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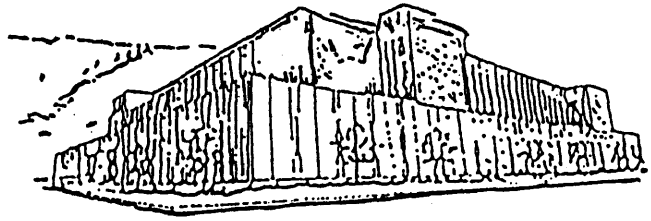
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Wilderness and the Internet:  
A Profile of Adopters of the World-Wide-Web as a Wilderness  
Information Acquisition Tool.

by

Charles D. Burgess

B.A, Anthropology, State University of New York at Plattsburgh

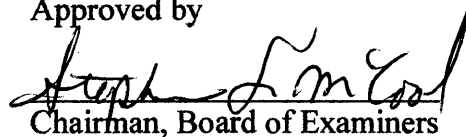
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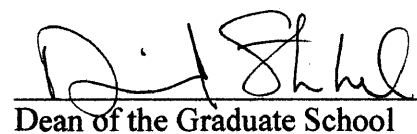
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Charles Burgess, M.S. 1998 Recreation Resource Management

Wilderness and the Internet: A Profile of Adopters of the World-Wide-Web as a Wilderness Information Acquisition Tool. (pp. 107)

Committee Chair: Stephen F. McCool, Ph.D. 

The Wilderness Act of 1964 mandates the federal agencies that manage designated wilderness areas to gather and disseminate information regarding their use and enjoyment. The World-Wide-Web, or web as it is commonly known, has shown exponential growth since its inception, and has been identified as a low-cost medium for information dissemination. A web-based survey was conducted online from January to November 1997 to determine characteristics of current web users and their perceptions of the web. The study sought to determine respondent characteristics most important in determining rate of adoption of the web using the theory of Diffusion of Innovations as the theoretical framework.

Study results indicate that the degree to which an individual is exposed to mass media resources such as newspapers, magazines, and professional journals, they are more likely to adopt the use of the web at a quicker rate. Additionally, the degree to which individuals perceive the web to be compatible with their norms and values influences the adoption of the web as an information medium. Although numerous hypotheses were not supported by the data for this study, alternative plausible hypotheses are presented and discussed.

Wilderness managers can use the results of this study as an impetus to provide training to employees on web use since respondents reported that the web is often difficult to use and that new skills are required to use it. Agencies should also take a greater lead in developing online information resources to ensure information available is accurate, up to date and meets the needs of wilderness managers. A potential caution raised in the literature that the web may not be an appropriate medium for disseminating wilderness information is not supported by the results of this study. The results indicate that respondents are comfortable with accessing wilderness information via the web. If reaching as broad an audience as possible with the goal of generating increased awareness and creating more proponents for wilderness protection is considered valuable to managers, they should embrace the web as a powerful medium available to reach that goal.

# Table Of Contents

<b>CHAPTER 1 .....</b>	<b>1</b>
<b>INTRODUCTION .....</b>	<b>1</b>
<i>The Rise of the Internet .....</i>	<i>3</i>
<i>Statement of the Problem .....</i>	<i>6</i>
<i>Objectives .....</i>	<i>7</i>
<b>CHAPTER 2 .....</b>	<b>9</b>
<b>CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW.....</b>	<b>9</b>
<i>Definitions .....</i>	<i>9</i>
<i>Stages in the Adoption Process.....</i>	<i>10</i>
<i>Behaviors Associated with Stages in the Adoption Process.....</i>	<i>13</i>
Knowledge.....	13
Persuasion.....	15
Decision Stage.....	16
Implementation Stage .....	17
Confirmation Stage.....	18
<i>Overview of Adoption Process – Attributes that Influence Adoption .....</i>	<i>18</i>
Interactive vs. Non-Interactive Innovations.....	21
Factors Affecting Rate of Adoption .....	22
Characteristics of the Decision-Making Unit.....	23
Perceived Characteristics of the Innovation.....	24
Unit of Analysis .....	26
<i>Adoption Studies and Applications in Recreation.....</i>	<i>27</i>
<i>Diffusion of Innovations - Application to the Problem.....</i>	<i>28</i>
<i>Summary of research hypotheses.....</i>	<i>34</i>

<b>CHAPTER 3 .....</b>	<b>35</b>
<b>STUDY METHODS.....</b>	<b>35</b>
<i>Introduction .....</i>	<i>35</i>
<i>Using Computers to Aid in Survey Research.....</i>	<i>35</i>
Overview of Computer Mediums Used in Survey Research.....	36
Data Quality in a Computer Survey Environment.....	37
<i>Technological Possibilities.....</i>	<i>37</i>
<i>Visible Presence of the Computer.....</i>	<i>39</i>
<i>World-Wide-Web Surveys.....</i>	<i>41</i>
Using Electronic Mediums for Survey Research in an Era of Change.....	46
<i>Population and Sample .....</i>	<i>46</i>
<i>Sources of Variation.....</i>	<i>46</i>
<i>Study Design.....</i>	<i>47</i>
<i>Procedures.....</i>	<i>49</i>
Operational definitions.....	49
<b>CHAPTER 4 .....</b>	<b>50</b>
<b>CHARACTERISTICS OF THE SAMPLE / HYPOTHESIS TESTING .....</b>	<b>50</b>
<i>Sample Characteristics.....</i>	<i>50</i>
Discussion .....	54
<i>Preparation of Data for Hypothesis Testing.....</i>	<i>55</i>
Skewness of Data.....	57
Preliminary Analysis of Data.....	59
Multi-Modality of Data.....	60
Categorization of Adopters.....	60
<i>Standard Deviation Method.....</i>	<i>61</i>
<i>Percentile Method of Categorization.....</i>	<i>62</i>
<i>Hypothesis Testing.....</i>	<i>64</i>
Controlling For Respondent Characteristics .....	65



Accounting for “Thin Cells” and Too Many Categories .....	65
<i>Hypothesis One</i> .....	67
<i>Hypothesis Two</i> .....	69
<i>Hypothesis Three</i> .....	70
<i>Hypothesis Four</i> .....	70
<i>Hypothesis Five</i> .....	71
<i>Hypothesis Six</i> .....	73
<i>Hypothesis Seven</i> .....	74
<i>Hypothesis Eight</i> .....	75
<i>Hypothesis Nine</i> .....	76
<i>Hypothesis Ten</i> .....	77
<i>Hypothesis Eleven</i> .....	79
<i>Hypothesis Twelve</i> .....	80
<u><i>Summary of Hypothesis Testing</i></u> .....	82
<b>CHAPTER 5 .....</b>	<b>86</b>
<b>DISCUSSION .....</b>	<b>86</b>
<u><i>Introduction</i></u> .....	86
<u><i>The applicability of the diffusion of innovations model for this study</i></u> .....	86
<u><i>Methodological factors</i></u> .....	87
Measurement factors .....	88
Variable selection .....	90
<u><i>Situational factors</i></u> .....	92
Utility of the web at the time of survey .....	92
Changing perceptions of relative advantage. ....	93
<u><i>Implications for managers</i></u> .....	94
Training and development .....	95
Personnel issues .....	96
Sensitivity issues .....	97
<u><i>Future research</i></u> .....	97

<b>LITERATURE CITED .....</b>	<b>100</b>
<b>APPENDIX I, THE ONLINE SURVEY .....</b>	<b>105</b>

## **TABLES AND FIGURES**

Figure 1.	Growth of the web since 1993 (Powell, 1997) .....	5
Figure 2.	A model of stages in the innovation-diffusion process (adapted from Rogers, 1995) .....	12
Figure 3.	The Cumulative Rate of Adoption for a Non-Interactive and an Interactive Innovation. ....	19
Figure 4.	Adopter categorization on the basis of innovativeness .....	22
Figure 5.	Factors affecting rate of adoption .....	23
Table 1.	Earlier adopters compared to later adopters (Watson, 1980, adapted from Muth and Hendee, 1979 and Rogers, 1995).....	25
Table 2.	Highest education level completed among survey respondents, in percent...	51
Table 3.	Status of respondents.....	52
Table 4.	Institutional affiliation (agency or educational institution).....	52
Table 5.	Number of times respondents use the web per day .....	53
Table 6.	Perception of web, in percent .....	54
Figure 6.	Histogram of Number of Months .....	55
Figure 7.	Histogram of Adoption Score .....	58
Table 7.	Adopter categorization by the standard deviation method.....	62
Table 8.	Adopter categorization by the percentile method .....	63
Figure 8.	Histogram of Adoption Score with Categories Determined by Percentile Method .....	63

Table 9.	Highest education level completed among survey respondents, in percent (re-categorized).....	67
Table 10.	Web use (re-categorized) .....	67
Table 11.	Spearman Correlation test for Hypothesis one; earlier adopters will have more exposure to mass media than later adopters.....	69
Table 12.	Results of the Spearman Correlation test for Hypothesis two; earlier adopters will have a higher education level than later adopters. ....	70
Table 13.	Results of the Spearman Correlation test for Hypothesis four; earlier adopters will perceive the web to be quicker than later adopters.....	71
Table 14.	Results of the Spearman Correlation test for Hypothesis five; earlier adopters will perceive the web to be more efficient than later adopters.....	72
Table 15.	Results of the Spearman Correlation test for Hypothesis six; earlier adopters will perceive the web to be of higher quality than later adopters. ....	74
Table 16.	Results of the Spearman Correlation test for Hypothesis seven; earlier adopters will perceive the web to be less expensive than later adopters.....	75
Table 17.	Results of the Spearman Correlation test for Hypothesis eight; earlier adopters will perceive the web to be less time consuming than later adopters. ....	76
Table 18.	Results of the Spearman Correlation test for Hypothesis nine; earlier adopters will perceive the web to be more current than later adopters.....	77
Table 19.	Results of the Spearman Correlation test for Hypothesis ten; earlier adopters will perceive the web to be more accessible than later adopters.....	79

Table 20.	Results of the Spearman Correlation test for Hypothesis eleven; earlier adopters will perceive the web to be more compatible with their norms and values than later adopters. ....	80
Table 21.	Results of the Spearman Correlation tests for Hypothesis twelve; earlier adopters will perceive the web to be less complex than later adopters. ....	82
Table 22.	Summary of hypothesis testing .....	84

# Chapter 1

## INTRODUCTION

In 1964, the Wilderness Act (pl. 88-577) mandated that federal agencies administering the National Wilderness Preservation System provide information to the general populace. The act states:

“...there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by the Congress as "wilderness areas," and these shall be administered for the use and enjoyment of the American people in such 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, *and for the gathering and dissemination of information regarding their use and enjoyment...* [emphasis added]”

Since the Act was signed into law the agencies have used various methods to provide this information: interpretive exhibits at trailheads, brochures and pamphlets, videos and films, maps, and presentations to various user groups. With the goal of keeping costs down, wilderness managers have targeted their education efforts at those groups deemed in most need of the information, or they have positioned the information to reach the largest number of persons possible per dollar spent. Examples of this include outreach efforts to outfitters and backcountry horse user groups.

Given the importance placed upon providing information that will allow the federal agencies to fulfill their information-dissemination-mandate as efficiently as possible, a World-Wide-Web-based (web, as it is commonly known) wilderness information resource is being developed. This type of information resource is relatively new. The first step in its development was to conduct a survey that provided

a detailed profile of the intended audience for this information resource. The following types of demographic information were collected as part of this survey; age, gender, and employment sector. Respondents were also asked to rate the relative benefit of 35 different types of wilderness information, if it were available to them on the web. Additional information was collected from this survey that sought to better understand the spread of the web among various populations. The research described here is based upon the results of this portion of the survey.

A study of how web use has spread among wilderness professionals, students, and other interested persons is particularly important because society is changing rapidly to one that increasingly demands information. The web has emerged as an indispensable tool for the collection and retrieval of information. Understanding the communication processes and other factors that allow for the spread of innovative has important implications for developing long-lasting and effective information dissemination for wilderness information users.

The use of the web to retrieve information represents the adoption of an innovation. An innovation is defined as an idea, object or practice that is perceived as new by an individual or another unit of adoption (such as a firm, family, agency, etc.). Adoption of an innovation such as the web confronts us with a number of questions important in its use as an effective information dissemination tool. First, what are the characteristics of adopters of the web as an information resource? What is the rate of adoption (measured as the length of time one has used the web) of the web for various audiences attempting to seek wilderness information? Finally, can a relationship be

established between the rate of adoption of the web, the characteristics of adopters of the web, and respondent perception of the web as an information resource?

Effectiveness of the web as an information dissemination agent depends on developing knowledgeable responses to the above questions.

*Efficiency* is an attribute sought after by federal land management agencies in pursuit of methods to fulfill the Wilderness Act mandate to gather and disseminate wilderness information. Efficiency is an attribute of *relative advantage*, the degree to which someone believes an innovation is superior in some way to previous methods of achieving the same result. An example of this is using a word processing program on a personal computer rather than a typewriter. Many individuals believe word processors to be superior in many ways to typewriters. These reasons may include beliefs that a word processor allows for easier editing of documents, stores more user-defined templates into memory, and enables the use of many different fonts. These beliefs could be characterized as efficiency, cost effectiveness and versatility.

The following sections in this introductory chapter describe background information on the web, a statement of the research problem, and finally the objectives of the research.

### **The Rise of the Internet**

As society moves from the industrial revolution into the information age, more innovations arise every day. This constant barrage can be overwhelming. The rise of the Internet exemplifies an innovation fundamental to many social changes. The

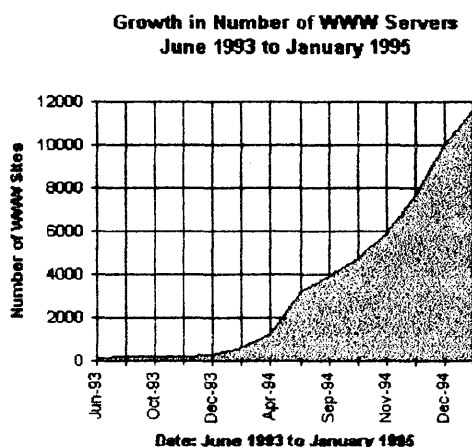


Internet began as Bitnet, an interconnection between university computers in 1981. It originally linked the City University of New York and Yale University. By the end of its first year, four more universities joined the network. When the University of California at Berkeley joined, the connection then spanned the United States. This made it relatively inexpensive for others to join. In 1985, Bitnet joined with Arpanet; a US Department of Defense electronic network. This network was developed during the cold war era to survive a nuclear attack. Arpanet was nearly invulnerable to attack because it was decentralized and spread across thousands of miles with numerous pathways for information to travel. The joining of Bitnet and Arpanet created the backbone of what we now know as the Internet (View from Internet Valley, 1997).

The web began as a small segment of the Internet. In 1990, two physics researchers were working at the European Particle Physics Laboratory (known as CERN) in Geneva, Switzerland. They were developing a system that would allow for the distribution of information across CERN's global computer network. They realized that one of the greatest impediments to information exchange across a network was the inherent complexity in converting electronic files for the many different systems that people use. Their goal was to create a single interface that users across all computer platforms could use (Powell, 1997).

The web has now evolved into a network of servers that transmit information across all major computer platforms and is accessible to anyone with access to a computer and modem. This information is linked both graphically and textually from

computers all over the world. What began initially with one computer at CERN in 1990 has grown from approximately 500 different web servers in late 1993, to over 11,500 a year later, as Figure 1 illustrates.



**Figure 1. Growth of the web since 1993 (Powell, 1997)**

The web has dramatically changed the way commerce, recreation, and information exchange has taken place the world over. For example, companies routinely sell goods and services through web site “stores”, with revenues exceeding 21 billion dollars in 1997 (Active Media Inc. 1988). Information for planning recreational trips abounds on the web with sites like GORP ([www.gorp.com](http://www.gorp.com)) leading the way. Purchasing plane tickets and comparing fares from several different airlines without the help of a travel agent is now possible through web sites like Expedia ([www.expedia.com](http://www.expedia.com)).

