these habitats can be maintained without restrictive strategies. I found that some features and managerial strategies are universally unacceptable while others are welcomed. By understanding these, management's response to impacts will not further diminish the resource. Often, when impacts occur, managements' response is for trail and site improvements to protect further deterioration. This change in access and facility development modifies the habitat and thus attracts a new population of recreationist. This cycle often leads to rationing--something that no Wildernism Specie desires. The key for Camper and Backpacker habitat protection is appropriate trail design, location, and maintenance.

Preserving Habitats

Distances from sights and sounds are critical to wilderness users. Wilderness experience relates to sensing unacceptable conditions inside wilderness boundaries and "knowing" that unacceptable (human-made) conditions do not exist. If managers can zone wilderness accordingly to Wildernism Species, recreationists can be prepared for the managerial induced factors they will experience. Sense of Space Scales should allow recreationists to indicate critical distances needed from sights, sounds, and objects causing intrusion. Then, management can zone to protect habitats accordingly to Species who will use them.

There was little variance in respondents' Economic Development wilderness experience properties. All respondents reported similar adversity to obtrusive structures

and developments restricted from wilderness such as logging, hydroelectric projects, mining, and powerlines. All subjects considered "remoteness" a high priority. They responded that wilderness should be "big enough to take at least two days to walk across" and desired an "area size of at least 64,000 acres (100 square miles). The 1964 Wilderness Act requires a minimum of 5,000 acres (eight square miles) of land. At an average walking pace in gentle terrain, a person could cross an eight-square mile-block in about an hour. The largest wilderness areas in the 48 States, more than 100,000 acres in the west and 50,000 acres in the east, are too small to be considered wilderness by most of my respondents. A hundred-thousand acres is 156 sq. miles; that is only a twelve-by-thirteen mile block of country. There is no place in the Lower 48 States that is more than 21 air miles from a constructed road. Even in the enormous Bob Marshall Wilderness and River of No Return Wilderness complex there is no place more than 18 air miles from a road. That is barely sufficient habitat for the Mountaineer Wildernism Specie, and inadequate for the Wildernist.

In Alaska wildlands are not circumvented by roads, however access and remoteness is an issue. Recreational snowmachine travel is legal in all Wilderness areas set aside under ANILCA. Summertime motorized travel by all terrain vehicles (ATVs) and boats is allowed for subsistence use and to access the private in-holdings. Since ANILCA allows unlimited airplane access, aircraft equipped with tundra tires, skis, or floats can land almost anywhere. Recreational "airplane-camping" is therefore legal. Theoretically, there is very little wilderness in Alaska that is remote enough for most of the recreationists sampled in this study.

Preserving Habitats for Solitude

This study verified aircraft flying overhead intrudes upon recreationists' privacy and solitude. Airspace, the third dimension of Wilderness, is largely overlooked by management. Flightseeing has become prevalent among travelers to Alaska. Automobile travel is restricted to road systems in the Lower 48 wilderness. Aircraft in Alaska's ANILCA wilderness areas might also be restricted into corridors. ANILCA and the Code of Federal Regulations allow restrictions to be placed on aircraft access and encroachment in order to protect wilderness resource values. My research demonstrated that wilderness values for most recreationists are impacted by aircraft, managers should design restrictive flight corridors, prohibit flight-seeing, disallow landing in certain zones

or on fragile surfaces. They could also limit access or fly-overs to certain months or seasons.

Education and Management Implications

Natural resource agencies need effective education programs to protect a specific resource within Wilderness areas or to curtail general overuse. If the goal is to preserve the integrity of Wilderness areas, they might look to WEA, NOLS and other programs with a strong wilderness leadership education curriculum as a model for visitor education. However, they must be aware of the implications to management. Since these education programs tend to influence purism and biocentric ethics, management must be prepared to protect suitable habitats, not displace Mountaineer and Wildernist Species.

There is a growing field of guide services now labeling trips as "ecotours." These outdoor adventure leaders often have outdoor skills but not wildland ethics, ecological understanding, appropriate behavior, or leadership skills. If they possess any of these, they may not have the skills or ability to teach them to their clients. While focusing on recreational thrills, they may limit emphasis on wildland ethics. For this reason and others, researchers and wilderness managers advocate that commercial groups, even wilderness education classes, do not belong in designated wilderness. They argue that traveling with large groups is a non-conforming use in wilderness. Wilderness should not be the venue of such courses or guided trips, but should be reserved for those individuals who have already "passed the course." Wildemess managers' attempt to lower existing group sizes have been challenged by commercial groups including NOLS, Outward Bound and the Boy Scouts.

Managers and educators need to design wilderness education programs which will increase purism through leave-no-trace skills and ethics courses. Education programs should never be haphazard, they must be well planned. Objectives must be identified, covered, assimilated, and applied. In addition, empowerment is necessary for a change of behavior to occur. Managers must be prepared for the additional numbers of recreationists desiring the higher-quality "purism" wilderness habitats.

Citizens need to act responsibly toward future generations, in four arenas. First students must learn and practice biocentric (leave-no-trace) wildland ethics in the backcountry and at home. Every piece of litter picked-up extends the wilderness for the next person. Second, they must build informed diverse constituencies committed to

preserving wilderness and all its values. Third, priorities must be made to live compatibly with the earth's systems and its resources. To accomplish this, individuals must take active steps to learn and understand "place" and design a proactive plan to maintain a high quality environment. Finally, in order to prepare for the planets increasing population, we need productive, resilient, and diverse ecosystems. Protecting the integrity of the wild ecosystems and native biodiversity must become a priority over recreation and other human uses. Action must be taken such that land managers reform their ethical perspective and their priorities. This only will occur with public input and action. Hopefully this research is a start. It is clear that wilderness education and experience is a move in this direction.

Limitations of the Study

The sample treatment-groups were incidental self-selected subjects. They were college-age students interested in wilderness leadership, resource management or environmental education (N =111). Some of the treatment-group sample sizes were small. This made multiple comparison of treatment effects impossible. Since this study was designed to investigate trends toward change in wilderness purism and ethics, it was not necessary to replicate other studies which sampled a specific wilderness area. Initial plans were to verify if environmental literacy scores changed due to education and experience. Time limitations, length of survey-test instrument, and inability to insure completion of all parts of the instrument restricted this part of the study.

The survey-test was in two parts. The first included a Wilderness Perception Test with three scales: a) Wildernism Scale; b) Sense of Space Scale; and c) Wilderness Management Scale. The second part of the survey-test consisted entirely of the Environmental Literacy Test. Treatment-group leaders were given instructions to administer a survey-test to their respected students or clients prior to and immediately following treatment. The Environmental Literacy test took approximately 60 minutes to complete. Treatment-group leaders had limited amount of free time therefore, many chose not to administer the Environmental Literacy following treatment. As a result, only responses for pre-treatment Environmental Literacy tests were available for analysis. Environmental Literacy Tests were not completed by Recreation Treatment or Non-Participant Treatment-groups because of the time commitment needed for the test's length. This resulted in a small sub-sample size for this portion of the survey-test (n = 66). It also made it impossible to analyze for affects of wilderness education experiences

on environmental literacy (i.e., comparing pre- treatment scores with post-treatment scores).

Recommendations for Future Study

This study should be replicated to confirm findings. WEA and NOLS along with Leave No Trace Inc. would be likely candidates for treatment groups. It would also be enlightening to assess the impacts of the courses offered by "The Tracker," Tom Brown who offers tracking and wilderness survival courses. Many colleges teach a WEA National Standard Program course as a semester class. Instructors could complete pre and post treatment analysis of wilderness purism and environmental literacy prior to and then following the field portion This would confirm the importance of field experience to induce changes. In addition, the environmental literacy instrument must be completed both prior to and following treatment. This would confirm if wilderness education induces higher environmental literacy scores and if there is indeed a strong correlation between wilderness purism and environmental literacy. To do this, the Environmental Literacy Test must be shortened as much as possible.

Over time, numerous influencing factors affect wilderness attitudes, knowledge, skills, and behaviors, outside of a course and this is to be expected. However, it should be determined if the attitudes and behaviors as measured in this study last over a period of time. Therefore, it is important to conduct a longitudinal study over 6-12 months to determine: a) if changes in Wildernism Standards remained; b) if changes in Sense of Space distances remained; c) if changes in environmental behaviors occurred, were enhanced over time, or diminished; and d) if these behavior changes remained, diminished, or grew.

The Sense of Space Scale should be revisited to include visual and audible intrusions as well as physical ones. Researchers might review the findings Roggenbuck, Williams, and Watson found in their study entitled, *Defining Acceptable Conditions in Wilderness* (1993) for additional indicators as well as those identified by Merigliano (1989). This study's SOS buffering distances should also be operationalized in wilderness in Alaska (1980 ANILCA), Western US (1964 Wilderness Act), and Eastern US Wilderness areas (1974 Eastern Wilderness Act).

Most visitors support limits on group size yet Cole (1995) maintained that large groups can minimize much of their impact through stringent adherence to Leave No Trace guidelines.This is something which must be addressed in future research.

The next step is verification of wilderness educators' hypothesis that wilderness education leadership courses (such as those offered by WEA and NOLS) induce metaphoric transference of leave-no-trace skills, and other appropriate environmental behaviors in students' home communities. It was hypothesized that higher purism scores and environmental literacy indicates an openness to place connectedness. This produces attitudes to better understand the wilderness systems and recreation impact issues. Continuing observable appropriate behavior in wilderness as well as "back-at home" may result from wilderness education programs; this needs to be further tested.

The most exciting future work could be accomplished with the geospatial operationalization of the Sense of Space Scale. A steep five-mile pass with a 2,500 foot elevation gain separating a campsite from trailhead provides significantly more remoteness and solitude than a ten-mile trail which is flat easy walking. Since the scale relied on buffer distances which were based on a daily travel formula of 8-12 trail miles or 3-7 cross-country miles, variances such as vegetation, topography, climate and substrate should be included into the GIS data base. A void can be seen in many of the geospatial images south of the Heaphy Track. This is an extreme mountainous region, and might be appropriate for Mountaineer and Wildernist Species who were eliminated entirely from Figure 25. Since elevation is not depicted, distances from trails and huts are not adequate for these species. As a remedy, topography could be entered as a "triangulated irregular network" (TIN) coverage or "digital elevation model" (DEM) to be combined with substrate/soil types, vegetation, and even weather patters such as wind direction or aspect. The TIN or DEM coverages could be transformed into a GRID. An suitability analysis attribute model could be developed, such as multi-criteria evaluation (MCE) as described by Carver (1991, 1996), for arranging and prioritizing values for each property on a linear scale of difficulty,. With this more realistic buffers could be obtained.

For management, the most relevant research would be to verify the validity of the habitats identified with the Wildernism mapping process. Once managers have identified habitats in the field, recreationists in these areas should be assessed with the Wildernism Scale to determine if there is a correlation (e.g. Wildernist in Wildernist habitat, Campers in Camper habitat). This would corroborate this research by using the hypo-deductive process, testing the observed correlations in the field.

REFERENCES

Adams, E. (1991). Aesthetic experience. *Children's Environments Quarterly, 8*(2), 19-29.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ: Prentice Hall.

Ajzen, I. (Ed.). (1985). *From intentions to actions: A theory of planned behavior.* Heidelberg, Germany: Springer.

Albrecht, D., Bultena, G., Hoiberg, E., & Nowak, P. (1982). The new environmental paradigm scale. *Journal of Environmental Education, 13*(3), 39-43.

Ashor, J. L., McCool, S. F., & Stokes, G. L. (1985). Improving wilderness planning efforts: Application of the transactive planning approach. In R. C. Lucas (Ed.), *Proceedings: National Wilderness Research Conference: Current Research,* General Technical Report INT-212 . Ogden, UT: USDA Forest Service Intermountain Research Station.

Belk, R. W. (1992). Attachment to possessions. In I. A. &. S. M. Low (Eds.), *Place attachment* (pp. 37-62). New York: Plenum Press.

Bennet, W. J. (1988). Moral literacy and the formation of character. *NASSP Bulletin, 20*(512), 29.

Besick, R. (1992). Character education. *OSSC Bulletin, 35*(9), 1-46.

Bluhm, W. J., Hungerford, H. R., McBeth, W. C., & Volk, T. L. (1995). *The middle school report: A final report on the development and pilot assessment of the middle school environmental literacy instrument* (Unpublished institutional report for NCEET and EPA grant Southern Illinois University, Carbondale.

Born, T., & Wieters, N. (1978). Non-reactive measurement of orientation toward the natural environment. *Journal of Environmental Education, 10*(1), 41-43.