## **Statement of the Problem**

The main problem giving rise to this research is that managers within the federal agencies that administer wilderness areas believe using the web is an efficient means of meeting the Wilderness Act mandate for information dissemination. Given the speed at which information can be disseminated and retrieved via the web, and the relatively low-cost at which this can be accomplished, managers think that the web is an ideal solution to meet this mandate. Characteristics of the potential audience however, are relatively unknown. In order to effectively reach this audience (web users with a wilderness interest), a greater depth of knowledge is needed about them.

We have some sense of who currently uses the web on an overall basis (GVU 1996, MIDI 1996, Network Wizards 1996)<sup>1</sup>, but little data exists that describe subsections of the population of web users. A two-tiered research project to first determine information needs for the wilderness audience, and then learn why some will more readily adopt the web to find information than others was begun in December of 1996. The research described herein details the results of the second part of the study.

The diffusion of innovation literature offers a useful approach to not only profile adopters of the web but also to explain why some individuals are relatively earlier in adopting the web than others. To better understand adopters of the web, the overall question this research seeks to study is:

---

<sup>1</sup> These surveys all offer data collected through the medium of the web. Non-response bias has not been calculated, therefore we know the demographics of respondents, but can make no judgements about the entire population.

**Are there characteristics of individuals and perceived attributes of the web that will affect how relatively early someone will adopt the use of the web to collect wilderness information?**

### **Objectives**

To effectively answer the above question, the following objectives for the research are listed below.

- Determine the communication patterns and rate of adoption for adopters of the web.
- Determine the degree to which respondents feel the web has a relative advantage over other methods of collecting information.
  - Determine if relative advantage correlates with rate of adoption.
- Evaluate sociodemographic variables including occupation, gender, education level, and age to determine if they correlate with rate of adoption.

From these research objectives, two primary types of data have been identified as potential sources of providing insight into the diffusion process. First, what are the salient demographic characteristics, communication patterns and perceived relative advantage of the web among individuals interested in wilderness information?

Second, what is the relationship between the demographic characteristics identified,

the patterns of communication, the perceived relative advantage of the web and its subsequent rate of adoption?

## Chapter 2

### CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

The research described herein is based upon the theory of diffusion of innovations. The relationships between perceived characteristics of the web, characteristics of the decision-making unit, and the decision when to adopt are the focus of hypothesis testing.

#### **Definitions**

Diffusion is defined as “to scatter or spread about (Webster, 1995).” In the context of this research, diffusion refers to a social process whereby an idea or practice is spread from individual to individual or across groups and social networks. Specifically, this research will examine the spread of the web among the general public and wilderness managers.

An innovation is defined as an idea, object or practice that is perceived as new by an individual or another unit of adoption (Rogers, preface, 1995). The length of time since the idea, object or practice has been in use or since it was discovered is not relevant to this definition. Rather, it is the *perceived* newness to the individual that is important (Rogers, 1995). If it is considered new, it is an innovation. For the purposes of this research, the web is considered an innovation.

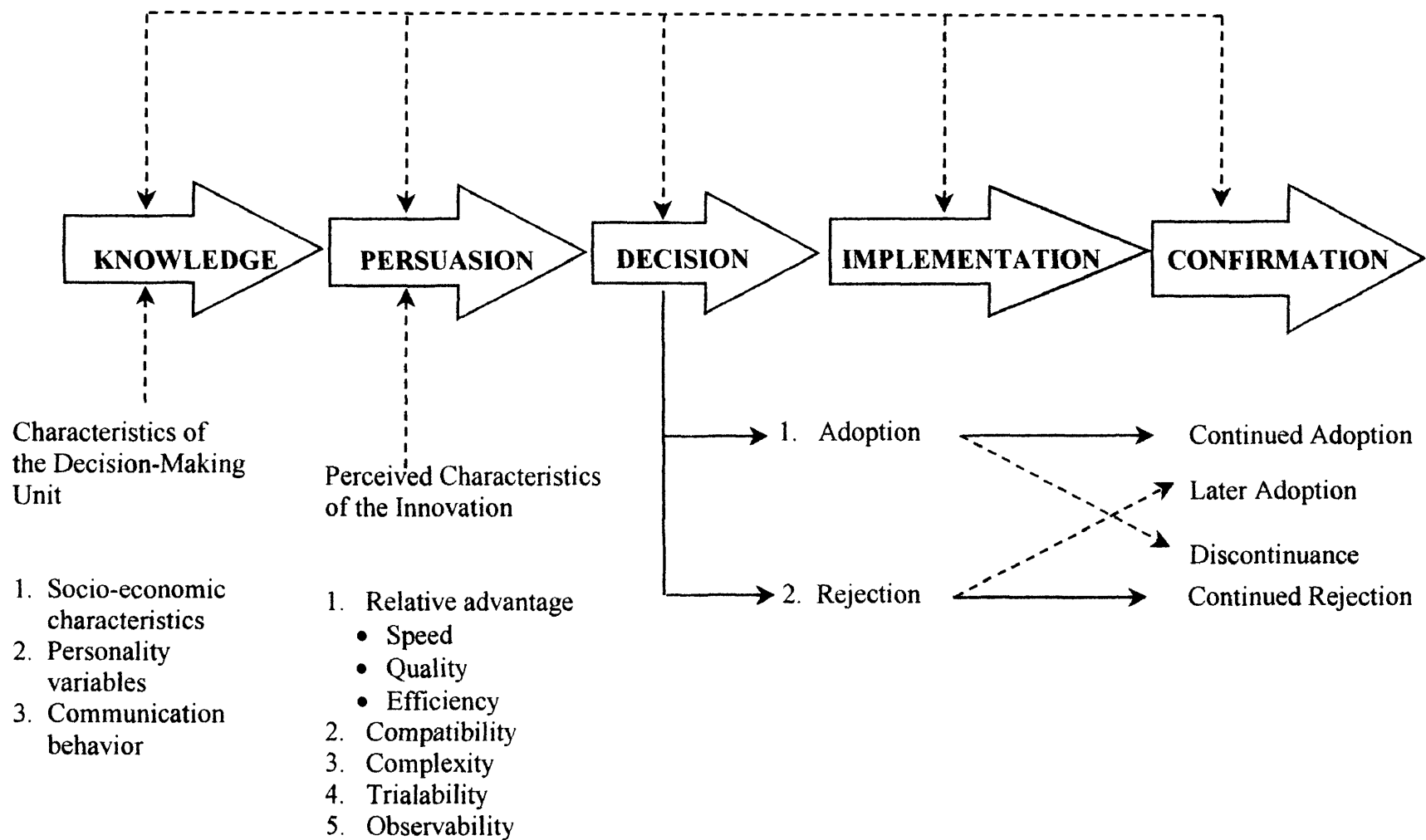
### **Stages in the Adoption Process**

The introduction of an innovation presents an individual or organization with new alternatives and means of solving problems. There is a degree of uncertainty concerning the extent to which the innovation is superior to previous methods of accomplishing the same tasks. This uncertainty will cause the individual to seek further information about the innovation to decrease the level of uncertainty (Rogers, 1995). For example, before purchasing a new pair of ultra-light weight hiking boots for backpacking (an innovation), an individual may be skeptical that the claims of manufacturers are in fact truthful. Because of the hardships involved with using heavy hiking boots, the individual may hope the claims are true and decide to conduct further research on the manufacturer claims by corroborating them with a third-party opinion. This process of seeking further information is an attempt to decrease the level of uncertainty associated with the manufacturer claims.

The adoption process is essentially an information-seeking and information-processing activity in which the individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation (Rogers, 1995). The decision to adopt an innovation is not made at any one point in time; rather, it occurs over time and contains certain actions and decisions. Rogers (1995) has identified five steps of the adoption process and laid out the framework of the conditions necessary for an innovation to be adopted or not. Beal and Rogers (1960), in their study of agricultural innovations and their adoption, started with initial hypotheses about the presence of these stages and discovered empirical evidence of their existence. Figure 2

graphically illustrates this process and the following section explains the stages in depth.





**Figure 1. A model of stages in the innovation-diffusion process (adapted from Rogers, 1995)**

### **Behaviors Associated with Stages in the Adoption Process**

Everett Rogers (1995) provides a description of behaviors normally associated with each stage. The following section paraphrases Rogers.

#### **Knowledge**

At the knowledge stage an individual is exposed to an innovation's existence and gains some understanding of how it functions. An individual's predisposition affects the reaction to messages about an innovation that are received. Individuals tend to be exposed to ideas that fit with their interests, needs and values. Hassinger (1959) identified this phenomenon as "selective exposure". The implications of this phenomenon for the present study indicate that the potential audience for wilderness information on the web will be more likely to adopt the web if their interests, needs and values do not conflict with the web. For example, some people may harbor a dislike for newer technologies like the web, even though their information needs may be best met through this medium. If the intended audience for wilderness information does not "selectively expose" themselves to the web, the literature suggests that they will be less likely to adopt it.

Knowledge about an innovation can influence a decision to adopt or not. There are three types of knowledge identified in the literature: awareness-knowledge, how-to-knowledge, and principles-knowledge.

Awareness-knowledge is information that an innovation exists. This will sometimes motivate an individual to seek more information about the innovation. This usually occurs at the knowledge stage but may occur at the persuasion or decision stages. An example of this may be viewing a short television commercial for a product, which piques the interest of a viewer, causing him or her to then call the telephone number that flashes on their screen and is repeated four times by the announcer to receive more information about the product.

How-to-knowledge consists of information or the skills necessary to use an innovation efficiently. Depending on the complexity of the innovation, the individual may seek more or less information. If not enough information is obtained to properly use the innovation as intended, the possibility of non-adoption or discontinuance is increased. For example, the purchase of a mini-satellite dish (DSS or Dish Network), is heralded by manufacturers and distributors alike as relatively inexpensive and simple to set up. However, faced with having to read three or more manuals, viewing an installation video, and grasping the principles of both geosynchronous orbiting and compass declination, many people will either decide to hire someone to install the dish professionally, or suffer through poor reception due to an improperly calibrated satellite connection.

Principles-knowledge is information that explains the fundamental basis on which the innovation is formed. Some individuals are more likely to adopt an innovation based upon a well developed understanding of the principles underlying its

function. Examples of principles-knowledge include the concept of photosynthesis which explains why trees grow and plate tectonics which can help explain why earthquakes occur (Rogers, 1995).

Contained within all three of these knowledge types is software information. This is information contained within the innovation that serves to reduce uncertainty about the cause-effect relationships that are involved in achieving a desired outcome (Rogers, 1995). An individual will usually ask how and why an innovation works. The purpose of asking these questions is to better understand the software information.

### Persuasion

At the persuasion stage, an individual forms a favorable or unfavorable attitude toward the innovation. The individual is generally motivated to seek innovation-evaluation information to reduce uncertainty about the innovation's expected consequences.

Using the example of the web, possible questions asked at the persuasion stage are, "Will there impacts, either positive or negative on my job performance or personal life, as a result of using the web?" and "What are the advantages and disadvantages of adopting the web?" Often this information will come from within the social network of the individual. A subjective evaluation of an innovation from a friend or co-worker is usually more highly valued than even a scientific report (Rogers, 1995).

### Decision Stage

The decision stage occurs when individuals engage in activities that lead to a choice to either adopt or reject the innovation. They may seek to make use of the innovation on a trial basis in order to judge its effectiveness or encourage others to make use of it. Marketing strategies that seek to disseminate a new product by making it available on a free trial basis, or by giving free trial samples away have been shown to be effective (Rogers, 1995). Innovations that can be used on a trial basis are usually adopted at a higher rate or at a larger scale than those that must be adopted sight-unseen.

Software companies have begun to take increased advantage of the to disseminate trial versions of new products. Many companies have engineered trial products to “expire” after a set time; usually 30 days. The advantages to both manufacturers and consumers alike is great. Before making a large investment in both time and money for a new product, anyone with a modem can acquaint themselves with the interface of a software product, evaluate the product, and make a more informed decision than ever before about its purchase.

The decision stage can lead to rejection as well as adoption. Two types of rejection have been identified. First, active rejection, which consists of considering the adoption of an innovation (by trial or otherwise) but ultimately deciding against this course of action. Second, passive rejection, is to reject the innovation without ever really considering using it.

Even after the decision is made to adopt or reject the innovation, an individual's mind can still change. An adopter can discontinue the use of the innovation and a non-adopter can later decide to adopt the innovation.

### Implementation Stage

The implementation stage occurs after the decision to adopt an innovation has been made. Questions that are asked at this stage are, "How do I make it work correctly?" and "If I have difficulties operating the innovation, how can I resolve them?"

Eventually the innovation will become so institutionalized that the individual will no longer think of it as having a separate identity. At this point the implementation stage can be considered at an end. An example of this is the television. Before ownership of televisions was widespread, only the wealthy had them in their homes. Implementing the use of a television in a home meant resolving where to place the television, when to view it, and what programming to watch.

Today, most American families have moved out of the implementation stage and developed norms around the viewing of a television. Many living rooms are arranged so that the television is the focal point, and it is quite common for a family to watch the television while eating meals or visiting friends.

### Confirmation Stage

The confirmation stage occurs when an individual seeks reinforcement of an innovation decision already made, or reverses a previous decision to adopt or reject the innovation if exposed to conflicting messages about the innovation. Some individuals may never progress into this stage, as they are perfectly happy with their decision to adopt or reject.

According to Rogers (1995), the confirmation stage is ultimately about trying to reduce what Festinger (1957) called cognitive dissonance. Leon Festinger was a social psychological researcher who reasoned that people strongly dislike inconsistency between their attitudes, or between their attitudes and their behavior, and seek to resolve that inconsistency.

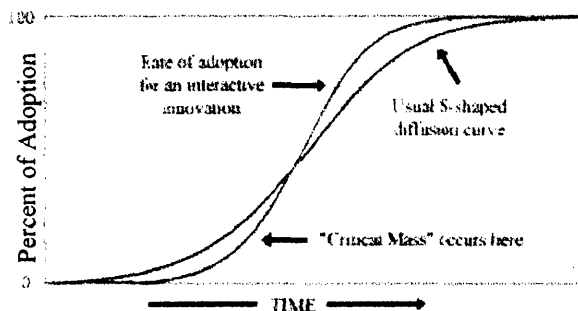
Seeking more information about the innovation in order to make a comparison between the innovation and an alternative is one way to reduce cognitive dissonance. An example of this is traveling to where the innovation was purchased and looking at alternative products to be sure that what was obtained matches the capabilities of similar products.

### **Overview of Adoption Process – Attributes that Influence Adoption**

The adoption process may be influenced by many factors including characteristics of the adopters and characteristics of the innovation itself. The

following section examines these influential factors using the adoption of microcomputers as an example.

When most innovations are first introduced, a somewhat eccentric and/or entrepreneurial group called innovators adopts it. This group is slightly outside the norm and may be considered odd by other members of society due to their acceptance of ideas and products out-of-the-mainstream (Rogers, 1995). Their perceived “oddness” may prevent them from possessing the necessary weight to drive large-scale adoption. It is usually necessary for change-agents or opinion leaders among the social system to embrace the innovation before any large-scale adoption can occur. They will step in next, thereby legitimizing the innovation and opening the potential for adoption to all members of the system. The next stage in an innovation's adoption is characterized by widespread adoption until such point that the innovation has saturated the social system and the rate of adoption tapers off. Diffusion researchers plot this process as an S-shaped growth curve (see Figure 3).



**Figure 3. The Cumulative Rate of Adoption for a Non-Interactive and an Interactive Innovation.**



The rise in use of microcomputers is a good example of the adoption process in action. When microcomputers were first introduced, the cost of purchasing them was considerable. Their high cost and the relatively low availability of useful software resulted in few people using this new innovation. Some people were intrigued by this new product and purchased it anyway. Some scientists and others immediately saw the advantages of using a microcomputer to organize information and conduct mathematical computations – advantages, they believed that would enable them to work faster or more efficiently. These persons are described by the literature as “innovators”.

As the power of microcomputers grew, the costs lessened, and the number and quality of software titles became more available, a new group described in the literature as “early adopters”, bought them. Within this group, certain individuals are very effective at persuading others about their purchasing decisions. The literature describes these individuals as “change agents”. Once the change agents collectively decided that microcomputers were products worth owning, their rate of adoption increased exponentially. Currently, the rate of adoption of microcomputers is still rising dramatically. Once the social system is saturated with computer owners, the rate of adoption may begin to taper off.

It is important to note here the difference between rate of adoption and rate of sales of a product. The two are not necessarily one and the same. Rate of adoption refers to the rate at which an individual or other unit of adoption first begins to use a

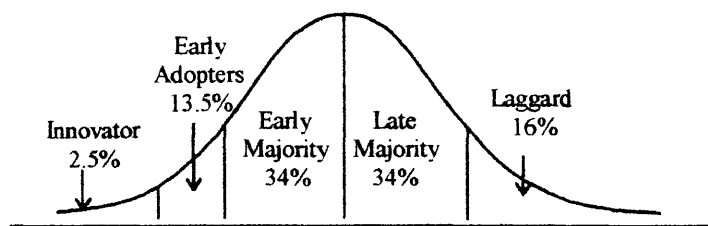
product that is *new* to them. Whereas rate of sales of a product refers to the rate at which a product or other item is bought by a consumer. Regardless of whether or not the consumer is replacing an older version of the same product or purchasing a product new to them. The rate of sales of computers may never be lessened due to the changes in technology which will precipitate constant upgrades. However, the rate of adoption will begin to taper off as the social system is saturated by new adopters.

### Interactive vs. Non-Interactive Innovations

An interactive innovation is one that individuals can exchange roles in and have some degree of control over (Williams, Rice and Rogers, 1988). These innovations are of little use to a single individual. Many people must make use of an interactive innovation for it to have utility. For example, the telephone was of little use to the public-at-large until more than one person was using it. Its value increased as the number of users increased.

Once a certain number of persons are making use of an innovation, it is said to be self-sustaining. This point is called a “critical mass”. The web is an interactive innovation because participants can communicate with one another through it, and build upon others’ discourse at the same time. The rate of adoption for an interactive innovation has been shown to have an S-shaped curve that is much steeper than non-interactive innovations (see Figure 3). This suggests that the adoption of the web among members of a social system will rise steeply as its members embrace its interactive features (Williams, Rice and Rogers, 1988).

The literature suggests that adopters of innovations can be categorized by their innovativeness (Rogers, 1995). Innovativeness is “the degree to which an individual or another unit is ... earlier in adopting new ideas than other members of a system.” (Rogers, 1995). One way to describe innovativeness is through the use of an adopter category scale (Rogers and Shoemaker, 1971). This scale measures the time at which an individual adopts an innovation compared to other adopters (see Figure 4). The center of the bell-shaped curve is the mean time of adoption. It is partitioned into units by the standard deviation of the mean.

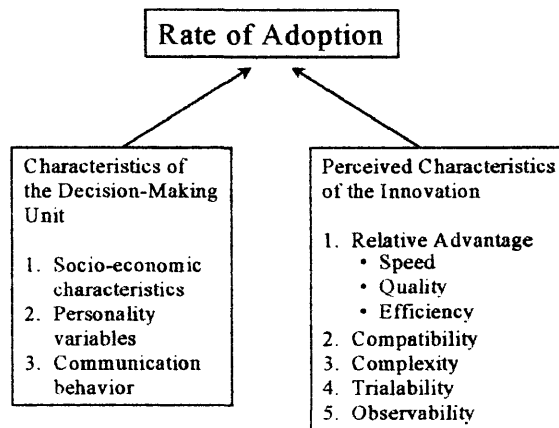


**Figure 4. Adopter categorization on the basis of innovativeness**

#### Factors Affecting Rate of Adoption

The point in time at which an individual (or another decision-making unit) will adopt an innovation can be influenced by many different factors. Among them are the characteristics of the decision-making unit and the perceived attributes of the innovation (see Figure 5). The relative importance of these factors in explaining the

rate of adoption will vary by individual and by group (organization, social system, etc.).



**Figure 5. Factors affecting rate of adoption**

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#### Characteristics of the Decision-Making Unit

Numerous differences often exist between earlier adopters and later adopters. These differences lie in personality characteristics, socio-demographic information, and channels of communication used to inform potential adopters. For example, earlier adopters of an innovation have been found to have higher social status, have achieved a higher level of education, and been more exposed to mass media than later adopters or laggards (Rogers 1961). Table 1 summarizes the results of many studies.

### Perceived Characteristics of the Innovation

Individuals (and other decision-making units), depending on how they perceive an innovation, will adopt at different rates. Perception is influenced by a number of characteristics; among them, the degree to which the innovation is perceived as:

- possessing a relative advantage over previous methods of achieving the same result;
- compatible with the norms and values of the individual;
- complex;
- able to be used on a partial basis without committing significant resources of time and money; and:
- possessing results that are observable to both the individual, and others.

**Table 1. Earlier adopters compared to later adopters (Watson, 1980, adapted from Muth and Hendee, 1979 and Rogers, 1995).**

Human Dimensions	Traits of Earlier Adopters
Social-Economic Characteristics	Not different in age More formal education More likely to be literate Higher social status Larger sized units (farms, etc.) Greater degree of upward social mobility More favorable attitude toward credit More specialized operations
	More empathetic Less dogmatic More abstract ability More rational More favorable attitude toward change More favorable attitude toward science Less fatalistic Higher motivation toward achievement Higher aspirations (for education, occupation, status, etc.)
	More cosmopolitan (outside contact) More contact with change agents More exposure to mass-media More interpersonal communication channels Seek more information about innovations Greater knowledge about innovations More opinion leadership More likely in social systems with modern vs. traditional norms More likely in well-integrated social systems
Communication Behavior	

Relative advantage, as mentioned earlier, is an important factor in explaining the rate of adoption of an innovation. Depending on the nature of the innovation,

relative advantage is defined by different concepts. Suggestions include; decrease in discomfort and savings in time and money.

### Unit of Analysis

Yin (1978) speaks of the “classic diffusion approach” as a social interaction approach. This approach to understanding the diffusion process focuses on communication processes among social networks and views diffusion as a process of learning among individuals. Given this view, individual innovativeness appears to be a key factor in the spread of an idea or technique through a social system. One problem with research of this sort is to determine which variables influence individual innovativeness within a particular social system. The number of such variables is perhaps 50 or 60 (Roessner et al. 1979). Rogers and Shoemaker (1971) have identified various demographic and socio-economic characteristics that they believe influence innovative behavior. Some of these are: age, education, social status, dogmatism, attitudes toward risk, social participation, cosmopolitanism, and exposure to interpersonal communication channels. Typically two-thirds of the studies support the importance of these variables; the remainder do not support them (Roessner et al., 1979). The individual researcher must identify the key variables and formulate study hypotheses on the basis of the unique nature of the particular social system of study, and the study subjects (Watson, 1980).

### **Adoption Studies and Applications in Recreation**

Though applied infrequently, the diffusion of innovations offers us a useful framework to explore the adoption and diffusion of new techniques in recreation management. The first such recreation-related application was Muth and Hendee's (1979, 1980) work, a position paper, which called for federal agencies to use the diffusion/adoption model to better understand the human dimensions of technology transfer. Watson contributed further to this body of knowledge with his (1980)<sup>2</sup> study in the transfer of Code-A-Site campsite monitoring techniques among recreation managers from the US Forest Service. As originally described by Hendee, et al. in 1976, the purpose of Code-A-Site is to provide for a continuing inventory system enabling managers to monitor changes in sites and the creation of new sites over time. Watson (1980) found that adopters of Code-A-Site participated in a greater number of professional meetings and conferences outside their region. Among adopters, those who were older with more job experience tended to adopt earlier. Identification of the characteristics of adopters and non-adopters by relative time of adoption proved useful to Forest Service administrators eager to spread what they thought were useful management tools to field-level personnel.

Schneider, Anderson and Jakes (1993) used the theory to identify important recreation management innovations and to determine their relative importance in meeting recreation management objectives. Their findings indicate that economic

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<sup>2</sup> Watson's research was later published in the Journal of Forestry with co-authors Roggenbuck, and Muth in 1983.



efficiency has little to do with whether or not an innovation is adopted. Rather, other benefits identified included providing support for management actions or improving the quality of visitor experiences.

Machlis and Harvey (1993), in their exploratory study of the diffusion of the Visitor Services Project (VSP) in US National Parks, used the diffusion of innovations model to develop principles that would guide in the development of sustained recreation research programs. This applied use of the diffusion model represents a significant and positive change in the diffusion of recreation research programs, but is as yet, untried.

Of the aforementioned diffusion studies and position papers, only those cited by Watson, and Schneider et al were developed with the so-called “classic diffusion approach” in mind (Yin, 1978). That is, they attempted to uncover the characteristics of either the adopters or the characteristics of the products or ideas that led to the individual decision to adopt or not adopt the innovation. Overall, diffusion research in the realm of recreation is still in its infancy. The following section describes the present research and how it will further contribute to diffusion studies in recreation.

### **Diffusion of Innovations - Application to the Problem**

The model of diffusion of innovations offers a framework within which research into the dissemination of the web can be better understood. Hypotheses

relating to adopters of the web as a wilderness information resource will be presented in this section and supporting literature will be discussed.

Rogers (1961) study on agricultural innovators found that farmers who read more research literature and farm magazines adopted innovations at a quicker rate. Mason (1964) studied the diffusion and adoption of three farm practices in an Oregon county and found significant differences in the types of information sources utilized during the various stages of the adoption process. He concluded by reporting that (1) the use of mass-media sources was higher at the awareness stage than for any other information source; (2) the use of mass-media sources was lower than for any other sources at the final adoption stage; (3) use of authoritative, peer, and commercial sources increased as farmers passed through the stages of the adoption process.

For a study on web adoption, we would expect, based on previous adoption studies that during the awareness stage exposure to mass media sources would affect the adoption rate in a positive manner. The literature does not specifically address if mass media sources are responsible for alerting the respondents to the innovation in question, or whether the respondents use of mass media sources as a daily or periodic information source underlies deeper personality characteristics. Although the literature does not specifically address the causality of the mass media phenomenon, Roger's 1961 and Mason's 1964 studies do indicate that exposure to mass media sources has a positive influence on adoption. Thus,

**H1. Earlier adopters of the web will have more exposure to mass media than later adopters.**

Rogers (1961) in his study of agricultural innovators, found that the higher the completed level of formal education, the faster the rate of adoption of certain farming practices. Achieved level of education may be indicative of a deeper psychological process that influences an individual's ability to evaluate complex situations and decisions. Again, the literature makes no judgements or recommendations whether education level achieved is ultimately responsible for earlier adoption, or whether there is a deeper psychological process responsible for this. Is the deeper psychological process the causal factor for this phenomenon, or is it simply that education level achieved is ultimately responsible for the higher rates of adoption? Whatever the ultimate underlying factor for this phenomenon, the literature makes clear that higher education levels have a distinctly positive correlation with earlier adoption rates. Thus, in relation to later adopters,

**H2. Earlier adopters of the web will have a higher education level.**

Watson in his study of code-a-site diffusion in among recreation land managers in the Forest Service (1980) found no discernible difference in age between adopters and non-adopters. Rogers (1995) reviewed 228 studies on this topic and found no relationship between age and innovativeness.

Judging by the fact that so many diffusion studies chose age as a possible factor in affecting rate of adoption, researchers in the past must have believed that an individual's age would either positively or negatively affect rate of adoption. This of course would depend on the population of study and the characteristics of the innovation (Yin, 1978). The lack of any conclusive findings in any of the studies researched by Rogers and Watson indicates that the same will be true of the present study. Thus, in relation to later adopters,

**H3. Earlier adopters of the web will be the same age.**

Rogers (1983), in discussing factors that affect the rate of adoption, points to five perceived attributes of an innovation that account for 49 to 87 percent of the variance in the rate of adoption. They are: relative advantage, compatibility, complexity, trialability and observability. Rogers (1995) further states that of the five aforementioned factors; perceived relative advantage lies at the root of the concept of diffusion research. Rogers states that the entire act of moving through the innovation-decision process is an effort to reduce uncertainty about the relative advantage of an innovation over a previous method of accomplishing the same task. A study of the adoption of the web should find a considerable amount of variance explained by relative advantage.

The following seven hypotheses relate to perceived relative advantage. Although the possible dimensions of perceived relative advantage are numerous,

operationalization of this concept should be guided by sorting out observations and measurements appropriate to the topic of study (Babbie, 1995). The function and context of the innovation will help to determine what types of criteria are used to operationalize relative advantage. For example, Schneider, et. al. (1993) determined that perceived economic efficiency had little to do with whether a recreation management innovation was adopted. Rather, the people who use the innovation perceive other benefits such as providing support for management actions or improving the quality of an experience, as more important. In the case of the web, the criteria deemed salient include perceived speed, perceived efficiency, perceived quality, perceived monetary expense, perceived accessibility, the degree to which the innovation is perceived to be up-to-date, and the degree to which the innovation is perceived to be time intensive. Thus, in relation to later adopters,

- H4. Earlier adopters will perceive the web to be quicker.**
- H5. Earlier adopters will perceive the web to be more efficient.**
- H6. Earlier adopters will perceive the web to be of higher quality.**
- H7. Earlier adopters will perceive the web to be less expensive.**
- H8. Earlier adopters will perceive the web to be less time consuming .**
- H9. Earlier adopters will perceive the web to contain more current information.**
- H10. Earlier adopters will perceive the web to be more easily accessible.**

Tarde is credited with first conceptualizing that the greater the perceived compatibility of the innovation with the norms and values of the individual, the greater the likelihood of adoption (Rogers, 1995). Machlis and Harvey (1993), in their exploratory study of the diffusion of the Visitor Services Project (VSP) in the National Parks, identified several features of the VSP that would make it attractive for adoption by National Park units. Among them, it could allow for comparison with other parks' results, the study period could be chosen by park staff based on management needs, and the results of the study could be made available to managers at key points in the budget/management cycle. Thus, in relation to later adopters,

**H11. Earlier adopters will perceive the web to be more compatible with their norms and values.**

Innovation complexity can be a severe detriment to adoption. If an individual or other decision-making unit perceives an innovation as intimidating to learn, the likelihood of adoption diminishes. Dewees and Hawkes (1988) provide empirical evidence of this in their study of the adoption of certain innovative commercial fishing practices and equipment. In the case of informational technologies, there is a perception among many that learning can be difficult and may require skills beyond their means. Thus, in relation to later adopters,

**H12. Earlier adopters will perceive the web to be less complex.**

### **Summary of research hypotheses**

The research hypotheses presented in the previous section examine the adoption of the web by comparing different types of adopters by several criterion. These hypotheses begin by examining characteristics of adopters, then progress to *perceived* characteristics of the web by adopters. The following paragraph provides a brief summary of the hypotheses.

The first three hypotheses explore adoption by examining characteristics of the adopters; exposure to mass media, education level and age. The next seven hypotheses use the concept of relative advantage to explore adoption. Specifically, this set of hypotheses examine adopters perceived quickness, efficiency, quality, cost, expense, time commitment, currentness and accessibility of the web instead of other available methods of finding wilderness information. The next hypothesis explores adopters perceived compatibility with the web. The last hypothesis examines the perceived complexity of the web by adopters.