Bromley, P. T., Hampton, E. L., & Wellman, J. D. (1989). Response to evaluation of the hunter education program in Virginia. In *Proceedings Annual Conference S.E. Association Fish & Wildlife Agencies,* 42 (pp. 450-454).

Brower, D. (1964). Foreword. In D. Brower (Eds.), *Wildlands in our Civilization: Proceedings of the First Five Biennial Wilderness Conferences, 1949-1957.* San Francisco: Sierra Club Books.

Brown, B. J., & Perkins, D. D. (1992). Disruptions in place attachment. In I. Altman. &. S. M. Low (Eds.), *Place attachment* New York: Plenum Press.

Brown, P. J., Driver, B. L., & McConnell, C. (1978). The opportunity spectrum concept and behavioral information in outdoor recreation resources supply inventories: Background and application. In *Integrated Inventories of Renewable Natural Resources*, USDA Forest Service General Technical Report RM-55.

Caduto, M. (1983). A Review of environmental values education. *Journal of Environmental Education, 14*(3), 13-21.

Cain, K. (1991). Judgment and decision-making ability. In D. Cockrell (Eds.), *The wilderness educator: The Wilderness Education Association curriculum guide* (pp. 13-34). Merrillville, IN: ICS Books.

Campbell, D. T. (1957). Factors relevant to the validity of experiments in social settings. *Psychological Bulletin, 54*(4), 297-311.

Campeau, R. J. (1982). *Development of a perceived environmental control measure* Unpublished doctoral dissertation, Michigan State University.

Carroll, C., & Hinrichsen, D. (1993). Monitoring ecological responses in wilderness using geographic technologies. In *International wilderness allocation, management, and research. Proceedings of the 5th World Wilderness Congress*, (pp. 304-308).

Carver, S. J. (1991). Integrating multi-criteria evaluation with geographical information systems. *International Journal of Geographical Information Systems, 5*(3), 321-339.

Carver, S. J. (1996). *Mapping the wilderness continuum* School of Geography, University of Leeds.

Chawla, L. (1992). Childhood place attachment. In I. Altman &. S. M. Low (Eds.), *Place attachment* (pp. 63-86). New York: Plenum Press.

Clark, K., & Kozacek, S. (1997). How do your personal wilderness values rate? *International Journal of Wilderness, 3*(1), 12-13.

Clark, R. N., & Stankey, G. N. (1979). *The recreation opportunity spectrum: A framework for planning, management, and research.* (General Technical Report PNW-98). Portland OR: USDA Forest Service Research Report, Pacific Northwest Forest and Range Experiment Station.

Cockrell, D. (1991). An introduction to the Wilderness Education Association. In D. Cockrell (Eds.), *The Wilderness Educator: The Wilderness Education Association Curriculum Guide* Merrillville, IN: ICS Books, Inc.

Cockrell, D., & Detzel, D. (1985). Effects of outdoor leadership certification on safety, impacts and program standardization. *Park Practice Program Trends, 22*(3), 15-21.

Cockrell, D. (1991). Environmental ethics and backcountry conservation practices. In D. Cockrell (Eds.), *The wilderness educator: The Wilderness Education Association curriculum guide* (pp. 65-83). Merrilville, IN: ICS Books Inc.

Cole, D. N. (1994). *The wilderness threats matrix: A framework for assessing impacts* (General Technical Report INT-475). Ogden, UT: USDA Forest Service Intermountain Research Station.

Cole, D. N. (1995). Group size limits: Can they work? *Master Network--A Publication of Program, 10*(Summer 1995), 1, 14-15.

Cole, D. N. (1996a). Wilderness recreation in the United States: Trends in use, users, and impacts. *International Journal of Wilderness, 2*(3), 14-18.

Cole, D. N. (1996b). *Wilderness recreation use trends, 1965 through 1994* (General Technical Report INT-RP-488). Ogden, UT: USDA Forest Service Intermountain Experiment Station.

Conover, W. J. (1980). *Practical nonparametric statistics* (2nd ed.). New York: John Wiley & Sons.

Cooper- Marcus, C. (1992). Environmental memories. In I. Altman &. S. Low (Eds.), *Place attachment* (p. 63-86). New York: Plenum Press.

Cornell, J., & Deranja, M. (1994). *Journey to the heart of nature.* Nevada City, CA: Dawn Publications.

Cornett, Zane J. (1994). GIS as a Catalysis for Effective Public Involvement in Ecosystem Management Decision-Making. In V. Alaric Sample (Eds.), *Remote Sensing and GIS in Ecosystem Management* (p. 337-345). Washington DC: Island Press.

Driver, B. L. (1976). *Quantification of outdoor recreationists' preferences* (USDA Forest Service Mimeograph Paper. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Driver, B. L., & Brown, P. J. (1978). *The opportunity spectrum concept in outdoor recreation supply inventories: A rationale* (General Technical Report RM-55). Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest Service & Range Experiment Station.

Dunlap, R. E., & Van Liere, K. D. (1978). The "new environmental paradigm": A proposal measuring instrument and preliminary results. *The Journal of Environmental Education, 9*, 10-19.

Dunlap, R. E., & Van Liere, K. D. (1984). Commitment to the dominant social paradigm and concern for environmental quality. *Social Science Quarterly, 65*, 1013-1028.

Dunlap, R. E. (1992). The new ecological paradigm. *Journal of Environmental Education, 23*(2), 34-40.

DuFresne, J. (1982). *Tramping in New Zealand.* Victoria, Australia: Lonely Planet Publications.

Dwyer, W. O., Lemming, F. C., Cobern, M. K., Jackson, J. M., & Porter, B. E. (1993). Critical review of behavioral interventions to preserve the environment; research since 1980. *Environment and Behavior, 25*(May), 275-321.

Eastman, J. R., Kyem, R. K., Toledano, J., & Weigen, J. (1993). *GIS and Decision-Making: explorations in Geographic Information Systems technology.* Geneva: UNITAR.

ESRI (1990). *Understanding GIS, the ARC/INFO method.* Redlands, CA: Environmental Systems Research Institute, Inc.

Fagence, M. (1990). Geographically referenced planning strategies to resolve potential conflict between environmental values and commercial interests. *Journal of Environmental Management, 31*, 1-18.

Fazio, R. H. (1986). How do attitudes guide behavior? In R. Sorrentino &. E. Higgens (Eds.), *The handbook of motivation and cognition* (p. 204-253). New York: Guilford Press.

Fazio, R. H. (1990). Multiple processes by which attitude guide behavior: The MODE model as an integrative framework. In M. P. Zanna (Eds.), *Advances in experimental social psychology* New York: Academic Press.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley.

Foreman, D. (1991). *Confessions of an eco-warrior.* New York: Crown Trade Paperback.

Friedmann, J. (1989). Planning, politics, and the environment. *Journal of the American Planning Association, 55*(3), 334-338.

Gass, M. A. (1985). Programming the transfer of learning in adventure education. *Journal of Experiential Education, 8*(3), 18-24.

Geller, J., & Lasley, P. (1985). The new environmental paradigm. *Journal of Environmental Education, 17*(1), 9-12.

Gilbert, G. C., Peterson, G. L., & Lime, D. W., (1972). Toward a model of travel behavior in the Boundary Waters Canoe Area. *Environment and Behavior, 4*(2), 131-157.

Gillett, D. P., Thomas, G. P., Skok, R. L., & McLaughlin, L. F. (1991). The effects of wilderness camping and hiking on the self-concept and the environmental attitudes and knowledge of twelfth graders. *Journal of Environmental Education, 22*(3), 33-44.

Glover, J. M. (1986). *A Wilderness original: The life of Bob Marshall.* Seattle, WA: The Mountaineers.

Gookin, J. (1996). Learning ethics: What the research says. *Master Network, 12*(Winter/Spring 1996), 3, 19.

Graber, L. H. (1976). *Wilderness as sacred space.* Washington, DC: Association of American Geographers.

Gray, D., Borden, R., & Weigel, R. (1985). *Ecological beliefs and behaviors: Assessment and change.* Westport, CT: Greenwood Press.

Hammitt, J. P. (1995). *Responsible environmental behavior: Metaphoric transference of minimum-impact ideology* Unpublished master's thesis, University of Montana.

Hammitt, W. E. (1982). Cognitive dimensions of wilderness solitude. *Environment and Behavior, 14*, 478-493.

Hammitt, W. E., & Cole, D. N. (1987). *Wildland recreation: Ecology and management.* New York: John Wiley and Sons.

Hampton, B., & Cole, D. N. (1988). *Soft paths: How to enjoy the wilderness without harming it.* Harrisburg, PA: Stackpole Books.

Hanna, G. (1995). Wilderness-related environmental outcomes of adventure and ecology education programming. *Journal of Environmental Education, 27*(1), 21-32.

Hansen, G. R. (1989). Education, the key to preservation. In D. W. Lime (Ed.), *Managing America's Enduring Wilderness*, . Minneapolis, MN: University of Minnesota.

Hardin, G. (1969). The economics of wilderness. *Natural History, 78*, 20-27.

Harshman, R. (1979). Values education processes for an environmental education program. *Journal of Environmental Education, 10*, 30-34.

Hartshorne, H., & May, M. (1928). *Studies in the nature of character.* New York: Mc Millan Co.

Hartung, J. (1973) *Evaluation of an experiential stress-challenge environmental education college course.* Unpublished doctoral dissertation, Southern Illinois University, Carbondale, IL.

Hawken, P. (1993). *The ecology of commerce: A declaration of sustainability.* New York: Harper Collins.

Hay, R. B. (1988). Toward a theory of sense of place. *Trumpeter, Journal of Ecosophy, 5*(4), 159-164.

Hendee, J. C., Cotton, W. R., Marlow, L. D., & Brockman, C. F. (1968). *Wilderness users in the Pacific Northwest—their characteristics, values, and management preferences.* Portland OR: USDA Forest Service Pacific Northwest Forest and Range Experiment Station, PNW-61.

Hendee, J. C., & Harris, R. W. (1970). Foresters' perception of wilderness-user attitudes and preferences. *Journal of Forestry, 68*(12), 759-762.

Hendee, J. C., Stankey, G. H., & Lucas, R. C. (1990). *Wilderness Management* (2nd ed.). Golden, CO: North American Press.

Hersey, P., & Blanchard, K. (1984). *Management of organizational behavior: Utilizing human resources.* Englewood Cliffs, NJ: Prentice Hall.

Hester, R. (1985). Subconscious landscapes of the heart. *Places, 2*(3), 10-22.

Hicks, D. (1996). Envisioning the future: The challenge for environmental educators. *Environmental Education Research,* 2(1), 101-108.

Higham, J. (1997). Perceptions of international visitors to New Zealand wilderness. *International Journal of Wilderness, 3*(2), 27-29, 45.

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1986). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *The Journal of Environmental Education, 18*(2), 1-8.

Hiss, T. (1990). *The experience of place.* New York: Alfred A. Knopf.

Howe, R. W., & Disinger, J. F. (1989). *Teaching desirable environmental ethics and action through school activities* (ERIC/SMEAC EDO-SE-90-21). Columbus, OH.

Hungerford, H. R., Peyton, R. B., Tomera, A. N., Litherland, R., Ramsey, J. M., & Volk, T. L. (1980). *Investigating and evaluating environmental issues and actions skill development modules.* Champaign, IL: Stipes.

Hungerford, H. R., & Peyton, R. B. (1976). *Teaching environmental education.* Portland, ME: J. Weston Walsh.

Hungerford, H. R., Ramsey, J. M., Volk, T. L., & Bluhm, W. J. (1990). *The environmental literacy instrument* Southern Illinois University, Carbondale.

Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *Journal of Environmental Education, 21*(3), 8-21.

Inayatullah, S. (1993). From who am I to when am I: Framing the shape and time of the future. *Futures, 25*, 235-253.

Iozzi, L. (1989). What research says to the educator: Environmental education and the affective domain. *The Journal of Environmental Education, 20*(3), 3-9.

Jaakson, R., & Shin, W. S. (1992). Purism and wilderness campers. *The Journal of Social Psychology, 133 (4)*, 489-493.

Jackson, R. M., & Norton, R. C. (1979). Improving ethical behavior in hunters. In *Transactions North American Wildlife and Natural Resources Conference*, 44 (pp. 306-318).

Jankowski, P., & Richard, L. (1994). Integration of GIS-based suitability analysis and multi-criteria evaluation in a spatial decision support system for route selection. *Environment and Planning, B*(21), 323-340.

Jones, J. E. (Ed.). (1973). *A model of group development.* La Jolla, CA: University Associates.

Jubenville, A., Twight, B. W., & Becker, R. H. (1987). *Outdoor recreation management: Theory and application.* State College, PA: Venture.