## **Chapter 3**

### **STUDY METHODS**

#### **Introduction**

The purpose of this chapter is to first provide background on how researchers presently use some of the new technologies available to compile data and aid in the subsequent analysis. The present research utilized a web-based interface to collect data from respondents. As this type of data collection is relatively new, a discussion of its strengths and weaknesses is necessary. This chapter further details the study methods utilized in the present study to collect data from respondents, the design of the study, sources of variation, and statistical analysis.

#### **Using Computers to Aid in Survey Research**

The research described herein relies upon gathering respondent data from a survey conducted through a web site. As not only the technology, but also the methods employed are relatively new to the field of research, it is appropriate to provide an overview of these new methods. Computers can be used to not only gather information from respondents, but also to help analyze data. The following discussion examines how computers have been used to gather information from potential respondents.



As new forms of electronic media have been introduced to survey researchers over the past 15 years, researchers have had to decide on appropriate methodologies to join these new technologies to the traditional survey methods that have been used in the past. The existence of these technologies brings up several questions. First, what are these technologies and how might they be used? Second, what factors can affect data quality when using these new resources? And third, what are the repercussions for research and society as a whole as these new technologies disseminate to an ever-broader audience?

#### Overview of Computer Mediums Used in Survey Research

Several methods of using electronic mediums for survey research have been implemented over the past 15 years. These have been summarized under the global terms; CADAC (Computer-Assisted Data Collection), CASIC (Computer-Assisted Survey Information Collection), and CAI (Computer-Assisted Interviewing) (De Leeuw, et al., 1995). Implementing these methods depends on the aims of the researcher, the funding available, and the characteristics of the population to be sampled. Attributes that all three of these methods have in common are that questions are read from a computer screen, and responses are entered directly in the computer, either by an interviewer or by the respondent. For the purposes of this proposal, the term CADAC will be used to signify all of the different methods available.

### Data Quality in a Computer Survey Environment

The quality of data in any survey environment can be affected by many factors. These factors are often called “errors”. Groves (1989), in a review of survey errors, points out four sources of possible error: coverage, non-response, sampling and measurement error. Coverage errors occur when a portion of the sample population is excluded. Non-response errors occurs if non-respondents have different characteristics than respondents. Sampling errors occur when the sample chosen does not properly represent the entire population. Measurement errors come in two types, systematic error and random error. Systematic error occurs when the information we collect does not adequately reflect the concept we seek to measure. Random errors do not bias our measures, but instead make them inconsistent from one measurement to the next (Rubin and Babbie 1989).

According to Denny and Glavin (1993), computer-assisted interviewing has become popular because of the expectation that it will lead to better data quality than traditional methods. They have identified three a priori groups of factors that can have an influence over data quality: (1) the technological possibilities of computer hardware and software; (2) the visible presence of the computer; and (3) the effect of the computer on the interviewing situation. The following section details Denny and Glavin’s (1993) findings.

#### Technological Possibilities

De Leeuw et al. (1995) describes four advantages to using computer-assisted interviews over traditional paper and pen methods.

1. Routing errors can be diminished. If the system is configured correctly, data goes directly from interviewer (or the respondent themselves) to a database.  
  
Furthermore, problems in question ordering can be greatly diminished because the computer can display the next appropriate question to the respondent. The answer to one question may determine the next question to be displayed on the screen.
2. Data can be checked immediately. An ongoing summation of responses can be compiled at any time for quick calculations. Data can also be checked as it is input for correct responses. For example, if questions are ordered on a likert type scale, say 1-5, and the respondent answers 6, the program can provide immediate feedback to respondents telling them to correct the error. In a paper and pen survey, these checks must be done during the “cleaning up” stage and are usually recoded as missing data. The ability to correct data as it is collected should lead to higher quality data.
3. The computer offers new possibilities for formulating questions. Randomizing the order of questions in a scale for all respondents can decrease systematic question ordering effects. Furthermore, randomizing response categories can decrease recency effects. In the Graphics, Visualization, & Usability Center’s 1994 on-line survey of web users, the researchers point to their use of so-called “adaptive questions” as one of the great strengths of their project (GVU, 1995).
4. Interviewers are held more accountable. The knowledge that the system records information about the interview process (e.g. time and duration of interviews, and

the interval between interviews) inhibits interviewers from “cheating”. Computer-assisted interviewing allows a research organization greater control over the quality produced by interviewers.

A further advantage in addition to those mentioned by De Leeuw et al. is the ability to precode some of the responses to questions in an electronic survey. In a survey conducted through a web site, answers to close-ended questions (e.g. those questions on a scale) can have a preset code for each response that is input to the database rather than the actual response. For example, if the question asks about income and the respondent claims they make \$20,000-29,000 per year. The program can send a “2” to the database instead of the lengthy reply: “\$20,000-29,000”. This allows a researcher to skip a step in the analysis, that of coding responses. This can significantly speed up the time it takes between administering the survey and producing final results (Wherrett, 1997).

#### Visible Presence of the Computer

As with all new innovations, the visible presence of the computer will only have a temporary effect on respondents. As people become more and more accustomed to using a computer these effects will diminish. The literature does suggest however four effects the visible presence of a computer can have on the way respondents or the interviewers perceive the interview situation.

1. Less privacy. If the respondent is totally unfamiliar with computers, there could be a “big brother” effect. This effect is attributed to a belief that the computer is

watching them or somehow could be used against them (De Leeuw et. al. 1995, Martin and Nagao, 1989). This could ultimately lead to more refusals and socially desirable answers to sensitive questions.

2. More Privacy. Because the answers to questions are typed directly into computers, respondents may believe there is less chance of others reading it, thus the expectation of greater privacy. All survey methods, because they standardize interaction, reduce social context information beyond that which we experience in normal everyday life (Kiesler and Sproull, 1986). Short et al., (1976) and Kiesler et al. (1984) believe that the reduced social context information inherent in electronic surveys will create a setting that is impersonal and therefore respondents will open up more and become less concerned with social norms.
3. Compliant respondents. An interviewer who feels confident using a computer for an interview may create more confidence for the respondent in the interviewing procedure.
4. Novelty effects. Society's fascination with computers can have an influence on its willingness to respond. If a home computer is given to respondents to answer survey questions, the newness of the computer and the appreciation of receiving the computer should make them more likely to respond. Disk-by-mail surveys, electronic mail surveys, and web surveys all have a strong novelty effect on respondents and could increase their willingness to respond.

### World-Wide-Web Surveys

There are several technical matters to be considered when undertaking an World-Wide-Web-based questionnaire. The Hypertext Markup Language (HTML) that is used by all web “browsers” is constantly evolving. Formatting tags change rapidly, with many tags not functional in earlier versions of web browsers. The questionnaire must be designed to be compatible with a range of versions of browsers, recognizing that many users will not have access to the latest version.

The time to process each page must also be considered; graphically intense pages may take an extremely long time to load. The formatting is somewhat limited compared with the capabilities of a survey created with a word processing program. Therefore, the design and content of a web page, coupled with the power of both the server and the user’s computer, may test the tolerance of the user to delays during the completion of the survey. A consequence of a poorly designed questionnaire would be a low response rate, particularly from those for whom there was an unacceptable delay in downloading any images on the page (Wherrett, 1997).

Conducting a survey through a web site closely resembles that of a survey in a magazine. In general, the sample will consist of only those respondents who happen across the survey and choose to fill it out. The following articles describe research conducted through on-line web surveys.

Wherrett (1997) studied landscape preferences through the use of a web survey. The researcher posted the survey on a web server and through the use of

newsgroups, bulletin boards, and personal communication, advertised its existence.

Wherrett summarizes the benefits of using the web as a survey tool by stating that

The use of electronic media to undertake a questionnaire means data from the replies does not have to be manually input into a database, it can be sent automatically. The use of this media also allows few or several versions to be run simultaneously, and changes to the questionnaire to be made with relative ease. Once set up, it is far less time consuming to run than a traditional postal or personal interview.

Wherret's results indicate that there is no statistically significant difference in responses between international users and those based in Scotland (where the survey originates). There is also no significant difference between respondents based on the computer monitor and resolution used to view the survey. These results indicate that within a self-selected sample frame there is some degree of confidence in the degree of generalizability of research results afforded by this method.

Log files are computer-generated files that are compiled by a web server as persons log on to a web site. They contain descriptive information about the web site visitor, including type of web browser used, computer platform used, numbers of times individual pages were accessed, length of time accessed, country of origin of visitor, and domain names. Domain names indicate the origin of visitors, for example, educational institutions (.edu), private internet service providers (.org, .net), private companies (.com), or government agencies (.gov). Wherrett (1997) was able to collect demographic information beyond the questions asked on the landscape preference by using log files to categorize respondents by country of origin. In addition, a somewhat crude response rate was calculated by dividing numbers of visitors to the introduction

page by numbers of respondents to the complete survey. The response rate calculated was 41.4%.

Abrams and Williams (1996) provide an in-depth examination of log file formats, their use in research, and ethical and privacy issues that have yet to be addressed by the Internet community through the creation of standards. They found that although log files may be a great source of demographic information about respondents, many people do not want such information to be collected without their knowledge. As software developers devise new methods to give web users increased anonymity, programs may be created whereby information transmitted to log files may be intentionally changed to protect the privacy of web users. Log file analysis may therefore become obsolete in the future.

In an examination of individuals who used the web to access a database of U.S. government publications, an email and web based survey was conducted (Boncheck, et al., 1996). The research sought to better understand the people who use a new source of political information enabled by the Internet. They further sought to understand the demographics of the users, their uses of the information, and the effects of this access on their political activity. Their results indicate that the web can improve the democratic process by enabling citizens easier access to political documents, political representatives, government agencies and each other. They caution though that this access is only available to users of these media who are already privileged and politically active.



The present study, because of its reliance on access to expensive computer equipment is fraught with the same problems detailed by Boncheck, et al. (1996). The present study excludes those without access to the necessary monies to purchase expensive technology, and those without knowledge on how to use technology they have access to. Furthermore, some individuals who harbor a dislike for computers, may have chosen to not become a respondent, even though they were notified of its existence. The exclusions listed above could potentially introduce pro-technology, and economic class biases into the analysis results.

World-Wide-Web survey researchers will often use the Graphics, Visualization and Usability (GVU) World-Wide-Web User Surveys to compare the demographics of their sample to the demographics of the entire population of web users. The results of these surveys have been made available through the web since 1991 (<http://www.cc.gatech.edu/gvu>). Although many entities have attempted to collect data on all users of the web (Mids, 1996, Network Wizards, 1996), Gvu surveys are the only ones endorsed by the World-Wide-Web Consortium. This entity exists to develop common standards for the evolution of the web and CERN, where the web originated (Segal, 1995, Kardas and Milford, 1996). Because of this endorsement and the high degree of publicity given to Gvu, their surveys have become the defacto standard. The sample for these surveys are the largest of their kind (the 1996 survey had over 15,000 respondents) and use the latest in technological advancements to ensure their sample fill the survey out only once. They also use several methods to

maximize the chances that their respondents do represent the larger web population (Kehoe and Pitkow, 1996).

The GVU surveys use the following methods to ensure the greatest number of web users as possible receive notification of the existence of their survey:

- Links to the survey from high-exposure, general-interest web sites, such as NCSA's "What's New," Yahoo, Lycos, CNN, etc.
- Announcements on web and Internet-related Usenet newsgroups
- Coverage in national and local newspapers and trade magazines
- An announcement on the web-surveying mailing list that is maintained by GVU for users who would like to be notified about GVU survey activities.

The authors admit however, that even the results of their complex methodology may not adequately be generalized to the entire population of web users, as the web does not yet have a mechanism or a way of registering every individual user. This makes it impossible to draw a random sample from a complete, or nearly complete, list of web users. The results of their research do match results of random surveys of web users compiled through telephone surveys though.

### Using Electronic Mediums for Survey Research in an Era of Change

Using electronic mediums for survey research involves the use of new methodologies that will continue to evolve as the mediums themselves evolve. Problems of generalizability and access exist for many of the methods listed here but these same problems have always existed since surveys were first conducted (Babbie, 1995). At one time, few people had access to telephones, so surveying through this medium had serious drawbacks. It is projected that one day most people will have access to computers and computer networks (Gates, 1996). This of course is very far off in the future. These methods will disseminate very slowly to underdeveloped countries and even in developed countries there will always be a small segment of the population who will do without.

### Population and Sample

The target population for this study is individuals interested in receiving wilderness information via the web. The study population and sample consists of respondents to the on-line survey located at <http://wilderness.net/survey.htm> from January through November 1997 (see Appendix 1).

### Sources of Variation

The independent variables used for hypothesis testing include: 1) perceived characteristics of the web, 2) socio-demographic variables including age and education level, 3) communication channels used to gather information about the web, 4) respondent's perceived characteristics of the web including relative advantage,

compatibility, and complexity. The dependent variable for the study is the length of time since the respondent began to use the web.

Sources of variation may also be present in the form of sampling bias. This bias is present in the study because of the self-selected nature of the responses. The responses came via the web site that respondents viewed out of curiosity or because the researchers and agency personnel specifically requested they fill it out. Those respondents who heard about the site from internal agency means may already have the characteristics of one who is more cosmopolitan. The self-selection process also creates a problem of representativeness. Visitors to the site might differ in perceptions toward the Internet from those who choose not to visit or never became aware of it.

The possibility of non-response bias introduces another potential source of variation within this proposed research. Visitors to the on-line site who chose not to fill out the survey may differ in important ways from those who do. Because there is no procedure to monitor all visitors to the site, there is no way to contact non-respondents and determine if they are different from respondents. Although the use of log file analysis would be an appropriate method to accomplish this, these files were not collected at the start of the project.

### **Study Design**

Sampling of the population in this study used a purposive method (Babbie, 1995). That is, respondents were chosen based on the research aims and the judgement of the researchers. Because it is not possible to randomize selection of all

individuals interested in receiving wilderness information, a method has been developed to achieve responses from population segments of interest to the researchers (described in the Procedures section).

The data collection instrument was an on-line survey page included in the site <http://www.wilderness.net>. The instrument measured the following variables: perceived characteristics of the web, socio-demographic variables of respondents including age and education level, communication channels used to gather information about the web and wilderness, respondent's perceived characteristics of the web and finally its rate of adoption.

Two pretests of the survey instrument were conducted prior to collecting on-line responses. The first test, created on paper, explored the wording of the questions, the ability for respondents to answer them, and how well the questions addressed the hypotheses. The pretest was given to individuals attending two conferences; the Montana Recreation and Parks Association Conference and the Association of Experiential Education Conference. The second pretest was conducted online through a web site address given out to persons acquainted with the researchers who were known to have an interest in both research and wilderness. The results of these pretests suggested that the survey was too lengthy, the wording of some of the questions was unclear, and it would be necessary to narrow the research focus.

## **Procedures**

The procedures employed for the online survey attempted to increase the number of respondents as much as possible. Listservs (bulk electronic mail services) were utilized to broadcast the existence of the survey to the widest audience possible. Listservs were chosen which contained wilderness and outdoor themes. Follow-up reminders to the same listservs were sent out periodically. In addition to this sample, contacts within the federal agencies broadcast through their own electronic mailing channels the existence of the survey in order to create interest.

## **Operational definitions**

*Education level* refers to the highest level of education achieved by respondents. *Rate of adoption* is measured as the number of months prior to completing the online survey that respondents have used the web. *Innovativeness* refers to the combination of characteristics, perceptions of the web, and other factors which contribute to an individual's rate of adoption.

## **Chapter 4**

### **CHARACTERISTICS OF THE SAMPLE / HYPOTHESIS TESTING**

The purpose of this chapter is to first describe characteristics of the sample population for this study. This analysis is strictly a univariate one, that is, frequencies and percentages are used to describe individual variables in isolation.