Jubenville, A., & Workman, W. G. (1993). The effects of development on the visitor's perception of unique natural resources. In *Leisure in Different Worlds: 3rd International Conference of the Leisure Studies Association*, Loughbourough University, England.

Jubenville, A., Twight, B. W., Cotgrove, B., & Pendergrast, D. (1994). *Wilderness recreational carrying capacity: A new look at an old friend* (Unpublished manuscript, University of Alaska Fairbanks.

Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective.* New York: Cambridge University Press.

Kliskey, A. D. (1992) *Wilderness perception mapping: A geographic information systems approach to the application of wilderness perceptions for protected area management in New Zealand.* Unpublished Ph.D. thesis, University of Otago, Dunedin, New Zealand.

Kliskey, A. D. (1994). A Comparative analysis of approaches to wilderness perception mapping. *Journal of Environmental Management, 1994*(41), 199-236.

Kliskey, A. D. (1995). The role and functionality of GIS as a planning tool in natural resource management. *Computers, Environment, and Urban Systems, 19*(1), 15-22.

Kliskey, A. D., & Kearsley, G. W. (1993). Mapping multiple perceptions of wilderness in southern New Zealand. *Applied Geography, 1993*(13), 203-223.

Knopf, R. C. (1983). Recreational needs and behavior in natural settings. In I. Altman & J. Wohlwill (Eds.), *Behavior and the Natural Environment* (pp. 205-240). New York: Plenum.

Kohlberg, L., & Candee, D. (1984). The relationship of moral judgment and moral action. In L. Kohlberg (Eds.), *Essays on moral development: The philosophy of moral development* San Francisco: Harper and Row.

Krumpe, E. E., & Brown, P. J. (1982). Redistributing backcountry use through information related to recreation experiences. *Journal of Forestry, 80*, 360-364.

Krutilla, J. V. (1967). Conservation reconsidered. *American Economic Review, 57*(4), 777-786.

Kuss, F. R., Graefe, A., Alan, R., & Vaske, J. (1990). *Visitor Impact Management: A review of research.* Washington DC: National Parks and Conservation Association.

Lemming, J. S. (1993). *Character education: Lessons from the past, models for the future*. Camden, ME: Institute for Global Ethics.

Leopold, A. (1949). *A Sand County Almanac.* New York: Oxford University Press.

Leslie, R. G., & Taylor, S. G. (1985). The Wilderness continuum concept and its implications for Australian wilderness preservation policy. *Biological Conservation, 32*(1985), 309-333.

Lesslie, R. G., Mackey, B. G., & Preece, K. M. (1988). A computer-based method of wilderness evaluation. *Environmental Conservation, 15*(3), 225-232.

Lickona, T. (1983). *Raising good children: From birth through the teenage years.* New York: Bantam.

Lickona, T. (1991). *Educating for character: How our schools can teach respect and responsibility.* New York: Bantam.

Low, S. M., & Altman, I. (1992). Symbolic ties that bind. In I. Altman &. S. M. Low (Eds.), *Place attachment* New York: Plenum Press.

Lucas, R. C. (1964). Wilderness perception and use: The example of the Boundary Waters Canoe Area. *Natural Resource Journal, 3*, 394-411.

Lucas, R. C. (1979). Perceptions of non-motorized recreational impacts: a review of research findings. In R. Ittner, D. R. Potter, J. K. Agee, & S. Anschell (Ed.), *Recreational impacts on wildlands*, (pp. 24-31). Seattle, WA: USDA Forest Service, Pacific Northwest Region.

Lucas, R. C. (1981). Redistributing wilderness use through information supplied to visitors. *Journal of Forestry, 80*(3), 148-151.

Lucas, R. C. (1985). *Visitor characteristics, attitudes, and use patterns in the Bob Marshall Wilderness Complex, 1970-82* (Research Paper INT-345). USDA Forest Service Intermountain Forest and Range Experiment Station.

Malmberg, T. (Ed.). (1992). *Time and space in human ecology*. Allshabad, IN: Chugh Publications.

Manfredo, M. J., Driver, B. L., and Brown, P. J. (1983). A test of concepts inherent in experience based setting management for outdoor recreation areas. *Journal of Leisure Research, 15*(3), 263-283.

Manning, R. E., & Valliere, W. A. (1996). Environmental values, environmental ethics, and wilderness management. *International Journal of Wilderness, 2*(2), 27-33.

Marcinkowski, R. J. (1989). An analysis of correlates and predictors of responsible environmental behavior. *Dissertation Abstracts International, 49*(12), 3677-A.

Marcinkowski, T. (1993). Assessment in environmental education. In R. J. Wilke (Eds.), *Environmental Education Teacher Resource Handbook: A practical guide for K-12 environmental education* Thousand Oaks, CA: Corwin Press, Inc.

Marion, J. L. (1994). *Capabilities and management utility of recreation impact monitoring programs* USDI National Biological Survey Virginia Tech/Department of Forestry Cooperative Park Studies Unit Blacksburg, VA.

Marshall, G. (Ed.). (1969). *Introduction*. San Francisco: Sierra Club.

Marshall, R. (1930). The problem of the wilderness. *Journal of Forestry, 30*.

Marshall, R. (1935). The Wilderness Society Platform. *Living Wilderness, 1*(1935), 2.

Martin, V. (1988). For the conservation of the Earth. In *Selected Proceedings of the Fourth World Wilderness Conference*, . Golden, CO: Fulcrum, Inc.

Mathews, B. E., & Riley, C. K. (1995). *Teaching and evaluating outdoor ethics programs* (National Wildlife Federation National Wildlife Federation, Cornell University Department of Natural Resources, USDI Fish and Wildlife Service.

McCloskey, M. (1990). *Evolving perspectives on wilderness values: Putting wilderness values in order.* USDA. Forest Service General Technical Report, SE-66.

McCool, S. F., Ashor, J. L., & Stokes, G. L. (1985). An alternative to rational-comprehensive planning: Transactive planning. In R. C. Lucas (Ed.), *Proceedings: National Wilderness Research Conference: Current Research,* Technical Report INT-212 . Ogden, UT: USDA Intermountain Research Station.

McRae, K. (1986). Developing and environmental ethic in outdoor programs. *Journal of Experiential Education, 9*(3), 31-35.

Merigliano, L. L. (1989). Indicators To monitor the wilderness recreation experience. In D. W. Lime (Ed.), *Managing America's Enduring Wilderness Resource,* (pp. 156-162). St. Paul, MN: University of Minnesota.

Merrill, T., Wright, R. G., & Scott, J. M. (1995). Using ecological criteria to evaluate wilderness planning options in Idaho. *Environmental Management, 19*(6), 815-825.

Mitchell, M. Y., Force, J. E., Carroll, M. S., & McLaughlin, W. J. (1993). Forest places of the heart: Incorporating special places into public management. *Journal of Forestry, 91*(4), 32-37.

Monz, C. A., Henderson, C., & Brame, R. (1994). *Perspectives on the integration of wilderness research and education.* National Outdoor Leadership School.

Nabhan, G. P. (1994). A child's sense of wildness. In G. P. Nabhan & S. Trimble (Eds.), *The geography of childhood: Why children need wild places* Boston: Beacon Press.

Nash, R. F. (1978). *Wilderness management: A contradiction in terms?* University of Idaho, Moscow.

Nash, R. F. (1979). Wilderness is all in your mind. *Backpacker, 70,* 39-41, 72-75.

Nash, R. F. (1981). Protecting the wilderness from its friends. *Backpacker, 9*(March), 15-17.

Nash, R. F. (1982). *Wilderness and the American mind* (Third ed.). New Haven and London: Yale Press.

Nash, R. F. (1983). Ultimate Wilderness: Aviation and Gates of the Arctic National Park. *Orion Nature Quarterly, 2*(Spring, 1983), 4-13.

Nash, R. F. (1988). Wilderness reconsidered. In D. L. Dustin (Eds.), *Wilderness in America: Personal perspectives* (p. 1-6). San Diego: San Diego State University.

Noss, R. F. (1991). Sustainability and wilderness. *Conservation Biology, 5,* 120-121.

Noss, R. F., & Cooperrider, A. Y. (1994). *Saving Natures Legacy.* Washington D.C.: Island Press.

Noss, R. F. (1990). What can wilderness do for biodiversity? In P. C. Reed (Ed.), *Preparing to Manage Wilderness in the 21st Century—Proceedings of the Conference,* (pp. 49-61). Athens, GA: USDA Forest Service General Technical Report SE-66.

Oliver, S. S., Roggenbuck, J. W., & Watson, A. E. (1985). Education to reduce impacts in forest campgrounds. *Journal of Forestry, 83*(4), 234-36.

Orr, D. W. (1991). *Ecological Literacy: Education and the transition to a postmodern world.* Albany, NY: State University of New York Press.

Orr, D. W. (1994). *Earth in mind: On education, environment, and the human prospect.* Washington D.C.: Island Press.

Ouren, D. S., Hummel, J., Eley, M., Sestak, M., & Riebau, A. (1994). Advanced technologies for wilderness monitoring and management. In *Wilderness: The spirit lives. Proceedings of the 6th National Wilderness Conference,* (pp. 61-64). Santa Fe, NM.

Passineau, J. F. (1990). Teaching a wilderness ethic: Reaching beyond the forest. In D. W. Lime (Ed.), *Managing America's Enduring Wilderness Resource,* (pp. 123-130). St. Paul: University of Minnesota.

Pellow, D. (1992). Spaces that teach. In I. Altman. &. S. M. Low (Eds.), *Place attachment* (pp. 187-270). New York: Plenum Press.

Perdue, R. R., & Warder, D. S. (1981). Environmental education and attitude change. *Journal of Environmental Education, 12*(3), 25-28.

Pereira, J. M., & Duckstein, L. (1993). A multiple criteria decision-making approach to GIS- based land suitability evaluation. *International Journal of Geographical Information Systems, 7*(5), 407-424.

Peters-Grant, V. M. (1987). The influence of life experiences in the vocational interests of volunteer environmental workers. *Dissertation Abstracts International, 47*(10).

Petty, R. E., & Caccioppo, J. T. (1986). The elaboration likelihood model of persuasion. In L. Berkowitz (Eds.), *Advances in experimental social psychology* (pp. 123-205). New York: Academic Press.

Petzoldt, P. (1974). *The Wilderness Handbook.* New York, NY: W. W. Norton & Co.

Petzoldt, P. (1981). Leadership: The most dangerous game. *Backpacker, 9,* 22.

Petzoldt, P. (1984). *The new wilderness handbook.* New York: W. W. Norton.

Phipps, M. L. (1986) *An assessment of a systematic approach to teaching outdoor leadership in expedition settings*. Unpublished doctoral dissertation, University of Minnesota, St. Paul.

Phipps, M. L. (1991). Group dynamics in the outdoors. In D. Cockrell (Eds.), *The wilderness educator: The Wilderness Education Association curriculum guide* (pp. 35-64). Merrillville, IN: ICS Books.

PLT (1997). *Project Learning Tree: Secondary Forest Module*. Washington DC: American Forest Foundation.

Proshansky, H. M., Fabian, A. K., & Kaminoff, R. (1983). Place identity. *Journal of Environmental Psychology, 3*, 57-83.

Pruneau, D., & Chouinard, O. (1996). An intervention model designed to improve the person-social group-environment relationship. In *Paper presented at the conference of North American Association of Environmental Education*, . Burlingame, CA: NAAEE.

Pyle, R. M. (1992). Intimate relation and the extinction of experience. *Left Bank, 2*, 61-69.

Quinnett, P. (!994). *Pavlov's Trout.*. Sandpoint, ID; Keokee Co.

Quinsland, L. K., & Van Ginkel, A. (1984). How to process experience. *Journal of Experiential Education, 7*(2), 8-13.

Ramsey, J. M. (1981). The effects of environmental action and environmental case study instruction on the overt environmental behavior of eighth-grade students. *The Journal of Environmental Education, 13*(1), 24-30.

Reitz, H. J. (1977). *Behavior in organizations*. Homewood, IL: Richard D. Irwin, Inc.

Relph, E. (1976). *Place and placelessness*. London: Pion.

Roggenbuck, J. W., & Lucas, R. C. (1987). Wilderness Use and User Characteristics: a state-of-knowledge review. In L. Robert C. (Ed.), *the National Wilderness Research Conference: Issues, State-of-knowledge, Future Directions*, INT-220:204-245 . USDA Forest Service General Technical Report.

Roggenbuck, J. W., & Manfredo, M. M. (1989). Choosing the right route to wilderness education. In D. W. Lime (Ed.), *Managing America's Enduring Wilderness Resource*, (pp. 103-112). Minneapolis, MN: University of Minnesota.