The next part of the analysis involves computing bivariate correlations to determine if evidence exists of relationships between variables; in this case, number of months respondents used the web prior to responding to the survey and all of the other variables. The results of this analysis will form the basis of deciding if evidence exists to either reject or accept the study hypotheses.

#### **Sample Characteristics**

Sampling procedures resulted in 187 respondents participating in this study. Web survey respondents ranged in age from 19 to 65, with a median age of 40 years old. Males comprised 75.5 percent of respondents, while females made up 24.5 percent. Table 2 illustrates that respondents are well educated with 59.9 percent having completed their University or College degrees.

**Table 2. Highest education level completed among survey respondents, in percent**

Education Level	Percent	Cumulative Percent	N
Grade School	1.1	1.1	2
High School	0.5	1.6	1
Some Vocational/Technical School	0.5	2.2	1
Vocational/Technical Completed	13.4	15.6	25
Some College/University	6.5	22.0	12
College/University degree	33.9	55.9	63
Post Graduate Degree	44.1	100.0	82

Respondents were asked to identify themselves in terms of their vocational status<sup>3</sup>. Table 3 indicates that over 60 percent were affiliated with educational institutions, as either educators or students. The next most prevalent status was Land Manager (23%), followed by Other (21.4%), and Planners (15.5%).

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<sup>3</sup> The methods employed for the needs assessment specifically sought to attract the audiences listed. Since these audiences do not match any categorization scheme that respondents were expected to be familiar with, and they are neither mutually exclusive nor exhaustive, respondents were prompted with the eight categories listed in Table 3, rather than asked to provide their status in an open-ended fashion.



**Table 3. Status of respondents**


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Status	Percent <sup>4</sup>	N
Educator	34.2	64
Student	29.9	56
Land Manager	23.0	43
Other	21.4	40
Planner	15.5	29
Activist	12.3	23
Scientist	12.3	23
Lobbyist	0.5	1

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Respondents were asked to identify themselves in terms of their institutional affiliation. Table 4 indicates that over 36 percent were affiliated with educational institutions. The next most prevalent status was Other (39%), US Forest Service (15%), followed by National Park Service (6.9%).

**Table 4. Institutional affiliation (land management agency or educational institution)**


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Agency	Percent	N
Educational Institution	36.2	63
Other	33.9	59
US Forest Service	14.9	26
National Park Service	6.9	12
Bureau of Land Management	5.7	10
US Fish and Wildlife Service	2.3	4

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<sup>4</sup> The percent column of Table 3 adds up to more than 100 percent because respondents could choose more than one category for this question.

The majority of respondents use the web once per day (26.7%) as Table 5 indicates. Overall, 60.4 percent of respondents use the web at least once per day. Only 1.1 percent of respondents use the web once per month or less.

**Table 5. Number of times respondents use the web per day**

Web use	Percent	Cumulative Percent	N
Four or more times per day	12.8	12.8	24
Two to three times per day	20.9	33.7	39
Once per day	26.7	60.4	50
Three to five times per week	17.8	78.1	33
One to two times per week	14.4	92.5	27
Twice per month	6.4	98.9	12
Once per month or less	1.1	100.0	2

Respondents were asked their perceptions of the web by asking them to indicate the extent to which they agreed with several statements. Level of agreement was based upon a Likert-type scale of “Strongly Disagree” to “Strongly Agree”. “Don’t Know” was also offered as a possible response. Both the statements and a summary of the responses can be found in Table 6.

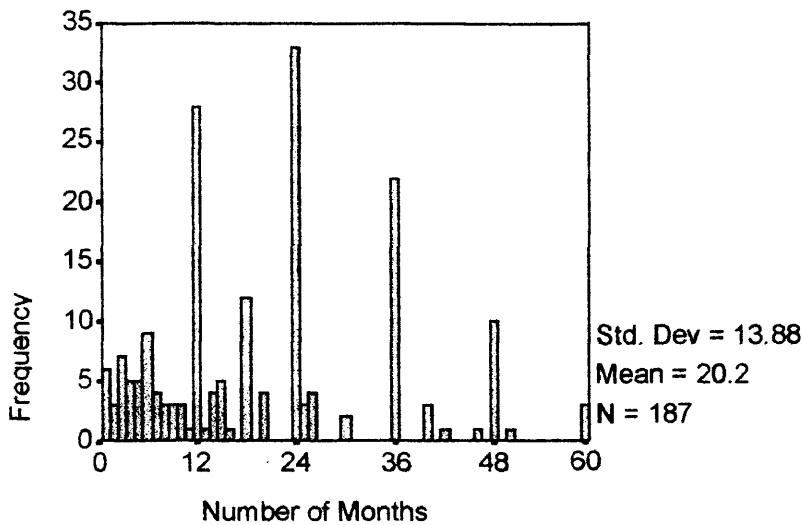
**Table 6. Perception of web, in percent.**

Respondent Perception of the Web	Don't Know	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Access to the web is easier than other information sources.	0.0	0.5	7.0	16.2	50.3	25.9
The web is too complicated.	0.0	30.1	49.2	13.7	5.5	1.6
The web contributes to more efficient professionals.	9.8	0.5	2.7	18.5	44.6	23.9
Using the web requires a large investment of money.	6.5	15.1	39.5	18.4	20.0	0.5
The amount of information on the web is overwhelming.	0.0	3.2	14.1	20.0	38.4	24.3
I prefer my information in digital form rather than paper format.	1.6	3.2	14.6	41.6	22.7	16.2
The general quality of information on the web is greater than other information sources.	4.9	8.2	23.5	41.5	17.5	4.4
Most people must develop new skills to be able to use the web.	1.1	3.2	23.2	15.7	45.9	10.8
Information is quickly retrieved using the web.	0.0	1.6	10.3	16.2	47.6	24.3
For most people, using the web requires a large investment of time.	0.5	10.3	39.7	16.8	29.3	3.3
There is a greater variety of information on the web compared with other information sources.	1.6	1.1	5.4	13.0	43.5	35.3
Information on the web is more current than most other sources.	4.3	0.0	7.6	17.9	51.6	18.5

The length of time respondents have used the web prior to responding to the online survey on average is 20.2 months (see Figure 6.) Significant increases in frequency can be noted at time intervals of 12, 24, 36 and 48 months. Although these increases may, in fact, reflect actual increases in the time periods specified, a more likely explanation is respondent error in the form of recall bias. In this case, respondents think in terms of years and not months. When prompted to provide information in terms of months, respondents instead take the approximate number of years they have used the web and multiply by a factor of 12.

### Discussion

Descriptive statistics tell us that the sample population is approximately 40 years old (median), is predominantly male (75.5 percent), and very well-educated



**Figure 6. Histogram of Number of Months**

(59.9 percent have completed a college degree). These findings are slightly different from those of the Graphics, Visualization and Usability Center's World Wide Web Study (1998). In this study, males comprised 71.6 percent of respondents, and 47 percent had completed a college degree. While the two studies cannot be directly compared to each other because of differing methods and intended audiences, the results indicate there is some evidence to suggest that seekers of wilderness information are more likely to be higher educated and male than the entire population of Internet users.

### **Preparation of Data for Hypothesis Testing**

Rogers (1961) hypotheses and treatment of data for analysis assumes that adoption of an innovation, over time, is normally distributed. Another assumption made by Rogers is that there will be equal numbers of data points in two adopter categories; early majority and late majority (34 percent in each). Also, Rogers assumes the total number of respondents in the categories, early adopters (13.5

percent) and innovators (2.5 percent), will approximately equal those in the laggard category (16 percent).

Respondent data shows considerable deviance from that which was expected. The adoption scale for this study, length of time using the web, deviates from the normal distribution in two important ways. First, the data is mildly positively skewed. Secondly, it is multi-modal with two percent of the data points (12, 24, 36, and 48 months) accounting for 49.7 percent of the total responses. Both of these deviations from the normal distribution present an immediate problem.

Using whole data is the preferred analysis method various reasons. First, transforming data by either linear or non-linear methods creates difficulties in making comparisons between studies, and between the original data and the results of statistical tests if the unit of measure has changed as a result of the transformation. Second, if data is grouped together to increase sample size in any particular category, information about respondents in the collapsed categories is lost (Babbie, 1995).

If an ordinal categorization scheme is used to transform whole data to ordered categories, certain assumptions are made that can be called into question. Specifically, the assumption that a data point falling on the outer boundary of one category is significantly different from the data point just beyond the outer boundary of the first category. However, if the distribution of data does not fit the hypothesized shape or

the methods used to gather the data preclude statistical testing with “whole” data, then using transformations and categorization must be entertained.

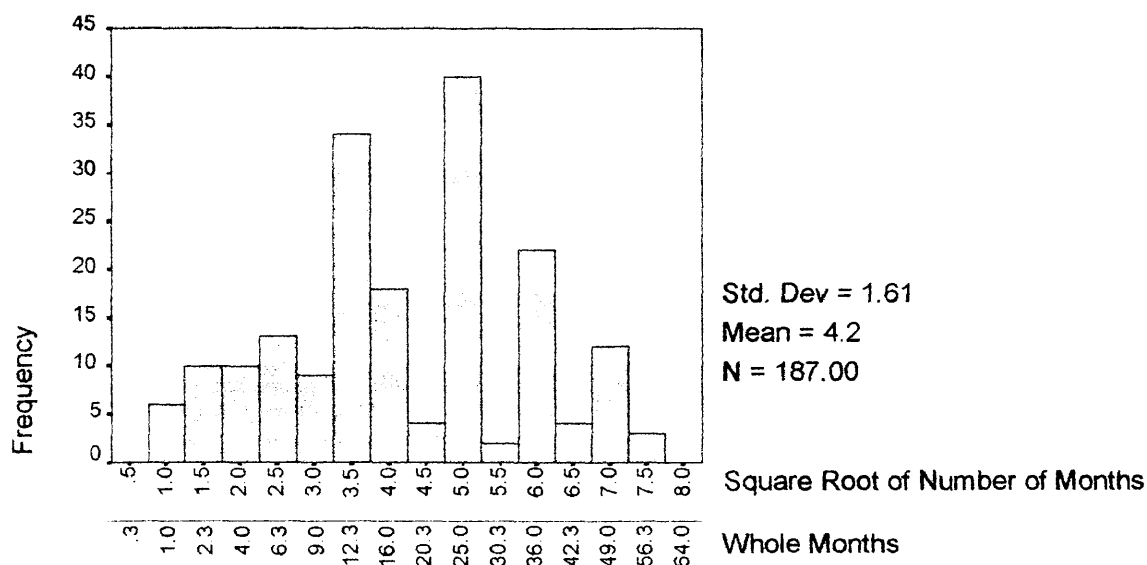
The methods described in the following sections to achieve a data set able to be tested with the original hypotheses were conducted only after considerable thought to the potential “loss” of information contained in the data. The resultant data set was manipulated only after weighing the costs of these methods on the ability to subsequently describe relationships between variables in the original units of measure.

### Skewness of Data

The distribution of data points (see Figure 6) for the data set is mildly positively skewed. This is problematic in that Rogers (1961) treatment of data for analysis assumes that adoption of an innovation, over time, is normally distributed. The literature suggests that the best method of preparing the data for further analysis in the event of mild positive skewness is to apply a non-linear transformation (Hamilton, 1990). A transformation is any mathematical change applied to data. An example of a simple transformation is converting hours into minutes, multiplying by 60. Such examples are linear transformations, which change the *scale* but not the *shape* of a distribution. Non-linear transformations change both the *shape* and the *scale* of a distribution.

Slight positive skewness is best controlled through a square root transformation (Hamilton, 1990). This transformation decreases the range of data

points and pulls on the upper tail of a distribution. Figure 7 shows the resulting distribution of the data after applying the square root transformation. Square root of number of months using the web is the *adoption score* that will be used for the remainder of this study as the main dependent variable.



**Figure 7. Histogram of Adoption Score**

The Kolmogorov-Smirnov one-sample test was utilized to test the hypothesis that the transformed adoption scores are normally distributed. This procedure compares the observed cumulative distribution function for a variable with a specified theoretical distribution, which may be normal, uniform, or poisson. The Kolmogorov-Smirnov Z is computed from the largest difference (in absolute value) between the observed and theoretical cumulative distribution functions. This goodness-of-fit test

assesses whether the observations could reasonably have come from the specified distribution (in this case, the normal distribution). Results of this test indicate the test statistic of .02 is less than the critical value of .099 at the .05 level of significance. Therefore, there is not sufficient evidence to suggest that the distribution of the 187 adoption scores is not normal.

### Preliminary Analysis of Data

Although the transformed distribution is now more normally distributed, it still shows signs of multi-modality. Before measures were taken to correct this potential problem, a preliminary analysis was completed to see the extent to which this multi-modality would affect the outcome of the analysis.

A Spearman Correlation Coefficient was computed for all of the hypotheses. This non-parametric method was selected because it makes no assumptions about homogeneity of variance or normal distributions in the sample data. The Spearman Correlation procedure is used to not only test for the presence of a linear association between two sets of data, but also to give some indication of the strength of that association (Noether, 1990).

The results of the test indicate only support for hypothesis number one. That is, the hypothesis that earlier adopters of the web will have more exposure to mass media than later adopters (H1), was found to have a statistically significant correlation. None of the other hypotheses were supported. The multi-modality of the



data was regarded as a potential factor for this outcome. Therefore, it was necessary to manipulate the data to mitigate this problem.

### Multi-Modality of Data

The main dependent variable, “length of time using the web,” measured in months, was intended to represent an interval measure of time. High frequencies of response for 12, 24, 36 and 48 months are noted. We would expect this interval level variable to be more normally distributed. Because variables to be tested for a relationship are interval (length of time using the web), and ordinal (education level, for example), the statistical test originally chosen to detect a relationship was the Spearman Correlation coefficient. This test looks for evidence of a relationship using ranks instead of whole numbers. Because much of the data falls on four points (12, 24, 36 and 48 months), it is necessary to first categorize the data into ordered categories, then treat length of time using the web as an ordinal variable instead of an interval variable.

### Categorization of Adopters

Two methods of adopter categorization were evaluated to determine which would result in categories whose makeup more closely resembles that which Rogers (1961) hypothesized. The two methods are the *standard deviation method* and the *percentile method*. A comparison of the methods is offered in the following section and a rationale for choosing one over the other is described.

### Standard Deviation Method

The normal shape of the distribution of adopter scores was utilized as a means of categorizing the respondents into five adopter categories. The normal distribution has two parameters, the mean ( $\bar{x}$ ) and the standard deviation ( $\sigma_x$ ), which may be used to divide the distribution into five areas. These five areas under the normal curve are labeled as: innovators, early adopters, early majority, late majority, and laggards. These categories and the numbers of respondents who fall into each are located on a histogram in Figure and in Table 7. The adoption scores had a mean of 4.2 and a standard deviation of 1.61.

By this method of categorization, The area lying to the right of the mean square root of the number of months since adoption (adoption score) plus two standard deviations ( $\bar{x} + 2\sigma_x$ ) would include the first 2.5 percent of the respondents to adopt the web (innovators) with adoption scores 6.93 and above. The next 13.5 percent of the adopters would be included between  $\bar{x} + \sigma_x$  (6.00) and  $\bar{x} + 2\sigma_x$  and are labeled “early adopters”. At the mean square root month of adoption plus one standard deviation ( $\bar{x} + \sigma_x$ ), a point of inflection occurs. At this point, adoption ceases to increase at an increasing rate and begins to increase at a decreasing rate (and level off). Between this inflection point and the mean square root month of adoption, 34 percent of the adopters are included in the “early majority” category.