Roggenbuck, J. W., Williams, D. R., & Watson, A. E. (1993). Defining acceptable conditions in wilderness. *Environmental Management, 17*, 187-197.

Roggenbuck, J. W. (1990). Wilderness research: Possible pitfall and potential solutions. *USDA Forest Service General Technical Report, SE-66.*

Roth, R. E. (1991). *Environmental literacy: Its roots, evolution, and directions in the 1990's.* Columbus, OH: ERIC/SMEAC.

Roth, R. E. (1970). Fundamental Concepts for Environmental Management Education. *The Journal of Environmental Education, 1*, 65-74.

Rubinstein, R. L., & Parmelee, P. A. (1992). Attachment to place and the representation of the life course by the elderly. In I. Altman &. S. M. Low (Eds.), *Place attachment* (pp. 139-163). New York: Plenum Press.

Sakofs, M. (1987). The field instructor's orientation toward certification. *Journal of Experiential Education, 10*(2), 40-42.

Sale, K. (1991). *Dwellers in the land.* Philadelphia: New Society Publishers.

Sample, V. A. (1994). Realizing the potential of remote sensing and GIS in ecosystem management planning, analysis, and policy making. In V. A. Sample (Eds.), *Remote Sensing and GIS in Ecosystem Management* (pp. 346-352). Washington DC: Island Press.

Sax, J. (1980). *Mountains Without Handrails; Reflections on the National Parks.* Ann Arbor, MI: University of Michigan Press.

Scholl, M. (1983). A survey of significant childhood learning experiences of suburban/urban environmentalists. In *North American Association of Environmental Education*, Ypsilanti, MI.

Schreyer, R., & Roggenbuck, J. W. (1978). The influence of experience expectations on crowding perceptions and social-psychological carrying capacity. *Leisure Sciences, 1*(4), 373-394.

Schreyer, R., Roggenbuck, J. W., McCool, S. F., Royer, L. E., & Miller, J. (1976). The Dinosaur National Monument whitewater river recreation study. Logan, UT: Utah State University.

Schwabb, K. E. (1982). Instructional methods: Their use and effectiveness in environmental education. *Journal of Environmental Education, 14*((2), 8-12.

Shafer, C. S., & Hammitt, W. E. (1995). Purism revisited: Specifying recreational conditions of concern according to resource intent. *Leisure Sciences.*

Shepard, C. L., & Speelman, L. R. (1986). Affecting environmental attitudes through outdoor education. *Journal of Environmental Education, 17*(2), 20-23.

Sia, A. P., Hungerford, H. R., & Tomera, A. (1984). Selected predictors of responsible environmental behavior: An analysis. *The Journal of Environmental Education, 17*(2), 31-40.

Sichel, B. A. (1988). *Moral education: Character, community, and ideals.* Philadelphia: Temple University Press.

Simon, H. A. (1976). *Administrative behavior.* London: The Free Press.

Simpson, S. (1985). Short-term wilderness experiences and environmental ethics. *Journal of Experiential Education, Fall,* 25-28.

Simpson, S. (1993). The intrinsic value of minimum impact. *The Journal of Experiential Education, 16*(2), 34-37.

Smith-Sebasto, N. J. (1992). The revised perceived environmental control measure: A review and analysis. *Journal of Environmental Education, 23*(2), 24-33.

Smith-Sebasto, N. J. (1995). The effects of an environmental studies course on selected variables related to environmentally responsible behavior. *Journal of Environmental Education, 26*(4), 30-34.

Snyder, G. (1995). *The Practice of Wild.*

Sobel, D. (1993). *Children's special places.* Tucson, AZ: Zaphyr Press.

Stankey, G., Cole, D. N., Lucas, R. C., Peterson, M. E., & Frissell, S. S. (1985). The limits of acceptable change (LAC) system for wilderness planning. *General Technical Report INT-176.*

Stankey, G. H. (1973). *Visitor perception of wilderness carrying capacity* (research Paper INT-142). USDA Forest Service Intermountain Forest and Range Experiment Station.

Stankey, G. H., & Schreyer, R. (1989). Attitudes toward wilderness and factors affecting visitor behavior: a state-of-knowledge review. In R. C. Lucas (Ed.), *National Wilderness Conference: Issues, State-Of-knowledge, Future Directions,* General Technical Report INT-220 (pp. 246-293). Ogden UT: USDA Forest Service.

Stapp, W. B. (1969). The concept of environmental education. *Journal of Environmental Education, 1*(1), 30-31.

Stapp, W. B. (1970). Environmental encounters. *The Journal of Environmental Education, 2*(1).

Stapp, W. B., & Cox, D. A. (1979). *Environmental Education.* Dester, MI: Stapp & Cox.

StatSoft (1994). *Statistica for the Macintosh.* Tulsa, OK: StatSoft, Inc.

Stubbs, C. J., & Roggenbuck, J. W. (1994). Assessing and improving wilderness recreationists' low-impact knowledge, behavioral intentions, and behavior. In *The Spirit Lives*. Santa Fe, NM.

Sumner, E. L. (1942). The biology of wilderness protection. *Sierra Club Bulletin, 27*(1942), 14-22.

Swearingen, T. C., & Johnson, D. R. (1994). Keeping visitors on the right track: Sign and barrier research at Mount Rainier. *Park Science, 14*(4), 17-19.

Tallmadge, J. (1981). Saying you to the land. *Environmental Ethics, 3*(4), 351-370.

Tanner, T. (1980). Significant life experiences. *Journal of Environmental Education, 11*(4), 20-24.

Thomashow, M. (1995). *Ecological identity: Becoming a reflective environmentalist.* Cambridge, MA: MIT Press.

Thoreau, H. D. (1975). Wild apples. In *The Selected Works of Thoreau* Boston: Houghton Mifflin.

Thornburgh, D. A. (1986). Responses of vegetation to different wilderness management systems. In R. C. Lucas (Ed.), *National Wilderness Research Conference*, (pp. 109-113). Fort Collins, CO: USDA Forest Service Intermountain Research Station, Ogden UT; General Technical Report INT-212.

Thornburgh, D. A. (1989). Success of a "gentle persuasion" wilderness management system. In D. W. Lime (Ed.), *Managing America's Enduring Wilderness Resource*, . Minneapolis, MN: University of Minnesota.

Tomera, A. N. (1979). *Environmental locus of control instrument*. Unpublished institutional research, Southern Illinois University at Carbondale.

Trimble, S. (1994). The scripture of maps, the names of trees. In G. P. N. &. S. Trimble (Eds.), *The Geography of childhood: Why children need wild places* Boston: Beacon Press.

Tuan, Y. F. (1974). *Topophillia*. New York: Prentice-Hall.

Tuan, Y. F. (1990). Realism and fantasy in art, history and geography. *Annals of the Association of American Geographers, 80*(3), 435-446.

Tuan, Y. F. (1991). Language and the making of place: A narrative descriptive approach. *Annals of the Association of American Geographers, 81*(4), 684-696.

US Congress (1964). *The Wilderness Act of 1964* Public Law 88-577.78 Statute 890). US Congress.

US Congress (1974). *Eastern Wilderness Act* Public Law 93-622 Statute 2096). US Congress.

US Congress (1980). *Alaska National Interest Lands Conservation Act* Public Law 96-487.94. US Congress.

UNESCO (1978). Needs and priorities in environmental education; An international survey. Paris: UNESCO/UNEP.

Van Matre, S. (1990). *Earth education : A new beginning*. Warrenville, IL: The Institute for Earth Education.

Volk, T. L. (1993). Integration and curriculum design. In R. J. Wilke (Eds.), *Environmental education teacher resource handbook: A practical guide for k-12 environmental education* (pp. 45-76). Thousand Oaks, CA: Sage Publications.

Wagar, J. V. K. (1940). Certified outdoorsmen. *American Forests, 46*.

Warren, G. A. (1985). Activities, attitudes, and management preferences of recreationists on the Arctic National Wildlife Range, Alaska. In *National Wilderness Research Conference*, . Fort Collins, CO:

Washburne, R. F., & Cole, D. N. (1983). *Problems and practices in wilderness management: A survey of managers.* (Research Paper INT-304). USDA Forest Service, Intermountain Research Station, Ogden Utah.

Watson, A. E., & Niccolucci, M. J. (1992). Defining past-experience dimensions for wilderness recreation. *Leisure Sciences, 14*, 89-103.

Wilke, R. J. (Ed.). (1993). *Environmental Education Teacher Resource Handbook: A practical guide for K-12 environmental education.*

Williams, D. R. (1995). *Mapping place meanings for ecosystem management* (ICRB Report PLACE_EM.WP5). USDA Forest Service Interior Columbia River Basin Ecosystem Management Project.

Williams, D. R., Patterson, M. E., Roggenbuck, J. W., & Watson, A. E. (1992). Beyond the commodity metaphor: Examining emotional and symbolic attachment to place. *Sciences, 14*(4), 29-46.

Wilson, E. O. (1984). *Biophillia*. Cambridge: Harvard University Press.

Wolke, H. (1991). *Wilderness on the Rocks*. Tuscon AZ: Ned Ludd Books.

Young, R. A. (1983). Toward an understanding of wilderness participation. *Leisure Sciences, 5*, 339-357.

Young, R. A., & Crandall, R. (1984). Wilderness use and self actualization. *Journal of Leisure Research, 16*(2), 149-160.

APPENDIX A

Table A-1. Comparison of Wildernism Standards of all subjects. Note narrow variance in indicator items logging, hydro electric, motor vehicles, mines

INDICATOR ITEM	*N*	Range Max	Mean	*SE*	*SD*	*V*
Campsites	111	0 - 4	2.6	0.1	1.1	1.1
Stocking	111	0 - 4	3.0	0.1	1.0	1.0
Road Access	111	0 - 4	2.2	0.1	1.1	1.3
Guided Trips	111	0 - 4	1.9	0.1	1.1	1.1
Trails	111	0 - 4	2.1	0.1	1.1	1.1
Bridges	111	0 - 4	2.1	0.1	1.1	1.2
Motor Vehicle	111	0 - 4	3.5	0.1	0.9	0.8
Trophy Hunts	111	0 - 4	2.3	0.1	1.4	2.0
Logging	111	1 - 4	3.3	0.1	0.8	0.6
Huts	111	0 - 4	2.6	0.1	1.2	1.3
HydroElec	111	0 - 4	3.5	0.1	0.8	0.6
Mines	111	2 - 4	3.6	0.1	0.6	0.4
Solitude	111	0 - 4	3.4	0.1	0.8	0.6
Remoteness	111	1 - 4	3.3	0.1	0.9	0.7
Sign of Human	111	1 - 4	3.5	0.1	0.7	0.5
Big Area	111	1- 4	3.3	0.1	0.9	0.8
Subsistence	111	0 - 4	2.6	0.1	0.9	0.8
Aircraft Access	111	0 - 4	2.5	0.1	1.1	1.2
Aircraft Over	111	0 - 4	3.0	0.1	0.9	0.8
Hazard Remv	111	0 - 4	2.6	0.1	1.0	1.1
Closed Area	111	0 - 4	2.4	0.1	1.1	1.1
Grazing	111	1 - 4	3.3	0.1	0.8	0.8
Dams	111	0 - 4	2.8	0.1	0.9	0.8
Signs	111	0 - 4	2.3	0.1	1.2	1.3
Predators Remv	111	0 - 4	3.0	0.1	1.1	1.2
Priv. Lodge	111	1 - 4	3.1	0.1	0.8	0.7
Group Size Ltd	111	0 - 4	2.6	0.1	1.0	1.1
Maps/Guide	111	0 - 4	1.6	0.1	1.0	1.0
Human Feat.	111	0 - 4	2.9	0.1	0.9	0.7
Size > 100m^2	111	0 - 4	3.2	0.1	0.9	0.7
Fire Supress.	111	0 - 4	2.7	0.1	0.9	0.9
Roads within	111	0 - 4	2.6	0.1	0.9	0.8
Rescue/Comm.	111	0 - 4	1.9	0.1	1.0	1.0

Table A-2. Verification of Specie classification with individual scoring of Wildernism Scale items (N = 111). *Gamma* is significant at the .001 level