Between the mean and the other inflection point (at  $\bar{x} - \sigma_x$  where adoption begins to decrease at a decreasing rate) include 34 percent of the adopters labeled as “late majority.” The last 16 percent of the the respondents to adopt the web (to the left of the inflection point at  $\bar{x} - \sigma_x$ ) are labeled as “laggards.”

While most of the categories resulted in percentages closely matching those suggested by Rogers (1961), the innovator category was slightly lower at 1.6 percent instead of 2.5 percent (see Table 7.). While this might not be problematic in a study with a sample size of thousands, the small sample size of this study resulted in only 3 innovators.

**Table 7. Adopter categorization by the standard deviation method**

Adopter Category	N	Limits of months <sup>1/2</sup>	Desired percentage in each category	Actual percentage in each category
Laggards	35	0 – 2.59	16.0	18.7
Late Majority	53	2.60 – 4.20	34.0	28.3
Early Majority	58	4.21 – 5.81	34.0	31.0
Early Adopters	38	5.82 – 7.42	13.5	20.3
Innovators	3	7.43 +	2.5	1.6
Total	187	N/A	100.0	100.0

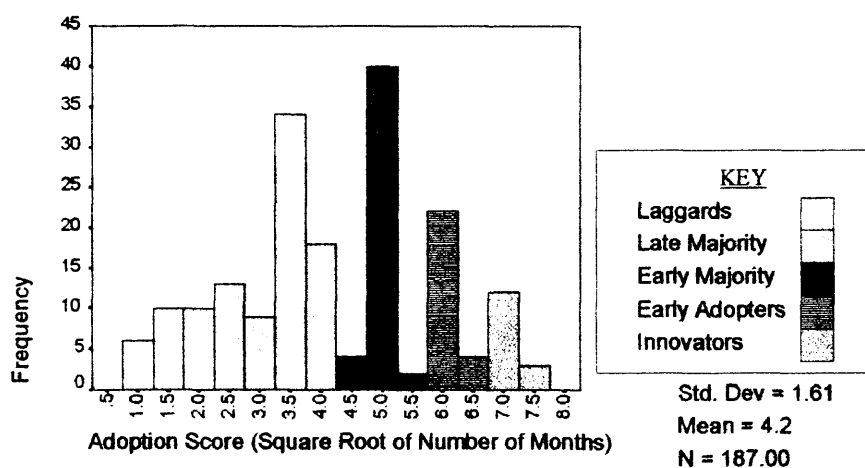
#### Percentile Method of Categorization

The second method of categorization was also suggested by Rogers (1961). This method involved using percentiles to determine cutoff points for data categorization. The percentiles are 2.5, 16, 34, 50, and 84. These percentiles form the

basis for determining data ranges. Table 8 and Figure 8 show the results of categorization by displaying the totals for each category, the desired percentage according to Rogers, the percentile limits of the square root of the number of months respondents have used the web, and the actual percentage in each category after categorization.

**Table 8. Adopter categorization by the percentile method**

Adopter Category	N	Limits of months <sup>1/2</sup>	Desired percentage in each category	Actual percentage in each category
Laggards	26	0 – 2.24	16.0	13.9
Late Majority	62	2.25 – 4.23	34.0	33.2
Early Majority	58	4.24 – 5.99	34.0	31.0
Early Adopters	27	6.00 – 6.92	13.5	14.4
Innovators	14	6.93 +	2.5	7.5
Total	187	N/A	100.0	100.0



**Figure 8. Histogram of Adoption Score with Categories Determined by Percentile Method**

The two methods of categorization have cell sizes that on the surface appear to be very similar. To test the hypothesis that the two methods are not significantly different, a bi-variate correlation coefficient was computed. The results indicate there is strong evidence to suggest that no statistically significant difference exists in the distributions between the two methods (one tailed significance  $< .000001$ ).

By using the percentile method the intent was to achieve approximately 2.5 percent of data in the Innovator category. Instead, 7.5 percent of the data (or a total of 14 respondents) were categorized as innovators. This deviance from the suggested percent is not problematic for this study however, as 2.5 percent of 187 (the total N of this study) would yield only 5 persons in the innovator category. A cell size of 14 persons, which also differs greatly from the expected 2.5 percent, can be criticized as well, but it is more adequate for quantitative statistical analysis than five. Based on the rationale that both methods of categorization are approximately equal (for the purposes of statistical research), and that the percentile method gives a better N for the Innovator category, using the percentile method of adopter categorization is the best way to proceed with the analysis.

### **Hypothesis Testing**

The following section describes the statistical analysis used to test hypotheses and the degree of support for the hypotheses.

### Controlling For Respondent Characteristics

In order to uncover relationships not readily apparent through examination of the whole data set, certain self-identified characteristics of respondents were selected to dis-aggregate the data into sub-groups. The characteristics chosen were sex (male or female), affiliation with either federal agencies or educational institutions (as either students, faculty or staff), relative amount of education achieved (high or low), and frequency of web use (low, intermediate or high.)

These variables were chosen as controls because they represent the extent of ordinal demographic variables available for analysis<sup>5</sup>. Only some of the characteristics of these variables were chosen for use as controls because they represent characteristics of interest to this research (for example, agency affiliation), or because the data suggests too many categories with not enough variability between them (see next section.)

### Accounting for “Thin Cells” and Too Many Categories

“Thin cells” refer to categories with relatively few cases. An occurrence of this can be problematic in statistical testing because it is not appropriate to use a small numbers of cases to make generalizations about larger groups (Hamilton, 1990). One way to account for this is to collapse categories, thereby “lumping” them together so

they are of adequate size. Another reason to collapse categories is to have a resultant data set that is easier to relate to or to provide thoughtful answers.

Some studies contain multiple-choice, or close-ended items that ask both questions of interest to researchers and some that are asked solely for the sake of encouraging thoughtful answers (Salant and Dillman 1994). In the present study, the question concerning completed education levels provided seven possible multiple-choice answers. Some of these seven categories were provided in order to allow respondents with diverse backgrounds the opportunity to list their accomplishments. To conduct hypothesis number two, it was necessary to collapse two of the seven categories because their counts were too small (some vocational/technical school and completed vocational/technical school).

When controlling for respondent characteristics in the hypothesis testing phase of this research, it became clear that overall, respondents were highly educated. Therefore, using a high number of categories would impose artificial variation. The decision to re-categorize education levels in terms of two criteria; those respondents with education levels less than a four year college degree and those respondents with greater than a college degree was made. Table 9 shows the results of re-categorization.

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<sup>5</sup> Age was excluded as a control because the literature suggests that it is not a significant factor in predicting adoption of innovations (see Rogers, 1995.) Status of respondent was excluded as well due to the presence of another category, "employment" which overlapped considerably with some of the categories contained in employment. *Employment* was chosen as a control because it contained categories that were more mutually exclusive than *status*.

**Table 9. Highest education level completed among survey respondents, in percent (re-categorized)**

Schooling Level	Percent	Cumulative Percent	N
≤ Four year college degree	55.9	55.9	104
> Four year college degree	44.1	100.0	82

After examining the results from the question that asked the number of times per day, week and month the web is accessed by respondents, it was determined that the great number of categories only served to create confusion in the analysis. Therefore, it became necessary to collapse categories. Table 10 shows the new categories after collapsing them.

**Table 10. Web use (re-categorized)**

Web use	Percent	Cumulative Percent	N
High (more than five times per week)	33.7	46.5	63
Intermediate (five times per week to once per day)	44.5	78.2	83
Low (less than once per day)	14.4	100.0	41

### Hypothesis One

To test the research hypothesis that earlier adopters of the web will have more exposure to mass media than later adopters, an additive scale was created which gave a score of “1” for each of three questions. Respondents were asked if they have read



any of the following in the past year: professional journals; environmental-oriented newsletters; and recreation-oriented magazines.

A Spearman Correlation Coefficient of .214 was computed for all data in the sample which is statistically significant when alpha is set at .01 ( $p\text{-value} = .002$ , see Table 11). Therefore, there is overall support for hypothesis one. Further analysis uncovered that respondents with education levels greater than the bachelor degree level had the strongest correlation ( $p\text{-value} < .001$ ), followed by those respondents with the highest reported web use ( $p\text{-value} = .001$ ), and females ( $p\text{-value} = .009$ .)

**Table 11. Spearman Correlation test for Hypothesis one; earlier adopters will have more exposure to mass media than later adopters.**

	<i>rho</i>	p-value <sup>1</sup>	N
<u>Overall Support</u>	.214**	.002	187
<u>Gender</u>			
Male	.191*	.012	139
Female	.354**	.009	45
<u>Affiliation</u>			
Agency	.297*	.016	52
Non-agency	.197*	.016	119
<u>Education</u>			
Education	.238*	.030	63
Non-education	.230**	.008	111
<u>Education Level</u>			
≤ 4-year degree	-.030	.430	37
> 4 year degree	.306**	<.001	149
<u>Web Use</u>			
High	.395**	.001	63
Intermediate	.196*	.038	83
Low	-.028	.430	41

\* denotes correlation statistically significant at  $\alpha = .05$

\*\* denotes correlation statistically significant at  $\alpha = .01$

<sup>1</sup>One-sided p-value

### Hypothesis Two

To test the hypothesis that earlier adopters will perceive the web to be more efficient than later adopters, a Spearman Correlation coefficient was computed. Results indicate no overall support for the hypothesis. Further analysis failed to uncover any other significant correlation (see Table 12

**Table 12. Results of the Spearman Correlation test for Hypothesis two; earlier adopters will have a higher education level than later adopters.**

	<i>rho</i>	p-value <sup>1</sup>	N
<u>Overall Support</u>	.001	.496	186
<u>Gender</u>			
male	-.028	.371	139
female	.112	.232	45
<u>Affiliation</u>			
Agency	.024	.432	52
Non-agency	-.079	.329	118
Education	-.079	.272	62
Non-education	.049	.303	111
<u>Web Use</u>			
High	-.096	.228	63
Intermediate	.024	.416	82
Low	-.050	.379	41

<sup>1</sup>One-sided p-value

### Hypothesis Three

To test the hypothesis that there is no difference between earlier adopters and later adopters in terms of age, a Spearman Correlation coefficient was computed. Results indicate no evidence of a statistically significant correlation ( $p\text{-value} = .328$ .)

### Hypothesis Four

To test the hypothesis that earlier adopters will perceive the web to be quicker than later adopters, a Spearman Correlation Coefficient was computed. Results indicate no overall support for this hypothesis. A closer examination of the data

uncovered moderate support that female earlier adopters perceive the web to be quicker than later female adopters ( $p\text{-value} = .027$ , see Table 13.)

**Table 13. Results of the Spearman Correlation test for Hypothesis four; earlier adopters will perceive the web to be quicker than later adopters.**

	<i>rho</i>	<i>p-value</i> <sup>1</sup>	N
<u>Overall Support</u>	.003	.484	185
<u>Gender</u>			
Male	-.086	.159	138
Female	.288*	.027	45
<u>Affiliation</u>			
Agency	-.138	.165	52
Non-agency	.125	.089	117
<u>Education</u>			
Education	.110	.200	61
Non-education	.008	.468	111
<u>Education Level</u>			
≤ 4-year degree	.029	.433	37
> 4 year degree	-.002	.490	148
<u>Web Use</u>			
High	-.048	.355	63
Intermediate	-.053	.320	81
Low	-.101	.265	41

\* denotes correlation statistically significant at  $\alpha = .05$

<sup>1</sup>One-sided P value

### Hypothesis Five

To test the hypothesis that earlier adopters will perceive the web to be more efficient than later adopters, a Spearman Correlation coefficient was computed.

Results indicate no overall support for the hypothesis. Further exploration of the data uncovered moderate support that highly educated respondents will perceive the web to be more efficient than later adopters ( $p\text{-value} = .029$ , see Table 14.)

**Table 14. Results of the Spearman Correlation test for Hypothesis five; earlier adopters will perceive the web to be more efficient than later adopters.**

	<i>rho</i>	<i>p-value</i> <sup>1</sup>	N
<u>Overall Support</u>	.088	.130	166
<u>Gender</u>			
male	.104	.123	126
female	.056	.369	38
<u>Affiliation</u>			
Agency	.239	.061	43
Non-agency	.009	.461	110
<u>Education</u>			
Non-education	.095	.237	59
	.067	.256	97
<u>Education Level</u>			
≤ 4-year degree	-.252	.082	32
> 4 year degree	.164*	.029	134
<u>Web Use</u>			
High	.171	.100	58
Intermediate	-.099	.202	73
Low	.077	.330	35

\* denotes correlation statistically significant at  $\alpha = .05$

<sup>1</sup>One-sided p-value

### Hypothesis Six

To test the hypothesis that earlier adopters will perceive the web be of higher quality than later adopters, a Spearman Correlation coefficient was computed. Results indicate no overall support for the hypothesis. Further exploration of the data uncovered moderate support that respondents with high levels of web use will perceive the web to be of higher quality than later adopters ( $p\text{-value} = -.037$ , see Table 15.)

**Table 15. Results of the Spearman Correlation test for Hypothesis six; earlier adopters will perceive the web to be of higher quality than later adopters.**

	<i>rho</i>	p-value <sup>1</sup>	N
<u>Overall Support</u>	-.081	.145	174
<u>Gender</u>			
Male	.079	.310	42
Female	-.139	.057	130
<u>Affiliation</u>			
Agency	-.202	.085	48
Non-agency	-.010	.461	110
<u>Education</u>			
Education	-.126	.172	58
Non-education	-.052	.299	103
<u>Education Level</u>			
≤ 4-year degree	-.087	.310	35
> 4 year degree	-.085	.161	139
<u>Web Use</u>			
High	-.238*	.037	57
Intermediate	-.088	.223	78
Low	-.13	.215	39

\* denotes correlation statistically significant at  $\alpha = .05$

<sup>1</sup>One-sided p-value

### Hypothesis Seven

To test the hypothesis that earlier adopters will perceive the web be less expensive than later adopters, a Spearman Correlation Coefficient of .139 was computed for all data in the sample which is statistically significant when alpha is set at .05 ( $p\text{-value} = .034$ , see Table 16.) Further analysis uncovered that respondents

with the highest levels of education ( $p\text{-value} = .014$ ) had the strongest correlation, followed by respondents affiliated with a federal agency ( $p\text{-value} = .043$ ).

**Table 16. Results of the Spearman Correlation test for Hypothesis seven; earlier adopters will perceive the web to be less expensive than later adopters.**

	rho	p-value <sup>1</sup>	N
<u>Overall Support</u>	.139*	.034	173
<u>Gender</u>			
Male	.126	.077	129
Female	.203	.098	42
<u>Affiliation</u>			
Agency	.251*	.043	48
Non-agency	.088	.179	111
<u>Education</u>			
Education	.090	.250	58
Non-education	.159	.054	104
<u>Education</u>			
≤ 4-year degree	-.017	.464	31
> 4 year degree	.184*	.014	141
<u>Web Use</u>			
High	.041	.378	60
Intermediate	.118	.155	76
Low	.238	.078	37

\* denotes correlation statistically significant at  $\alpha = .05$

<sup>1</sup>One-sided p-value

### Hypothesis Eight

To test the hypothesis that earlier adopters will perceive the web be less time consuming than later adopters, a Spearman Correlation coefficient was computed.



Results indicate no overall support for this hypothesis. Further analysis failed to uncover any other significant correlations (see Table 17.)