ITEMS COMPARED WITH SPECIE	*Gamma*	p-level
Developed campsites	0.53	.00
Stocking of fish & wildlife	0.54	.00
Road access to wilderness boundary	0.53	.00
Commercial recreation	0.37	.00
Maintained trails	0.49	.00
Bridges	0.53	.00
Motorized travel by visitors	0.61	.00
Hunting (sport-trophy)	0.07	.31
Logging	0.36	.00
Maintained huts, shelters, cabins (public use)	0.58	.00
Hydroelectric	0.48	.00
Commercial mine	0.53	.00
Solitude	0.49	.00
Remoteness	0.53	.00
No evidence of human impact	0.47	.00
Big enough to take at least two days to cross	0.51	.00
Subsistence use (consumptive hunting, fishing, gathering)	0.18	.00
Airplane access	0.53	.00
No airplanes overhead	0.44	.00
Natural obstructions or hazards removed	0.48	.00
Restrictions & closures to preserve wildlife & vegetation	0.52	.00
Livestock grazing	0.42	.00
Lakes behind small human-made dams	0.58	.00
Trail signs, cairns, blazes	0.55	.00
Native predators or dangerous animal removal	0.54	.00
Small commercial lodge or private cabins	0.45	.00
Restrictions on group size (> 10 people)	0.42	.00
Map & guidebook with tips, hazards, or points of interest	0.50	.00
Absence of all human-made features	0.55	.00
Area size at least 64,000 acres	0.46	.00
No wildlife suppression	0.58	.00
Roadways or fire-breaks	0.59	.00
Communication systems & services for visitor aid & rescue	0.55	.00

Table A-3. Analysis of similarities between Specie and individual's Sense of Space buffer distances with Kruskal-Wallis ANOVA by Ranks significant at the .001 level

1. ROADS:		
Pre-treatment Minimum: H (3, N= 111) = 35.63 p =.00	*N*	Sum of Ranks
Camper	20	527.0
Backpacker	51	2675.0
Mountaineer	31	2203.0
Wildernist	9	811.0
Pre-treatment Maximum: H (3, N= 111) = 51.51 p =.00	*N*	Sum of Ranks
Camper	20	437.5
Backpacker	51	2587.5
Mountaineer	31	2281.5
Wildernist	9	909.5
Post-treatment Minimum: H (3, N= 111) = 67.54 p =.00	*N*	Sum of Ranks
Camper	12	176.5
Backpacker	30	1001.0
Mountaineer	43	2681.5
Wildernist	26	2357.0
Post-treatment Maximum: H (3, N= 111) = 92.92 p =.00	*N*	Sum of Ranks
Camper	12	160.0
Backpacker	30	768.5
Mountaineer	43	2798.5
Wildernist	26	2489.0

Table A-3. continued. Analysis of similarities between Specie and individual's Sense of Space distances with Kruskal-Wallis ANOVA by Ranks significant at the .001 level

2. TRAILHEAD:		
Pre-treatment Minimum : H (3, N= 111) = 44.63 p =.00	*N*	Sum of Ranks
Camper	20	444.5
Backpacker	51	2605.9
Mountaineer	31	2460.0
Wildernist	9	706.5
Pre-treatment Maximum: H (3, N= 111) = 14.53 p =.00	*N*	Sum of Ranks
Camper	20	697.5
Backpacker	51	2820.5
Mountaineer	31	2065.5
Wildernist	9	632.5
Post-treatment Minimum: H (3, N= 111) = 84.85 p =.00	*N*	Sum of Ranks
Camper	12	146.5
Backpacker	30	769.0
Mountaineer	43	2980.0
Wildernist	26	2320.5
Post-treatment Maximum: H (3, N= 111) = 72.72 p =.00	*N*	Sum of Ranks
Camper	12	207.5
Backpacker	30	783.0
Mountaineer	43	3329.5
Wildernist	26	1896.0

Table A-3. continued. Analysis of similarities between Specie and individual's Sense of Space distances with Kruskal-Wallis ANOVA by Ranks significant at the .001 level

3. TRAIL

Pre-treatment Minimum: H (3, N= 111) = 45.01 p =.00	*N*	Sum of Ranks
Camper	20	477.0
Backpacker	51	2624.5
Mountaineer	31	2319.0
Wildernist	9	795.5

Pre-treatment Maximum: H (3, N= 111) = 53.20 p =.00	*N*	Sum of Ranks
Camper	20	442
Backpacker	51	2545
Mountaineer	31	2327.5
Wildernist	9	901.5

Post-treatment Minimum: H (3, N= 111) = 84.71 p =.00	*N*	Sum of Ranks
Camper	12	266.5
Backpacker	30	718.5
Mountaineer	43	2852.0
Wildernist	26	2379.0

Post-treatment Maximum: H (3, N= 111) = 96.44 p =.00	*N*	Sum of Ranks
Camper	12	219.0
Backpacker	30	684.0
Mountaineer	43	2798.0
Wildernist	26	2515.0

Table A-3. continued. Analysis of similarities between Specie and individual's Sense of Space distances with Kruskal-Wallis ANOVA by Ranks significant at the .001 level

4. CAMPSITES		
Pre-treatment Minimum: H (3, N= 111) = 35.77 p =.00	*N*	Sum of Ranks
Camper	20	513
Backpacker	51	2751
Mountaineer	31	2128.5
Wildernist	9	823.5
Pre-treatment Maximum: H (3, N= 111) = 47.63 p =.00	*N*	Sum of Ranks
Camper	20	411.0
Backpacker	51	2676.0
Mountaineer	31	2286.0
Wildernist	9	843.0
Post-treatment Minimum: H (3, N= 111) = 77.74 p =.00	*N*	Sum of Ranks
Camper	12	300.0
Backpacker	30	712.5
Mountaineer	43	2917.0
Wildernist	26	2286.5
Post-treatment Maximum: H (3, N= 111) = 97.29 p =.00	*N*	Sum of Ranks
Camper	12	176.0
Backpacker	30	734.0
Mountaineer	43	2766.0
Wildernist	26	2540.0

Table A-3. continued. Analysis of similarities between Specie and individual's Sense of Space distances with Kruskal-Wallis ANOVA by Ranks significant at the .001 level

5. BRIDGES		
Pre-treatment Minimum: H (3, N= 111) = 38.03 p =.00	*N*	Sum of Ranks
Camper	20	635.5
Backpacker	51	2511.0
Mountaineer	31	2188.5
Wildernist	9	881.0
Pre-treatment Maximum: H (3, N= 111) = 49.31 p =.00	*N*	Sum of Ranks
Camper	20	488.0
Backpacker	51	2486.0
Mountaineer	31	2383.0
Wildernist	9	859.0
Post-treatment Minimum: H (3, N= 111) = 90.36 p =.00	*N*	Sum of Ranks
Camper	12	241.0
Backpacker	30	727.5
Mountaineer	43	2777.5
Wildernist	26	2470.0
Post-treatment Maximum: H (3, N= 111) = 94.32 p =.00	*N*	Sum of Ranks
Camper	12	226.0
Backpacker	30	678.0
Mountaineer	43	2813.0
Wildernist	26	2499.0

Table A-3. continued. Analysis of similarities between Specie and individual's Sense of Space distances with Kruskal-Wallis ANOVA by Ranks significant at the .001 level

6. SIGNS		
Pre-treatment Minimum: H (3, N= 111) = 49.92 p =.00	*N*	Sum of Ranks
Camper	20	557.5
Backpacker	51	2395
Mountaineer	31	2472.5
Wildernist	9	791.0
Pre-treatment Maximum: H (3, N= 111) = 45.29 p =.00	*N*	Sum of Ranks
Camper	20	541.0
Backpacker	51	2453.0
Mountaineer	31	2379.5
Wildernist	9	842.5
Post-treatment Minimum: H (3, N= 111) = 86.08 p =.00	*N*	Sum of Ranks
Camper	12	204.0
Backpacker	30	751.5
Mountaineer	43	2876.0
Wildernist	26	2384.5
Post-treatment Maximum: H (3, N= 111) = 94.88 p =.00	*N*	Sum of Ranks
Camper	12	250.0
Backpacker	30	679.0
Mountaineer	43	2750.5
Wildernist	26	2536.5

Table A-3. continued. Analysis of similarities between Specie and individual's Sense of Space distances with Kruskal-Wallis ANOVA by Ranks significant at the .001 level

7. AIRSTRIPS

Pre-treatment Minimum: H (3, N= 111) = 21.23 p =.00	*N*	Sum of Ranks
Camper	20	580.0
Backpacker	51	2882.5
Mountaineer	31	2159.5
Wildernist	9	594.0

Pre-treatment Maximum: H (3, N= 111) = 18.16 p =.00	*N*	Sum of Ranks
Camper	20	622.0
Backpacker	51	2995.0
Mountaineer	31	1904.0
Wildernist	9	695.0

Post-treatment Minimum: H (3, N= 111) = 55.93 p =.00	*N*	Sum of Ranks
Camper	12	80.0
Backpacker	30	1168.0
Mountaineer	43	2977.0
Wildernist	26	1991.0

Post-treatment Maximum: H (3, N= 111) = 38.73 p =.00	*N*	Sum of Ranks
Camper	12	80.5
Backpacker	30	1574.5
Mountaineer	43	2618.0
Wildernist	26	1943.0

Table A-3. continued. Analysis of similarities between Specie and individual's Sense of Space distances with Kruskal-Wallis ANOVA by Ranks significant at the .001 level

8. HUTS

Pre-treatment Minimum: H (3, N= 111) = 31.72 p =.00	*N*	Sum of Ranks
Camper	20	564.5
Backpacker	51	2636.0
Mountaineer	31	2327.5
Wildernist	9	688.0

Pre-treatment Maximum: H (3, N= 111) = 49.70 p =.00	*N*	Sum of Ranks
Camper	20	425.5
Backpacker	51	2652.5
Mountaineer	31	2233.5
Wildernist	9	904.5

Post-treatment Minimum: H (3, N= 111) = 82.53 p =.00	*N*	Sum of Ranks
Camper	12	275.0
Backpacker	30	675.5
Mountaineer	43	2974.5
Wildernist	26	2291.0

Post-treatment Maximum: H (3, N= 111) = 97.24 p =.00	*N*	Sum of Ranks
Camper	12	91.5
Backpacker	30	840.5
Mountaineer	43	2737.5
Wildernist	26	2546.5

Table A-3. continued. Analysis of similarities between Specie and individual's Sense of Space distances with Kruskal-Wallis ANOVA by Ranks significant at the .001 level

9. AIRCRAFT OVERHEAD

Pre-treatment Minimum: H (3, N= 111) = 39.12 p =.00	*N*	Sum of Ranks
Camper	20	568
Backpacker	51	2627.0
Mountaineer	31	2138.0
Wildernist	9	883.0

Pre-treatment Maximum: H (3, N= 111) = 51.06 p =.00	*N*	Sum of Ranks
Camper	20	412.0
Backpacker	51	2604.5
Mountaineer	31	2339.5
Wildernist	9	860.0

Post-treatment Minimum: H (3, N= 111) = 63.30 p =.00	*N*	Sum of Ranks
Camper	12	358.0
Backpacker	30	982.5
Mountaineer	43	2450.5
Wildernist	26	2424.5

Post-treatment Maximum: H (3, N= 111) = 80.88 p =.00	*N*	Sum of Ranks
Camper	12	227.5
Backpacker	30	831.5
Mountaineer	43	2672.5
Wildernist	26	2484.5

Table A-3. continued. Analysis of similarities between Specie and individual's Sense of Space distances with Kruskal-Wallis ANOVA by Ranks significant at the .001 level

10. DAMS

Pre-treatment Minimum: H (3, N= 111) = 30.62 p =.00	*N*	Sum of Ranks
Camper	20	474
Backpacker	51	2950.0
Mountaineer	31	2056.5
Wildernist	9	735.5

Pre-treatment Maximum: H (3, N= 111) = 20.15 p =.00	*N*	Sum of Ranks
Camper	20	589.5
Backpacker	51	2978
Mountaineer	31	1935
Wildernist	9	7135

Post-treatment Minimum: H (3, N= 111) = 51.4 p =.00	*N*	Sum of Ranks
Camper	12	78.0
Backpacker	30	1577.0
Mountaineer	43	2357.0
Wildernist	26	2204.0

Post-treatment Maximum: H (3, N= 111) = 33.89 p =.00	*N*	Sum of Ranks
Camper	12	120.0
Backpacker	30	1600.0
Mountaineer	43	2571.0
Wildernist	26	1925.0

Table A-4. Kruskal-Wallis ANOVA by Ranks of Species and Wilderness Management Acceptance Standards

REALISTIC ACCEPTANCE STANDARD

H (3, N= 111) = 42.98 p =.00

	N	Sum of Ranks
Camper	12	145.00
Backpacker	30	1316.00
Mountaineer	43	2686.50
Wildernist	26	2068.50

IDEAL ACCEPTANCE STANDARD

H (3, N= 111) = 38.77 p =.00

	N	Sum of Ranks
Camper	12	141.50
Backpacker	30	1318.50
Mountaineer	43	2885.50
Wildernist	26	1870.50

Table A-5. Wilcoxon analysis of change in Sense of Space buffer distances

VARIABLE: ROADS MINIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	25.00	.00***
WSP	22	10.00	.07
RT	9	2.50	.79
CC	36	46.50	.44
NP	11	0.00	.11

VARIABLE: ROADS MAXIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	7.50	.01***
WSP	22	7.50	.01***
RT	9	20.50	.11
CC	36	20.50	.81
NP	11	0.00	.11

VARIABLE: TRAILHEAD MINIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	11.00	.00***
WSP	22	22.00	.00***
RT	9	0.00	.03***
CC	36	14.50	.06
NP	11	0.00	.11

VARIABLE: TRAILHEAD MAXIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	56.50	.01***
WSP	22	0.00	.00***
RT	9	12.50	.441
CC	36	48.50	.06
NP	11	0.00	.11

VARIABLE: TRAILS MINIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	15.00	.01***
WSP	22	0.00	.00***
RT	9	0.00	.07
CC	36	6.00	.69
NP	11	0.00	.11

Table A-5. continued. Wilcoxon analysis of change in Sense of Space buffer distances

VARIABLE: TRAILS MAXIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	8.00	.04***
WSP	22	0.00	.04***
RT	9	0.00	.11
CC	36	0.00	.11
NP	11	0.00	.11

VARIABLE: CAMPSITE MINIMUM

Treatment-group	*N*	*T*	p-level
NSP	33	0.00	.02***
WSP	22	0.00	.07
RT	9	3.00	.47
CC	36	1.00	.29
NP	11	0.00	.11

VARIABLE: CAMPSITE MAXIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	11.00	.093
WSP	22	0.00	.028***
RT	9	1.00	.144
CC	36	3.00	.465
NP	11		.11

VARIABLE: BRIDGES MINIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.00***
WSP	22	0.00	.07
RT	9	0.00	.03***
CC	36	0.00	.11
NP	11	0.00	.11

VARIABLE: BRIDGES MAXIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.03***
WSP	22	0.00	.00***
RT	9	0.00	.07
CC	36	0.00	.11
NP	11	0.00	.11

Table A-5. continued. Wilcoxon analysis of change in Sense of Space buffer distances

VARIABLE: SIGNS MINIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.00***
WSP	22	0.00	.00***
RT	9	0.00	.04***
CC	36	0.00	.11
NP	11		.11

VARIABLE: SIGNS MAXIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.00***
WSP	22	0.00	.02***
RT	9	5.00	.25
CC	36	0.00	.07
NP	11	0.00	.11

VARIABLE: AIRSTRIPS MINIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	3.00	.00***
WSP	22	0.00	.00***
RT	9	7.50	.53
CC	36	13.50	.00***
NP	11	0.00	.11

VARIABLE: AIRSTRIPS MAXIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.00***
WSP	22	0.00	.01***
RT	9	0.00	.11
CC	36	1.00	.08
NP	11	0.00	.11

VARIABLE: HUTS MINIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.00***
WSP	22	0.00	.00***
RT	9	1.50	.20
CC	36	0.00	.02***
NP	11	0.00	.11

Table A-5. continued. Wilcoxon analysis of change in Sense of Space buffer distances

VARIABLE: HUTS MAXIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.01***
WSP	22	0.00	.01***
RT	9	1.00	.05***
CC	36	4.00	.72
NP	11	0.00	.11

VARIABLE: AIRCRAFT OVERHEAD MINIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.00***
WSP	22	0.00	.04***
RT	9	0.00	.07
CC	36	0.00	.11
NP	11	0.00	.11

VARIABLE: AIRCRAFT OVERHEAD MAXIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.00***
WSP	22	0.00	.01***
RT	9	4.00	.35
CC	36	5.00	.25
NP	11	0.00	.11

VARIABLE: DAMS MINIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.00***
WSP	22	0.00	.02***
RT	9	0.00	.11
CC	36	0.00	.02***
NP	11	0.00	.11

VARIABLE: DAMS MAXIMUM

TREATMENT-GROUP	*N*	*T*	p-level
NSP	33	0.00	.00***
WSP	22	0.00	.04***
RT	9	1.50	.11
CC	36	2.00	.13
NP	11	0.00	.11

Note. Wilcoxon test is significant at the .05 level.

APPENDIX B

Survey-Tests:

1. Wilderness Perception Test
2. Environmental Literacy Test

Wilderness Perception

This questionnaire is designed to help us better understand people's attitudes, knowledge, skills, and opinions about wilderness conditions and issues. It will help us better understand the process of developing environmentally responsible behavior in managing wilderness resources.

Your identity will be kept in strictest confidence. Your name and address is necessary to collate the four parts. If you do not want to provide your name, please use a pseudonym or number. Thank you very much for your participation!

Name			
Address		**State**	**Zip**
Phone	**E-Mail**		
WEA Course Affiliate	**Trip Location**		
Instructor(s)			
Date:	**Your Age:**		

This research is part of a joint project with the University of Alaska Fairbanks, Department of Resources Management and the Wilderness Education Association (W.E.A.) with cooperation from the University of Southern Illinois, Carbondale, and University of Cantebury, New Zealand.

If you are interested in the results of this research check (√) here ☐ or contact Rick Foster University of Alaska Fairbanks (907) 474-4527; e-mail FTFAF@aurora.alaska.edu

About You and Wilderness

DIRECTIONS: The following items ask how you feel about different aspects of the environment. Think carefully about each item before you **check (√) the column which best reflects how you feel.** There are no right or wrong answers. If you are **not sure** about any item, **leave it blank.**

1. Check (√) One

To what extent do you feel that you are **environmentally sensitive?** This means that you appreciate and care about the environment.

No Extent	A Little Extent	A Moderate Extent	A Large Extent	A Great Extent

2. Check (√) One

To what extent are you concerned about the loss of natural areas and habitats?

No Extent	A Little Extent	A Moderate Extent	A Large Extent	A Great Extent

3. Check (√) One

To what extent do you take part in recreation activities which take place in natural places such as parks and wilderness?

No Extent	A Little Extent	A Moderate Extent	A Large Extent	A Great Extent

4. Check (√) One

To what extent do you **oppose** environmental laws and regulations designed to help protect the environment?

No Extent	A Little Extent	A Moderate Extent	A Large Extent	A Great Extent

5. Check (√) One

How competent do you think you are about your ability to use wilderness skills (pathfinding, safety, leave-no-trace?)

No Extent	A Little Extent	A Moderate Extent	A Large Extent	A Great Extent

Please answer the following questions if you take part in recreational activities in wilderness areas.
DIRECTIONS: Check (√) **only one** in each of the following questions:

1. How many **other** people do you enjoy to be with **you** on your wilderness trips?
☐ No one ☐ 1 person ☐ 2 people ☐ 3 people ☐ 4-7 people ☐ 8-10 ☐ Other _____

2. What size of group do you consider **too** large to encounter on the trail or to camp near?
☐ Anyone ☐ 1 person ☐ 2 people ☐ 3 people ☐ 4-7 people ☐ 8-10 ☐ Other ____

3. Which would be **more acceptable** to encounter on the trail?
either ☐ four or five small groups (of three or four people) spread-out during each day
or ☐ one large group at a time per day (one group of 12-15 people)

DIRECTIONS: Please number (**1, 2, 3**) the following statements in the order **you think** is the best wilderness management policy. 1 = highest priority, 2 = second priority, 3 = third priority

☐ Protection of wilderness recreational opportunities should be the priority of management actions.

☐ Protection of local resident's hunting and gathering opportunities should be the priority of management actions.

☐ Protection of natural biodiversity (wildlife and vegetation) should be the priority of management actions

How Do You Feel About Different Wilderness Conditions?
DIRECTIONS: The following list of features, opportunities, and restrictions might be found in wilderness areas. Please (√) how **desirable** each item is in what you consider to be **wilderness.**

	Features	Strongly Undesirable	Undesirable	Neutral Not important	Desirable	Strongly Desirable
1.	Developed campsites (firepits, outhouse, food containers)					
2.	Stocking of fish & wildlife species not native to the area					
3.	Road access to wilderness boundary					
4.	Commercial recreation (e.g. guided trips)					
5.	Maintained trails					
6.	Bridges or walkwires over rivers or streams					
7.	Motorized travel by visitors (ATV, boats, snowmobiles)					
8.	Hunting (sport-trophy)					
9.	Logging (e.g. for timber, fire, or pest control)					
10.	Maintained huts, shelters, cabins (public use)					
11.	Hydroelectric development (e.g. dams, powerline)					
12.	Commercial mining					
13.	Solitude: not seeing many people (besides your party)					
14.	Remote from cities, towns, railroad & major roadways					
15.	No evidence of human impact (firerings, trails, litter)					
16.	Big enough to take at least two days to walk across					
17.	Subsistence use (consumptive hunting, fishing, gathering)					
18.	Airplane access (landings within --on land or water)					
19.	No airplanes overhead					
20.	Natural obstructions or hazard removal/elimination					
21.	Restrictions & closures to preserve wildlife & vegetation					
22.	Livestock grazing					
23.	Lakes behind small human-made dams					
24.	Trail signs, cairns, or blazes					
25.	Native predators or dangerous animal removal/elimination					
26.	Small commercial lodge or private cabins					
27.	Restrictions on group size (more than 10 people)					
28.	Map & guidebook with tips, hazards, or points of interest					
29.	Absence of all human-made features					
30.	Area size of at least 64,000 acres (100 sq. miles)					
31.	No wildfire suppression					
32.	Roadways or fire-breaks					
33	Communication system & services for visitor aid & rescue					

Spatial Distances and Wilderness Qualities

How far do you prefer to be from the following features for a "true" wilderness experience?

DIRECTIONS: Use the corresponding symbols √ and Δ for each question.
Mark a √ and Δ over the **minimum** buffer distance (mile) you desire to be "away from" each feature. Circle the √ and Δ to indicate the maximum buffer distance (mile) as well. You may write-in a greater distance under "other" at the far end of the scale. **Mark** a distance of "0" if you prefer to be near the feature or, if it does not matter.
Distances will vary according to vegetation, topography, climate and substrate. We are looking for a "ballpark" **minimum** distance. To help you calculate, you may wish to use the formula:
One day of travel = 8-12 trail miles or 3-7 cross-country miles.

1. • Roads √ • Trailheads (parking lot) Δ

Miles 0 .5 1 2 10 20 30 40 50 60

2. • Trail √ • Developed campsites Δ

Miles 0 .5 1 2 10 20 30 40 50 60

3. • Bridges √ • Trail signs Δ

Miles 0 .5 1 2 10 20 30 40 50 60

4. • Trail culverts √ • Antennae (microwave/radio) Δ

Miles 0 .5 1 2 10 20 30 40 50 60

5. • Airstrips/landings √ • Powerlines Δ

Miles 0 .5 1 2 10 20 30 40 50 60

6. • Huts, shelters, cabins √ • Lodge or private cabins Δ

Miles 0 .5 1 2 10 20 30 40 50 60

7. • Logged site √ • Aircraft fly-overs Δ

Miles 0 .5 1 2 10 20 30 40 50 60

8. • Large groups √ • Non-native vegetation or stocked wildlife Δ

Miles 0 .5 1 2 10 20 30 40 50 60

9. • Dams √ • Mines Δ

Miles 0 .5 1 2 10 20 30 40 50 60

Wilderness Qualities and Conditions

People appreciate wilderness conditions at different times for different reasons and situations.

DIRECTIONS: For each of the following, you may choose **one** which represents your ideal choice and also choose **another** which represents a more practical alternative. In some or all cases both choices may be the same. **Please draw a circle O around your ideal** (model choice) and a **square** ☐ **around your realistic (or more practical) choice.**

1. For the type of wilderness experience you desire which area/zone would you choose? One with:

a	1-3 hours from urban centers; short distance & easy access from road to trailhead & to backcountry.
b	3-5 hours from urban centers; moderate access from road to trailhead & hike to backcountry.
c	remote with arduous vehicular access from road to trailhead & moderate hiking to backcountry.
d	very remote with extreme access to trailhead & hike to backcountry access (steep/difficult/long).

2. For the type of wilderness experience you desire which area/zone would you choose? One with:

a	easy-to-follow trails, well constructed bridges, clear directional and information signs.
b	trails well marked but rugged at times, signs at intersections and confusing locations; footbridges.
c	few constructed trails, rock cairns or blazes on trees at confusing locations; natural bridges only.
d	extremely inaccessible; challenging travel, some bushwhacking; can be precarious to hazardous.