**Table 17. Results of the Spearman Correlation test for Hypothesis eight; earlier adopters will perceive the web to be less time consuming than later adopters.**

	<i>rho</i>	p-value <sup>1</sup>	N
<u>Overall Support</u>	.094	.102	183
<u>Gender</u>			
Male	.141	.051	136
Female	-.012	.470	45
<u>Affiliation</u>			
Agency	.181	.100	52
Non-agency	.071	.226	115
<u>Education</u>			
Education	.058	.329	60
Non-education	.111	.124	110
<u>Education</u>			
≤ 4-year degree	.106	.266	37
> 4 year degree	.096	.125	146
<u>Web Use</u>			
High	.049	.352	62
Intermediate	.079	.243	80
Low	.082	.305	41

<sup>1</sup>One-sided p-value

### Hypothesis Nine

To test the hypothesis that earlier adopters will perceive the web be more current than later adopters, a Spearman Correlation coefficient was computed. Results indicate no overall support for this hypothesis. Further exploration of the data

uncovered moderate support that respondents with education levels greater than 4 years of college perceive the web to be of more current than later adopters ( $p\text{-value} = .043$ , see Table 18.)

**Table 18. Results of the Spearman Correlation test for Hypothesis nine; earlier adopters will perceive the web to be more current than later adopters.**

	<i>rho</i>	p-value <sup>1</sup>	N
<u>Overall Support</u>	.055	.236	176
<u>Gender</u>			
male	.080	.179	133
female	-.005	.489	41
<u>Affiliation</u>			
Agency	.004	.490	47
Non-agency	.052	.293	114
<u>Education</u>			
Education	.068	.303	59
Non-education	.015	.439	105
<u>Education</u>			
≤ 4-year degree	.005	.477	142
> 4 year degree	.298*	.043	34
<u>Web Use</u>			
High	-.072	.290	61
Intermediate	.068	.280	75
Low	-.075	.323	40

\* denotes correlation statistically significant at  $\alpha = .05$

<sup>1</sup>One-sided p-value

### Hypothesis Ten

To test the hypothesis that earlier adopters will perceive the web be more accessible than later adopters, a Spearman Correlation coefficient was computed.

Results indicate no overall support for this hypothesis. Further analysis failed to uncover any other significant correlations (see Table 19.)

**Table 19. Results of the Spearman Correlation test for Hypothesis ten; earlier adopters will perceive the web to be more accessible than later adopters.**

	<i>rho</i>	p-value <sup>1</sup>	N
<u>Overall Support</u>	.018	.404	185
<u>Gender</u>			
male	-.018	.416	137
female	.143	.174	45
<u>Affiliation</u>			
Agency	<.001	.499	52
Non-agency	.089	.170	117
<u>Education</u>			
Education	-.055	.336	61
Non-education	.073	.223	111
<u>Education</u>			
≤ 4-year degree	-.095	.289	37
> 4 year degree	.048	.281	147
<u>Web Use</u>			
High	-.103	.212	63
Intermediate	.012	.459	81
Low	-.085	.298	41

\* denotes correlation statistically significant at  $\alpha = .05$

<sup>1</sup>One-sided p-value

### Hypothesis Eleven

To test the hypothesis earlier adopters will perceive the web to be more compatible with their norms and values than later adopters, a Spearman Correlation Coefficient of .156 was computed for all data in the sample which is statistically significant when alpha is set at .05 ( $p\text{-value} = .018$ , see Table 20.) Further analysis uncovered that respondents with no affiliation to federal agencies ( $p\text{-value} = .020$ ) had

the strongest correlation, followed by male respondents ( $p\text{-value} = .026$ ), respondents with an education greater than the bachelor degree level ( $p\text{-value} = .028$ ), and respondents not affiliated with educational institutions ( $p\text{-value} = .032$ ).

**Table 20. Results of the Spearman Correlation test for Hypothesis eleven; earlier adopters will perceive the web to be more compatible with their norms and values than later adopters.**

	<i>rho</i>	p-value <sup>1</sup>	N
<u>Overall Support</u>	.156*	.018	182
<u>Gender</u>			
Male	.169*	.026	134
Female	.207	.087	45
<u>Affiliation</u>			
Agency	.141	.164	50
Non-agency	.192*	.020	116
<u>Education</u>			
Education	.120	.180	60
Non-education	.178*	.032	109
<u>Education</u>			
≤ 4-year degree	.163	.168	37
> 4 year degree	.160*	.028	144
<u>Web Use</u>			
High	.059	.324	63
Intermediate	.066	.283	79
Low	.142	.191	40

\* denotes correlation statistically significant at  $\alpha = .05$

<sup>1</sup>One-sided p-value

### Hypothesis Twelve

To test the hypothesis earlier adopters will perceive the web to be less complex than later adopters, Spearman Correlation Coefficients were computed for three

measures. Results indicate no overall support for this hypothesis. Further analysis, controlling for gender, affiliation with educational institutions and federal agencies, highest education level achieved, and frequency of web use failed to uncover any other significant correlations (see Table 21.)

**Table 21. Results of the Spearman Correlation tests for Hypothesis twelve; earlier adopters will perceive the web to be less complex than later adopters.**

	Measures of Complexity								
	Complexity 1 <sup>a</sup>			Complexity 2 <sup>b</sup>			Complexity 3 <sup>c</sup>		
	<i>rho</i>	p-value <sup>1</sup>	N	<i>rho</i>	p-value <sup>1</sup>	N	<i>rho</i>	p-value <sup>1</sup>	N
<u>Overall Support</u>	-.093	.103	185	-.010	.446	183	.077	.151	183
<u>Gender</u>									
Male	-.087	.155	37	-.033	.353	136	.043	.309	135
Female	.093	.271	45	.045	.387	44	.184	.114	45
<u>Affiliation</u>									
Agency	-.020	.444	52	.127	.187	51	.165	.121	52
Non-agency	-.119	.101	117	-.009	.460	117	.068	.235	115
<u>Education</u>									
Non-education	-.170	.095	61	-.122	.175	61	.123	.173	61
Education	-.044	.322	111	.111	.123	110	.062	.262	109
<u>Education</u>									
≤ 4-year degree	.110	.259	37	.142	.209	35	.105	.271	36
> 4 year degree	-.084	.157	147	.023	.393	147	.077	.179	146
<u>Web Use</u>									
High	-.184	.075	63	-.082	.262	63	-.002	.494	63
Intermediate	.076	.250	81	.057	.307	80	-.047	.340	79
Low	-.237	.068	41	-.063	.349	40	.208	.096	41

<sup>1</sup> One-sided p-value

<sup>a</sup> "The amount of information on the WWW is overwhelming."

<sup>b</sup> "Most people must develop new skills to be able to use the WWW."

<sup>c</sup> "The WWW is too complicated."

### **Summary of Hypothesis Testing**

Overall support was found for two of the twelve hypotheses. The support for these two hypotheses was moderate. Of the additional ten hypotheses, five had partial

support due to weak or moderately statistically significant correlations among subgroups. A summary of the hypothesis test results are presented in Table 22.



**Table 22. Summary of hypothesis testing**

<b><i>Hypothesis</i></b>	<b><i>Support</i></b>	
	<u><b>Overall Support</b></u>	<u><b>Support Summary</b></u>
<b>One:</b> Earlier adopters of the web will have more exposure to mass media than later adopters.	<b>Yes</b>	Moderately supported. Support strongest for respondents with high education levels and high web use. No hypothesis support if education level less than bachelor level or web use low.
<b>Two:</b> Earlier adopters of the web will have a higher education level than later adopters.	<b>No</b>	No support. No statistically significant correlations for any subgroups.
<b>Three:</b> Earlier adopters of the web will be the same age as later adopters.	<b>No</b>	No support. No statistically significant correlations for any subgroups.
<b>Four:</b> Earlier adopters will perceive the web to be quicker than later adopters.	<b>No</b>	Controlling for gender uncovered weak support that female early adopters perceive the web to be quicker than later female adopters.
<b>Five:</b> Earlier adopters will perceive the web to be more efficient than later adopters.	<b>No</b>	Controlling for achieved education level uncovered weak support for hypothesis at high education levels.
<b>Six:</b> Earlier adopters will perceive the web to be of higher quality than later adopters.	<b>No</b>	Controlling for frequency of web use uncovered weak support for hypothesis at high web use.

**Table 22. Summary of hypothesis testing (continued)**

<i>Hypothesis</i>	<i>Support</i>	
	<u>Overall Support</u>	<u>Support Summary</u>
<b>Seven:</b> Earlier adopters will perceive the web to be less expensive than later adopters.	<b>No</b>	Controlling for achieved education level uncovered moderate support for hypothesis at high education levels.
<b>Eight:</b> Earlier adopters will perceive the web to be less time consuming than later adopters.	<b>No</b>	No support. No statistically significant correlations for any subgroups.
<b>Nine:</b> Earlier adopters will perceive the web to contain more current information than later adopters.	<b>No</b>	Controlling for achieved education level uncovered weak support for hypothesis at high education levels.
<b>Ten:</b> Earlier adopters will perceive the web to be more easily accessible than later adopters.	<b>No</b>	No support. No statistically significant correlations for any subgroups.
<b>Eleven:</b> Earlier adopters will perceive the web to be more compatible with their norms and values than later adopters.	<b>Yes</b>	Moderately supported. Support strongest for male respondents, non-agency, and high education.
<b>Twelve:</b> Earlier adopters will perceive the web to be less complex than later adopters.	<b>No</b>	No support. No statistically significant correlations for any subgroups.

## **Chapter 5**

### **DISCUSSION**

#### **Introduction**

The goal of this study was to determine if “innovativeness” or perceptions of relative advantage, affects how relatively early someone will adopt the use of the web to collect wilderness information. It investigated the communication patterns and rate of adoption for adopters of the web, the degree to which someone feels the web has a relative advantage over other methods of collecting information correlate with rate of adoption, and whether sociodemographic variables including occupation, gender, education level, and age correlate with rate of adoption. This section of the study discusses the results of this project in terms of the questions raised in chapter one, the applicability of the diffusion of innovations model for this study, management implications, and future research needs and opportunities.

#### **The applicability of the diffusion of innovations model for this study**

The diffusion of innovations model for determining if “innovativeness” affects how relatively early someone will adopt the use of the web to seek wilderness information provides a time-tested framework for discovering characteristics of adopters, communication patterns adopters utilize, and perceived attributes of the web. The diffusion of innovations model has proven very useful for medical researchers, market researchers, and other social science disciplines. The present study, however,

did not provide much insight into the diffusion of the web among the study population. Because only two of the twelve hypotheses were supported, it is appropriate to ask what the alternative plausible hypotheses are. Since the entire study is based upon the diffusion of innovations theory, the validity of the theory may be questioned. Nearly sixty years of widely accepted prior research exist as an admonition to such claims however. Other factors must be responsible for the discrepancies between past research findings and those of the present study. It may be that the important variables which help to explain the diffusion of the web were not included in this study. The following section explores some of the factors which may have contributed to this; including both methodological and situational factors.

### **Methodological factors**

The methods utilized in the present study relied upon respondents to haphazardly chance upon the web survey. The methodology precluded sampling of non-adopters. Although the original intention of this study was to include these non-adopters, it was determined that utilizing two different methodologies for data collection would produce results that could not, with any scientific rigor, be compared.

Using a different methodology for data collection, for example, mail-out surveys, or telephone surveys, would have enabled both adopters *and* non-adopters of the web to be sampled. Based upon other studies that utilized the diffusion of innovations framework that sampled both adopters and non-adopters of a particular idea or product, a great deal of variability exists between the two groups. This

variability would most likely result in more statistical support for hypotheses such as the ones from the present study.

The present study produced results with little variability. This factor most likely contributed greatly to the absence of many statistically significant correlations. It appears that the sample for the present study is highly homogenous, and therefore inadequate to detect subtle differences necessary for the statistical tests to be supported.

#### Measurement factors

The main dependent variable for the present study, adoption score, was measured as the length of time since respondents first used the web. Most other adoption/diffusion studies rely on several innovations, all related to one another, to form a composite adoption score (Babbie, 1995). For example, Dewees and Hawkes (1988), in their study of the adoption of commercial fishermen, utilized 12 different innovative fishing practices and equipment to create their adoption scale. Perhaps in the present study, the web was but one of many innovations important in better understanding the target population.

Other innovations related to the web include; E-mail, the commercial Internet providers including America On Line, Compuserve, and Microsoft Network, and FTP (File Transfer Protocol) sites. All of the aforementioned innovations provide access to information via the Internet and may be utilized by the target population. Combining

them to create the adoption score for the present study may have produced results with greater variability.

Single item measures for dependant variables can be much too narrow in their scope to adequately explain a complex situation. Ultimately, the goal of the present research was to better understand the use of *new technologies* for information acquisition. The web was chosen as the main dependant variable to study for two reasons. First, a larger research project was funded that, in part, would conduct a needs assessment for wilderness information on the web. Second, the web was a truly different and unique innovation that showed great promise as a powerful tool for managers to pass along information to the public. Choosing to study only the adoption of the use of the web, was in hindsight, a great limitation of the present study. Not only is the independence of this single-item measure in question, but also it too narrowly focused the research away from the phenomenon of new technology adoption, to an overly simplistic look at a societal trend.

Variable independence is achieved when no interactions exist between the variable in question and similar variables. Clearly, the use and the adoption of the web, e-mail, file transfer protocol (FTP) sites, and other technological advancements used for both information dissemination and retrieval are interrelated. Slight differences in circumstance require different tools for information gathering techniques. All of the aforementioned tools, and their use, underlie a sweeping

societal change; from hard-copy paper sources to increasingly electronic sources. This emphasis should have been more strongly adhered to in the present study.

The theory underlying the present research, diffusion of innovations, relies upon a perception that the innovation in question is perceived as being new. Respondents to the on-line survey may not have perceived the web as new. Technological advances evolve so quickly today that perhaps individuals cognitively use a shorter time-frame in their determination of what is “new”.

#### Variable selection

Social scientists from different disciplines will utilize vastly different approaches in their quest for knowledge about the same phenomenon. In the case of the adoption and dissemination of the use of the web for gathering wilderness information, it could be argued that three approaches exist and are valid for this type of investigation. Moving in focus from the individual to larger aggregate social units, the three approaches are the psychological, the sociological, and the anthropological.

The psychological approach to the present research problem might be to examine *personality traits* of adopters and non-adopters to determine if differences exist. These personality differences would explain variation at the individual level only. The sociological approach might be to examine *institutional systems* and how they operate to better understand adoption. This approach would help explain variation at a larger aggregate social unit, the social system. The anthropological

approach might include an examination of cultural norms and a participant-observation approach to data collection, with the intent to better understand cultural change. While each of the three aforementioned approaches are appropriate, research needs, the availability of subjects or respondents, and institutional constraints on human subject testing will all act in concert to shape the methodology of any given research project.

In the absence of institutional and societal pressure, an individual is relatively free to make a decision regarding the adoption or non-adoption as the case may be, of an innovation. What then drives this decision? One of the most fundamental factors to be considered is an individual's personality type. The adoption of the web as a wilderness information resource was initially thought by the researchers as a phenomenon best understood through an examination of an individual's personality traits. Cost and other restrictions on the use of the Minnesota Multiphasic Personality Inventory test, or MMPI test, which is generally accepted as the best tool for personality typing, precluded its use for the present study. Perhaps individual personality data would explain a greater proportion of the variance found in the present study. This would be a good avenue for future research on this topic.

Another variable selection factor in the present study which may have contributed to the relatively small number of hypotheses being supported, concerns what specifically can be called innovative in the process of using the web? Is it accessing the web to search out information (information acquisition), or to utilize the



web as a new medium for information dissemination? The web has seen exponential growth since its inception, and has since lost its “newness” in the eyes of much of the western world. The ease of adoption of the web may have been greatly speeded by the existence of already present hardware foundations within many institutions. The proliferation of web sites has also seen such exponential growth, but clearly there are far fewer web sites than there are persons who have accessed the web looking for information. Hardware foundations for generating web sites do not exist in the same proportion as for accessing the web. Perhaps the truly definitive “innovative” aspect of the web, is that of creating a web page with the intent to distribute information. Study questions concerning web site creation may have been a more appropriate avenue of investigation, than accessing the web.