3. For the type of wilderness experience you desire which area/zone would you choose? One with:

a	permanent signs with distance and/or times to destinations, restrictions on use, highly patrolled.
b	some signs, mostly cairns or blazes; some use limitations, permits required; frequent ranger patrols.
c	no signs; some cairns; directions limited to guidebooks & maps, permits & occasional ranger patrols.
d	rarely traveled area, no guidebooks, limited maps available, no ranger patrols nor rescue service.

4. For the type of wilderness experience you desire which area/zone would you choose? One with:

a	maintained campsites, some with tables, animal-proof containers, outhouses, firepits, water.
b	established (hardened) campsites, rustic fire rings, animal-proof containers.
c	obvious informal campsites, some rock firerings; leave-no-trace skills are necessary.
d	no conspicuous campsites; equipment preparedness, leave-no-trace & survival skills are vital.

5. For the type of wilderness experience you desire which area/zone would you choose? One with:

a	aircraft landings allowed everywhere possible; no restrictions on flying heights.
b	aircraft flying restricted to travel corridors; no commercial/private landings outside of corridors.
c	aircraft flying restricted to 2,000 ft. above ground in corridors; no commercial/private landings.
d	aircraft fly-overs restricted; no landings allowed by anyone for any reason (including agency).

Background Information: More About You and Wilderness

DIRECTIONS: Please answer the following questions with regards to your trips to wild or natural areas. Answer all of the following using "your" definition of wilderness areas.

1. How many years have you been visiting wilderness areas?
   - ☐ never
   - ☐ one year
   - ☐ two to five years
   - ☐ six to ten years
   - ☐ more than ten years

2. How long do you usually spend on a single wilderness trip?
   - ☐ day-trips only
   - ☐ 1-2 nights
   - ☐ one week to ten days
   - ☐ two weeks to a month
   - ☐ more than a month

3. How often do you visit wilderness areas each year?

   Summer _____ times Fall _____ times Winter _____ times Spring _____ times

4. Have you ever been involved with an organized camping or wilderness education training school such as scouting, Outward Bound, 4-H etc.? ☐ Yes ☐ No

   If Yes, which one(s)_____

5. Have you lead organized wilderness trips (as a paid position)? ☐ Yes ☐ No

   What was the average group size? _____

6. Type of community in which you live (check √ one):
   - ☐ major metro area (over 5000,000) ☐ medium city (50,000 - 500,000)
   - ☐ small city (10,000 - 50,000) ☐ rural or small town (1,000 - 10,000
   - ☐ village (up to 1,000) ☐ farm, ranch, or homestead

7. Favorite Wilderness Area(s) Location State Managing Agency

_____

_____

Wilderness Education

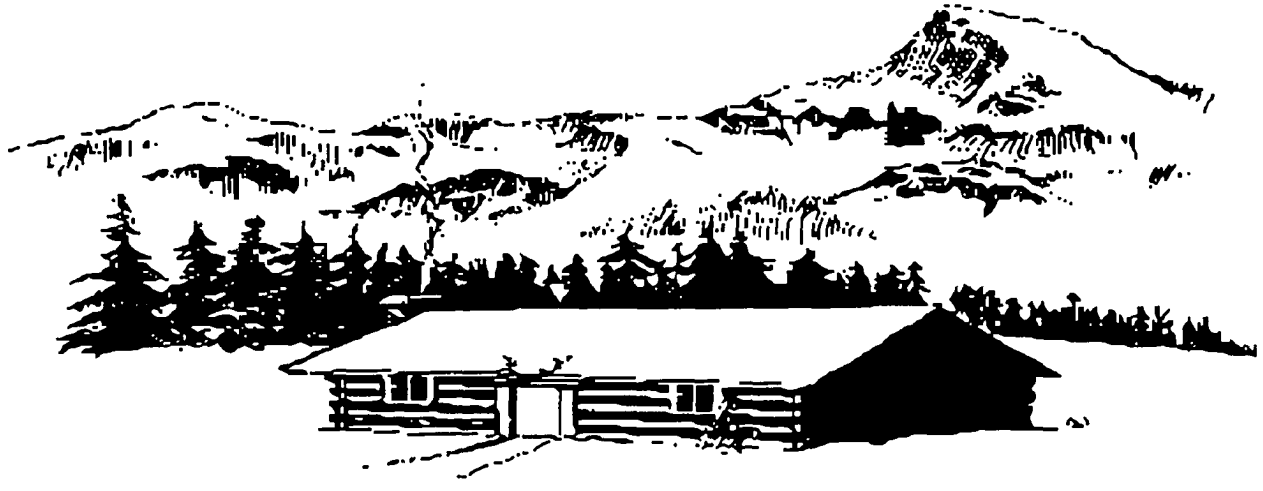
This questionnaire is designed to help us better understand people's attitudes, knowledge, skills, and opinions about wilderness conditions and issues. It will help us better understand the process of developing environmentally responsible behavior in managing wilderness resources.

Your identity will be kept in strictest confidence. Your name and address is necessary to collate the three sections. If you do not want to provide your name, please use a pseudonym or number.

Thank you very much for your participation!

Literacy Part 1

Name			
Address		**State**	**Zip**
Phone	**E-Mail**		
WEA Course Affiliate	**Location**		
Instructor(s)			
When did you complete this survey?	☐ **before the class** **or**	☐ **after the class**	



This research is part of a joint project with the University of Alaska Fairbanks, Department of Resources Management and the Wilderness Education Association (W.E.A.) with cooperation from the University of Southern Illinois, Carbondale, the Sierra Institute for Environmental Research and Education, and Alaska Watershed Ecology Institute.

If you are interested in the results of this research check (√) here ☐ or contact Rick Foster University of Alaska Fairbanks (907) 474-7298; e-mail FTFAF@aurora.alaska.edu

Issue Awareness and Ecological Foundations

DIRECTIONS: Below, you are asked to **list up to six (6) environmental issues** with which you are **currently familiar. These should include three (3) issues found in your region or state and three (3) which have to do with natural wild areas (local, national, or world-wide).**

The examples show you ways to write items for your own list. It is important to include the **cause, the effects, and locations** in your issues. In the first example, **the cause is** industrial pollution. The **effect** is lowered water quality.

Examples:

The effect of industrial pollution on lowering water quality in the Mississippi River south of St. Louis, MO.

or, if written as a question...

What is the effect of housing construction on loss of habitat for fox squirrels in Maryland?

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

6. _____

Ecological Foundations

DIRECTIONS: Please circle the letter of the correct response for each multiple choice item.

1. A flower with colorful petals and a sweet smell would most likely be pollinated by:

   a. rain
   b. wind
   c. a gardener
   d. insects

2. A small bird eats a butterfly that has been eating some nectar from a flower. Then the bird is eaten by a hawk. This is an example of:

   a. mutualism
   b. a food chain
   c. competition
   d. survival of the fittest

3. Which of the following is a predator-prey relationship?

   a. a flea bites a dog
   b. a robin eats a worm
   c. a caterpillar eats a leaf
   d. a deer eats grass that has a grasshopper in it

4. A fox dies. This creates a problem for:

   a. the fleas that were drinking the fox's blood
   b. a rabbit that has a nest nearby
   c. another fox whose territory is nearby
   d. an animal that hunts in the same area that the fox did

5. Termites eat only wood; however they cannot digest it. Tiny organisms that live in termite's stomachs and intestines digest the wood. The relationship the tiny organisms and the termites have is:

   a. helpful to one and has no effect on the other
   b. helpful to one and harmful to the other
   c. helpful to both of them
   d. helpful to neither of them

6. A cat and a snake are hunting the same mouse. What is the relationship between the cat and the snake?

   a. one is using the other but not harming it
   b. they are competing with each other
   c. they are helping each other
   d. one is trying to eat the other one

7. If there were no decomposers on Earth, what would happen?

   a. dead plants and animals wouldn't become part of the soil
   b. many human diseases would disappear
   c. more meat would be available for humans to eat
   d. little would change

8. A grassland turns into a desert. What will most likely happen to the animals that live in the grassland?

   a. most will leave or die
   b. they would have more babies to survive
   c. those that eat grass would adapt to new food
   d. many will pass on traits that would help their young survive in the desert

9. Some people started a program in a National Forest to protect deer. They started killing wolves. Ten years later there were no wolves in the forest. For a few years after the wolves were gone there were many more deer than there had ever been. Then suddenly there were almost no deer.

   The people who wanted to protect the deer did not know that:

   a. deer only live to be a few years old
   b. fires would kill so many deer
   c. other animals would eat so much of the deer's food
   d. the deer would eat all of the food and that many would starve

10. The original source of energy for all living things is:

    a. the sun
    b. water
    c. the soil
    d. plants

11. A dead bird is decomposing. What happens to the energy that was stored in the bird's body?

    a. nothing happens to it, once the bird is dead the energy is lost
    b. it passes through the organisms that decomposed the bird
    c. it is destroyed by solar radiation
    d. the bird used up its energy when it was alive

12. A rabbit eats some corn. The energy from the corn goes into the rabbit. The next day a fox eats the rabbit. The fox gets very little of the energy that was in the corn. Why?

    a. a fox can't digest corn
    b. the rabbit had already digested the corn
    c. corn doesn't have much energy
    d. most of the corn's energy was used by the rabbit

13. Most of the oxygen in the atmosphere comes from:

    a. insects
    b. plants
    c. the soil
    d. the sun

14. Which of the following would give humans the most food energy from 1,000 pounds of plants?

    a. feed the plants to insects, feed the insects to fish, and then humans eat the fish
    b. humans eat the plants
    c. feed the plants to cattle then humans eat the cattle
    d. feed the plants to fish, then humans eat the fish

15. After living things die, they decompose. As a result of this process, nutrients are:

    a. released back into the environment to be recycled
    b. destroyed by the bacteria of decay
    c. changed from nutrients to oxygen and water vapor
    d. evaporated due to the heat produced during decomposition

16. Which of the following is a part of the water cycle?

    a. erosion
    b. ocean tides
    c. evaporation
    d. decomposition

17. A pollutant gets into an ecosystem and kills large numbers of insects. How might this affect the ecosystem?

    a. plants are not damaged so it doesn't affect the ecosystem
    b. it damages part of the ecosystem so it may effect the whole ecosystem
    c. it kills only insects so the other animals in the ecosystem stay healthy
    d. most animals eat plants so it doesn't affect the ecosystem much

18. Which is an example of a food chain?

    a. sun - corn - mouse - hawk - moss
    b. sun - flower - bee - small bird - hawk
    c. sun - beaver - birch tree - fish - algae
    d. sun - grass - field mouse - dog - deer

19. On a trip across the country, you notice no trees in the desert, and plenty of trees in the mountains. Which of the following pair of factors best accounts for this observation?

    a. altitude and latitude
    b. moisture and light
    c. temperature and altitude
    d. temperature and moisture

20. If traveling with large amounts of food or trash, the **best** protection from animals is storing it:

    a. in a tree, high rock, or on an island in the creek
    b. in PVC or other proven animal proof containers
    c. in two ziplock bags and a stuffsack away from camp
    d. buried in the ground

21. Consider the relationship between the following statements:

    • Compaction of soil in a given area, **and**
    • Water infiltration rate by the soil after a heavy rain

    Which of the following is true?

    a. An increase in the first is usually accompanied by an increase in the second.
    b. An increase in the first is usually accompanied by a decrease in the second.
    c. An increase in the first has no apparent effect on the second.
    d. A decrease in the first has no apparent effect on the second.

22. What is the most important consideration in deciding whether or not to build a campfire?

    a. the presence of existing fire rings
    b. potential damage to the system
    c. cooking
    d. ceremonial needs

23. When traveling in a popular wilderness area it is **best** to:

    a. hike on trail except in rutted or muddy areas
    b. spread out use into pristine areas because it is hardier
    c. divide the group and travel off-trail to keep from seeing people
    d. concentrate the group's use and impact on established trails

24. In a pristine area it is **best** to travel:

    a. spread -out to minimize the impact
    b. by moving quickly two by two
    c. in single file which minimizes impact
    d. dividing-up into small groups

25. When camping in a frequently used wilderness area it is **best** to:

    a. never camp at heavily impacted sites
    b. pitch tents and confine activities to impacted areas
    c. always camp at an pristine unused site
    d. spread-out the group into as many sites as possible

26. Vegetative impact and soil compaction usually:

    a. is only temporary
    b. occurs a little at a time over long periods
    c. doubles each time a group passes and continues to decline
    d. occurs with greatest initial impact and then levels off

27. When cleaning dishes it is best to always:

    a. there is no rule, it depends on the area and situation
    b. clean and rinse into soil away from waterways so as to not add nutrients
    c. use only washrooms and potable water
    d. strain into waters and pack out food scraps so as to not attract wildlife

An Evaluation for Issue Analysis and Action Skills
The Story: Additions to Wilderness System Proposal

Tempers are flaring over a legislative proposal to add land in a western state to the National Wilderness Preservation System. Wilderness areas are open to restricted recreational activities such as hiking, camping, fishing, and hunting--provided they do not damage the land or ecosystem.

Representatives from various interest groups have expressed their views on the proposal. Sherry Witherspoon, a representative from a mining company, feels that enough land in the United States has already been set aside as wilderness. She also feels that public lands should continue to be managed under the principle of multiple use, which allows for economic as well as recreational use. She believes that if these lands are taken out of production, it will be difficult to get the resources we need for national defense.

Brian Smith, from a preservation group, advocates setting aside more land as wilderness. Brian believes that more land in the lower 48 states needs to be set aside, since over half of the existing wilderness lands are in Alaska. These lands should be preserved from development by timber, mining, and other economic interests. He argues that the preservation of the wilderness areas maintains the natural environment. It preserves forests, natural resources, and wildlife; and offers land for wilderness recreation.

Still another view was expressed by Dave Talbot, a scientist at a local university. He also believes more land should be set aside as wilderness, but new regulations should be set for the wilderness system. Studies have indicated that recreational use can have a lasting negative impact upon natural biodiversity. He argues that within wilderness areas, certain regions should be managed for recreational use, while other areas should be declared off-limits to all human visitors and left completely undisturbed so that scientists may conduct research on the ecology of the area. He is not adverse to closing-off as much of a n area as necessary.

A fourth consideration is that of the locale residents. Some have been hunting and gathering, the resources of the area for generations. Other local residents have grazed their livestock on the land. Their joint belief is that these uses are an integral part of their lifeway and should continue.

DIRECTIONS: The information above contains an environmental issue (a disagreement between 2 or more individuals or groups). Check (√) in front of the statement that best identifies this environmental issue.

- ☐ Should the government lock-up resources that are essential to a peoples' lifeway.
- ☐ Should the government add this area of land to the national wilderness preservation system?
- ☐ Should the government continue multiple use of the land and allow mineral exploration?
- ☐ Should the government zone the area for ecological studies with no human entry for recreation?

The information suggests at least **one** major cause of this issue. **DIRECTIONS:** Identify **one cause** using no more than one sentence.

The Major Cause is:

_____

A *belief* is something that someone or a group of people holds to be true. A *value* is the worth placed on something by someone or a group of people. *Values are closely related to beliefs.* **DIRECTIONS:** Below, you will find a list of some of the key players. For each player, please **list** the player's **stated position, their *belief*** , and **name** the most important ***value*** present in that ***belief.***

PLAYER	Player's Stated Position	Reason for Taking This Position (beliefs)	Values
Sherry Witherspoon			
Brian Smith			
Dave Talbot			
Local Residents			
Other Players			

DIRECTIONS: Below you will find eight action strategies that you might use to insure action is taken on your point of view. Select what you believe to be *the best two* (2) *action strategies.* Check (√) the box in front of the *two action strategies* that you select.

Choose Two.

☐ 1. Contact the President of the United States to explain your point of view regarding wilderness.

☐ 2. Write to your state representative and urge him/her to get a law passed to support your point of view regarding wilderness.

☐ 3. Organize a group to hold a raffle and bake sale in an attempt to raise enough money to purchase the land.

☐ 4. Circulate a petition which asks the U.S. Congress to support your point of view.

☐ 5. Organize a group of citizens with the same position as yours to write persuasive letters to the editor of the local news paper.

☐ 6. Assemble a group of citizens with the same position as yours and offer its services to a lobbying coalition which might influence federal legislators.

☐ 7. Distribute flyers at stores encouraging shoppers to organize and demonstrate at the offices, businesses, or homes of those in opposition to your point of view.

☐ 8. Make anonymous phone calls which threaten to sabotage the area if your point of view is not followed.

Issue Analysis and Citizenship Action

DIRECTIONS: Each of the following items looks at different aspects about you and the environment. **Please be completely honest.** There are no right or wrong answers. You are asked to think carefully about each item before you mark a check (√) in the appropriate box.

1. The term **Ecomanagement refers to those environmental actions in which people work directly with the natural world to help prevent or resolve environmental issues.**
Examples would be: (1) taking part in or organizing litter clean-ups; (2) constructing elevated boardwalks in sensitive park areas; (3) building and installing nesting boxes for birds;
(4) helping to set controlled fires to manage plant/animal habitats; (5) organizing a campaign to plan or protect a community.

Check (√) One	No Extent	A Little Extent	A Moderate Extent	A Large Extent	A Great Extent
A. How **knowledgeable** do you think you are about **ecomanagement strategies?**.					
B. How **skilled** do you think you are in your ability to use **ecomanagement strategies?**					

C. **Circle** the number of times you have done the following **ecomanagement actions** over the past six (6) months.

	NUMBER OF TIMES					
1. Used an alternative form of transportation (e.g. mass transit, bicycle, ski, car pooling).	0	1	2	3	4	5 +
2. Taken steps to reduce the energy used for heating, cooling, and/or lighting.	0	1	2	3	4	5 +
3. Taken steps to reduce water use.	0	1	2	3	4	5 +
4. Taken steps to improve wildlife habitat or food supplies (e.g., plant trees or flowers; build bird houses or feeders).	0	1	2	3	4	5 +
5. Recycled materials such as paper, glass, plastic, metals, or organic refuse.	0	1	2	3	4	5 +
6. Picked up litter or trash.	0	1	2	3	4	5 +
7. Taken steps to mitigate recreational damage in wilderness area	0	1	2	3	4	5 +
8. Other: _____	0	1	2	3	4	5 +
9. Other _____	0	1	2	3	4	5 +

2. The terms Consumer Action and Economic Action refer to those environmental actions in which people use monetary support or financial pressure to help prevent or resolve environmental issues. Examples: (1) avoid buying products with excessive packaging;
(2) boycotting products which damage the environment or have a poor environmental record;
(3) purchasing products in reusable or recyclable containers.

Check (√) One	A Little Extent	A Moderate Extent	A Large Extent	A Great Extent
A. How **knowledgeable** do *you think* you are about **consumer/economic action strategies?**				
B. How **skilled** do you think you are in your **ability to use consumer/economic action?**				

C. **Circle** the number of times you have done the following **consumer/economic actions** over the past six (6) months.

	NUMBER OF TIMES					
1. Purchased products packaged in reusable, returnable, refillable or recycled containers.	0	1	2	3	4	5 +
2. Avoided buying products with non-biodegradable, non-recyclable, **or** excessive packaging.	0	1	2	3	4	5 +
3. Stopped buying products which can have harmful environmental effects (e.g., aerosols, Styrofoam, toxic chemicals, pesticides).	0	1	2	3	4	5 +
4. Paid membership fees to or donated money to conservation/environmental groups	0	1	2	3	4	5 +
5. Avoided purchasing products directly associated with damage to wildlife or their habitats.	0	1	2	3	4	5 +
6. Purchased products made in whole or in part from recycled materials (e.g. paper, plastic products)	0	1	2	3	4	5 +
7. Other _____	0	1	2	3	4	5 +
8. Other _____	0	1	2	3	4	5 +

3. The term **Persuasion refers to those environmental actions in which individuals or groups appeal to others to help prevent or resolve environmental issues.** Examples would be things like: (1) encouraging your family to save energy by adjusting the thermostat or turning off lights not in use;(2) making a presentation to a local group about action strategies regarding environmental issues; (3) talking to other wilderness users regarding leave-no-trace actions; (4) lobbying groups to support environmental protection measures; (5) writing letters to the editor regarding community issues.

Check (√) One	No Extent	A Little Extent	A Moderate Extent	A Large Extent	A Great Extent
A. How **knowledgeable** do you think you are about **persuasion strategies?**					
B. How **skilled** do you think you are in your ability to use **persuasion strategies?**					

C. **Circle** the number of times you have done the following **persuasion actions** over the past six (6) months.

	NUMBER OF TIMES					
1. Encouraged others to help the environment (e.g., to recycle, buy recyclable or recycled products, to remove a fire-ring in wilderness, conserve energy, use rapid transit, etc.).	**0**	**1**	**2**	**3**	**4**	**5+**
2. Prepared and/or publicly distributed literature supporting a "pro" environmental position or action.	**0**	**1**	**2**	**3**	**4**	**5+**
3. Signed or distributed a petition asking a person, group, agency, or company to take an action to improve the environment.	**0**	**1**	**2**	**3**	**4**	**5+**
4. Encouraged an individual, agency or a group involved in some kind of destructive environmental behavior to stop that activity.	**0**	**1**	**2**	**3**	**4**	**5+**
5. Wrote a letter to or encouraged a person, group, agency, or company to stop an activity, or to take an action, for the purpose of improving the environment.	**0**	**1**	**2**	**3**	**4**	**5+**
6. Other _____	**0**	**1**	**2**	**3**	**4**	**5+**
7. Other _____	**0**	**1**	**2**	**3**	**4**	**5+**

4. The term **Political Action refers to those environmental actions in which people use political means**(e.g. political processes, organizations parties, or offices) to **help prevent or resolve environmental issues.** Examples would be things like: (1) writing letters to elected officials asking them to support the way you think they should vote; (2) campaigning for those with "pro" environmental voting records; (3) voting for environmental protection measures;
(4) joining or helping a political group/party which supports environmental protection.

Check (√) One	No Extent	A Little Extent	A Moderate Extent	A Large Extent	A Great Extent
A. How **knowledgeable** do you think you are about **political action strategies?**					
B. How **skilled** do you think you are in your ability to use **political action strategies?**					

C. **Circle** the number of times you have done the following **political actions** over the past **six (6) months.**

	NUMBER OF TIMES					
1. Passed out materials **or** gathered signatures in support of "pro" environment policies or legislation (e.g., flyers, petitions)	0	1	2	3	4	5 +
2. Supported **or** voted for a "pro" environment candidate.	0	1	2	3	4	5 +
3. Supported **or** voted for a "pro" environment laws, or programs.	0	1	2	3	4	5 +
4. Participated in political meetings or hearings concerning environmental policies or plans (e.g., city council meetings, public hearings)	0	1	2	3	4	5 +
5. Wrote letters to elected officials encouraging them to support environmental protection (e.g., legislation, funds for enforcement).	0	1	2	3	4	5 +
6. Ran for or served in any position with the intent of supporting the environment actions (e.g., advisory committee, city council, legislature, board of directors)	0	1	2	3	4	5 +
7. Other _____	0	1	2	3	4	5 +
8. Other _____	0	1	2	3	4	5 +

5. The term **Legal Action refers to those environmental actions in which people use to support or enforce existing laws which are designed to help prevent or resolve environmental issues.** Examples would be things like: (1) reporting cases of poaching, illegal hunting, wildland abuse, illegal plant/animal collecting to authorities; (2) initiating legal action against people responsible for serious environmental damage.

Check (√) One	No Extent	A Little Extent	A Moderate Extent	A Large Extent	A Great Extent
A. How **knowledgeable** do you think you are about **legal action strategies**					
B. How **skilled** do you think you are in your ability to use **legal action strategies?**					

C. Circle the number of times you have done the following **legal action strategies** over the past **six (6) months**

	NUMBER OF TIMES					
1. Reported pollution violations to authorities (e.g., littering).	**0**	**1**	**2**	**3**	**4**	**5+**
2. Reported violations of fishing, trapping, hunting laws or wildland use restrictions.	**0**	**1**	**2**	**3**	**4**	**5+**
3. Reported the illegal collection of live plants or animals to authorities (e.g., in parks, preserves, wilderness sanctuaries).	**0**	**1**	**2**	**3**	**4**	**5+**
4. Persuading others not to break environmental laws or Leave-No-Trace ethics or informing others that they are breaking suc laws.	**0**	**1**	**2**	**3**	**4**	**5+**
5. Helped authorities patrol areas for the purpose of enforcing environmental laws.	**0**	**1**	**2**	**3**	**4**	**5+**
6. Provided information for or testimony at a legal hearing on an environmental issue	**0**	**1**	**2**	**3**	**4**	**5+**
7. Other _____	**0**	**1**	**2**	**3**	**4**	**5+**
8. Other _____	**0**	**1**	**2**	**3**	**4**	**5+**

IMAGE EVALUATION TEST TARGET (QA-3)

150mm

6"

APPLIED IMAGE . Inc
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