### **Situational factors**

In addition to methodological problems with the present study, some situational factors may have contributed to the relatively small number of supported hypotheses. These factors include the utility of the web to respondents at the time of surveying, and the changing perceptions of relative advantage.

### **Utility of the web at the time of survey**

As the web continues to grow in size, so too does the amount of useful information. When the project began, the amount of wilderness information available

on the web was very small. One year after beginning the web survey project it had grown dramatically.

In designing the on-line web survey, the researchers, due to their familiarity with finding useful information on the web, may have overlooked the relatively little information available and concluded that potential respondents to the survey would be able to access information with success rates similar to their own. This belief may have clouded the researchers judgement and made them overly optimistic about the web's benefit to the public. The choice of variables was affected by researcher bias. If respondents did not find a relative advantage to using the web over other information resources, the survey questions related to relative advantage were of little value in answering research questions. The end result of this error in judgement may have been in asking the wrong questions.

#### Changing perceptions of relative advantage.

The relative advantage measures, as utilized in the present study, assume that the function for which the web is being used, is a replacement for another way of achieving the same result. This assumption may be in error. Many of the present functions of the web are wholly new. For example, the ability to first check a web site to view a camera pointed at the desk of a person across the country to which you would like to speak on the telephone. The ability to first check if the person is present.

in their office, prior to calling on the telephone can greatly save on long-distance phone bills, and increase work efficiency by providing more information that would allow for better decisions to be made. In this example, the decision might be made to call someone else, because the web site displayed only an empty chair, instead of the person with whom you wished to speak.

In the example given above, the web function (video streaming) did not replace a previous method. Instead, it allowed for a heretofore impossible feat to be accomplished very quickly. Perhaps “relative advantage” then, does not inclusively contain all of the important factors for the web as an innovation. It could be that the web makes use of so many technologies and is advancing so fast, that it is an entirely new kind of innovation. The previous tools for evaluating innovations may not be refined to the extent necessary to properly evaluate the web. If this is true, the development of new evaluation techniques would be necessary.

### **Implications for managers**

Managers who wish to take advantage of some of the what the web has to offer, can derive important information from the results of this study. The results of the present study suggest the need for additional training and development, changing personnel hiring strategies, and fewer constraints from the prior held belief that many managers were uncomfortable with the display of wilderness information on the web.

### Training and development

Overall, respondents feel that using the web contributes to efficiency in the workplace. A few caveats exist to that, however. Respondents said that the amount of information on the web is overwhelming. Also, that new skills are needed to use the web. These perceptions point to the need for additional agency training in the *use* of the web, and a greater commitment by agencies to the *development* of wilderness web resources. Training should focus on improving web techniques for information retrieval. Agencies should proactively work to ensure high quality information exists and is presented in easy to navigate formats. Simply waiting for high quality resources to be developed by someone else may not bear fruition. The wilderness community must embrace new technologies and take a leadership role in information development and management.

As many information-driven wilderness web sites are commercial enterprises, revenues are generated from online advertising. This money allows these commercial enterprises is utilized to hire multi-media professionals and professional marketing agencies to draw in many web visitors. Without an organized front by the wilderness community to work with outside entities for high quality information, and to invest in projects that they themselves work cooperatively to develop, great opportunities are lost to achieve the information dissemination mandate called for by the 1964 Wilderness Act.

### Personnel issues

Managers sampled for the present study were overall, highly educated. Because the sampling design allowed anyone who currently uses the web to complete the survey, this indicates some evidence that highly educated managers are more likely to adopt the web, because they were the ones to complete the survey. Highly educated people may have a different capacity to evaluate advantages and costs associated with the adoption of an innovation.

Hypothesis number two, that earlier adopters of the web will have a higher education level than later adopters however, was not supported. It is important to note here that non-adopters of the web were not included in the study sample, so there is no way of knowing based on the hypothesis results, whether *all* highly educated respondents are more likely to adopt the web.

Hypothesis testing indicated that individuals with a greater exposure to mass media sources are more likely to adopt the web. Personality profiling has become a popular way for human resource personnel to determine if a potential employee would be a good “fit” for a company. If managers wish to profile current or potential employees, this information could be of great value to them. Other hypotheses tested would be of less value to managers, in terms of profiling, due to their specificity. For example, earlier adopters of the web who are female perceive the web as quicker than later adopters who are male do. Because perceived “quickness” is only one of many characteristics that combined with other attributes, form the *relative advantage*

component of adoption, by itself, perceived “quickness” tells very little about an individual. If all or most of the relative advantage measures were found to be statistically significant for the hypotheses, then it would be possible to say with a certain degree of confidence that individuals who fit a certain profile would be more likely to adopt the web. The value to managers, in this case, would be greater.

### Sensitivity issues

Some managers may be hesitant to display information about wilderness to the public because they feel the medium of the web detracts from the “idea” of wilderness, that wilderness is a concept based upon something free from technology and other man-made contrivances (Freimund, et al, 1998). The study results indicate that, for respondents, this type of thinking does not predominate. Study results suggest that non-managers are more comfortable with accessing wilderness information via the web than managers are. If reaching as broad an audience as possible with information about wilderness, with the goal of generating increased awareness and creating more proponents for wilderness protection, is considered valuable to managers, they should embrace the web as one of many mediums available to them to reach that goal.

### Future research

Until such time as everyone has universal access to the web, further research to explore web use should utilize mediums other than the on-line survey. This would enable both non-adopters and adopters of the web to be included in the population

sample. Their inclusion is crucial to providing the variability in response necessary to test hypotheses similar to those in the present study.

Future research on this topic should broaden the focus from just the web to multiple technological innovations used to access information. Adoption scales could then be composed of multiple innovations, all related to the innovation of primary interest.

Another research topic to be explored is how information is utilized once it is accessed from the web. Do web users utilize information differently than non-web users? Does the overwhelming amount of information available on the web cause “information overload” among web users? Access to so much information in so many locations may make web users less likely to remember facts since the web provides a ready-made storehouse they can access. Non-web users, on the other hand, may derive more benefit and long-term remembrance from the information resources they utilize.

Agencies who manage wilderness may be interested to know the occupational categories of personnel they employ (planners, wilderness rangers, interpreters, etc.) who currently utilize the web as part of their jobs, and the relative benefit of this medium to project success.

Another potential research project would be to focus on the adoption and diffusion of the web at the institutional level rather than the individual, as the present

research did. Adoption or non-adoption of the web may be entirely controlled by institutional decision-makers, rather than individuals at a lower level in the hierarchy. A study of institutional barriers to the dissemination of web use would allow for a greater understanding of this phenomenon. If on the other hand, the decision is more a function of personal choice, then an investigation of individual personality traits would likely contribute to the body of this knowledge.



## Literature Cited

- Abrams, M. and S. Williams (1996) "Complementing Surveying and Demographics with Automated Network Monitoring" *The World Wide Web Journal*, 1(3), <http://www.w3.org/pub/WWW/Journal/3/s3.abrams.html> (4-May 1997).
- Active Media Incorporated "The Real Numbers behind 'Net Profits '98" (<http://www.activmedia.com/netprofits98.html>) (13- Aug. 1998).
- Babbie, E., (1995) *The Practice of Social Research*. Wadsworth, CA.
- Bass, F. M. (1969) A new product growth model for consumer durables. *Management Science*. 13(5): 215-227.
- Bass, F. M. (1986) The adoption of a marketing model: comments and observations. In Vijay Mahajan, and Yoram Wind (eds.) *Innovation diffusion of new product acceptance*, Cambridge, MA. Ballinger.
- Beal, G. M, E. M. Rogers (1960), The adoption of two farm practices in a central Iowa community, Ames, Iowa Agricultural and Home Economics Experiment Station, Special Report 26.
- Bonchek, M. S.; R. Hurwitz; J. Maller, 1996 "Will the Web Democratize or Polarize the Political Process? A White House Electronic Publications Survey" *The World Wide Web Journal*, 1(3), <http://www.w3.org/pub/WWW/Journal/3/s3.bonchek.html> (4-May 1997).
- Coleman, J. S, E. Katz, H. Menzel. 1957. The diffusion of an innovation among physicians. *Sociometry*. 20:253-270.
- de Leeuw, E. D.; J. J. Hox; G. Snijkers. (1995). The effect of computer-assisted interviewing on data quality. A Review. *Journal of the Market Research Society*. 37 (4):325-344.
- Deweese, C. M. and G. R. Hawkes. (1988). Technical innovation in the pacific coast trawl fishery: The effects of fishermen's characteristics and perceptions on adoption behavior. *Human Organization*. 47(3):224-234.
- Dillman, D. D. (1978). *Mail and Telephone Surveys*. John Wiley and Sons, N. Y., N. Y.
- Festinger, L. (1957). *A theory of cognitive dissonance*. Evanston, IL: Row, Peterson.

- Queen, L. P.; S. L. Peel; W. A. Freimund; P. Baird. 1998. Educating a dispersed wilderness audience: Internet opportunities. *International Journal of Wilderness*, 4(1): 19-22.
- Gates, B.; N. Myhrvold; P. Rinearson. (1996). *The Road Ahead*. Penguin, N.Y., N. Y.
- Graphic, Visualization, & Usability Center "GVU's 5th WWW Survey"  
[http://www.cc.gatech.edu/gvu/user\\_surveys/survey-04-1996](http://www.cc.gatech.edu/gvu/user_surveys/survey-04-1996) (19- Dec. 1996)
- Graphic, Visualization, & Usability Center "GVU's 5th WWW Survey"  
[http://www.cc.gatech.edu/gvu/user\\_surveys/survey-04-1996](http://www.cc.gatech.edu/gvu/user_surveys/survey-04-1996) (19- Dec. 1996).
- Grubler, A. Time for a change: on the patterns of diffusion of innovation. *Daedalus*, vol 125, no. 3 p. 19(24) from  
[http://www.searchbank.com/infotrac/session/8/2/442828/42?xrn\\_17](http://www.searchbank.com/infotrac/session/8/2/442828/42?xrn_17)  
 (10\26\1996).
- Hamilton, L. C. (1990). *Modern Data Analysis: A first course in applied statistics*. Brooks, Cole. Pacific Grove, CA.
- Hassinger, E. (1959). Stages in the adoption process *Rural Sociology* 24:52-53.
- Hendee, J..C., R. N., Clark, N. L. Hogans, D. Wood, and R. W. Koch. (1976). Code-A-Site: a system for inventory of dispersed recreational sites in roaded areas, backcountry, and wilderness. USDA Forest Service Res. Pap. PNW-209. 33pp.
- Kardas, E. P. and Milford, T. M., (1996). *Using the Internet for Social Science Research*, Belmont, CA, Wadsworth.
- Kehoe, C. M., Pitkow, J. E., (1996). "Surveying the Territory: GVU's Five WWW User Surveys," *The World Wide Web Journal*, 1(3),  
<http://www.w3.org/pub/WWW/Journal/3/s3.kehoe.html> (4-May 1997).
- Kiesler, S. and L. S. Sproull. (1986). Response effects in the electronic survey. *Public Opinion Quarterly*, 50:402-413.
- Machlis, G. E. and M.J. Harvey. (1993). The adoption and diffusion of recreation research programs: A case study of the Visitor Services Project. *Journal of Park and Recreation Administration* 11(1):49-65.
- Markus, M. L. (1990) Toward a 'critical mass' theory of interactive media. In Janet Fulk and Charles Steinfield (eds.) *Organizations and Communications Technology*, Newbury Park, CA, Sage.

- Martin, C. L. and D. H. Nagao. (1989). Some effects of computerized interviewing on job applicant responses. *Journal of Applied Psychology*. 74(1):72-80.
- Mehta, R. and E. Sividas. (1995). Comparing response rates and response content in mail versus electronic mail surveys. *Journal of the Market Research Society*. 37 (4):429-439.
- Mercer, D. (1993). Victoria's National Parks (Wilderness) Act 1992: Background and issues. *Australian Geographer* 24(1)25-32.
- Mids, "Internet Demographics: the MIDS Internet Demographic Surveys."  
<http://www.mids.org/ids/index.html> (19- Dec. 1996)
- Mort, P. R. (1953) Educational adaptability. *The school executive*. Vol. 71.
- Muth, R. M., and J.C. Hendee. (1979). Technology transfer in forestry as a human behavior process. Paper presented to the USDA Forest Service National Technology Transfer Workshop, Tucson, AZ, Feb. 13-15. 28pp.
- Muth, R. M., and J.C. Hendee. (1980). Technology transfer and human behavior. *Journal of Forestry*. 78(3):141-144.
- Network Wizards, "Internet Domain Survey, July 1996"  
<http://www.nw.com/zone/WWW/report.html> (19- Dec. 1996)
- Network Wizards, "Internet Domain Survey, July 1996"  
<http://www.nw.com/zone/WWW/report.html> (19- Dec. 1996).
- Noether, G. E. 1990. Introduction to Statistics: The nonparametric way. Springer-Verlag New York Inc., New York. 414 p.
- Pampel, F., J. van Es (1977) Environmental quality and issues of adoption research. *Rural Sociology* 42:57-71.
- Powell, Bob The atlas of the world wide web "Chapter 1"  
<http://www.rhythm.com/~bpowell/Atlas/Ch1.htm#ORIGINS> (1-April 1997)
- Powell, Bob The atlas of the world wide web "Chapter 1"  
<http://www.rhythm.com/~bpowell/Atlas/Ch1.htm#ORIGINS> (1-April 1997)
- Roessner, J. D. 1977. Incentives to innovation in public and private organizations. *Administration and Society* 9:341-365.

- Rogers, E. M. (1983). *Diffusion of Innovations*. The Free Press. New York.
- \_\_\_\_\_ (1995). *Diffusion of Innovations*. The Free Press. New York.
- Rogers, E., M. (1961). Characteristics of agricultural innovators and other adopter categories. Ohio Agricultural Experiment Station. Research Bulletin 882.
- Rogers, E., M., G. M. Beal (1958) The importance of personal influence in the adoption of technological changes. *Social Forces* 36: 329-335.
- Rogers, E., M., Shoemaker, F.F. (1971) *Communications of innovations - a cross-cultural approach*. Edition two, Free Press, New York.
- Rubin, A. and Babbie, E. (1989) *Research methods for social work*. Wadsworth Publishing Company Corp, Belmont CA.
- Ryan, B. and N. C. Gross (1943) The diffusion of hybrid seed corn in two Iowa communities. *Rural Sociology* 8:15-24.
- Salant, P., D. Dillman, (1994). *How to conduct your own survey*. John Wiley and Sons, New York.
- Schneider, I., D. Anderson, P. Jakes. (1993). *Innovations in recreation management: Importance, diffusion, and implementation*. Gen. Tech. Rep. NC 155. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station:
- Segal, B. "A Short History of Internet Protocols at CERN,"  
<http://wwwcn.cern.ch/pdp/ns/ben/TCPHIST.html> (12-May 1996).
- Sproull, L. S. (1986). Using electronic mail for data collection in organizational research. *Academy of Management Journal*. 29 (1):159-169.
- Tan, B.H. (1997). *The impact of man-made structures on the landscape*. Ph.D. Thesis (unpublished), Robert Gordon University, Aberdeen.
- Tarde, G. (1903) *The laws of imitation*. Translated by Elsie Clews Parsons, New York, Holt; reprinted 1969, University of Chicago Press.
- Tse, A. C.; K. C. Tse; C. H. Yin; C. B. Ting; K. W. Yi; K. P. Yee; W. C. Hong. (1995). Comparing two methods of sending out questionnaires: E-mail versus mail. *Journal of the Market Research Society*. 37 (4):441-446.

- Urken, A. B. (1996). "Polls, Surveys, and Choice Processor Technology on the World Wide Web" *The World Wide Web Journal*, 1(3),  
<http://www.w3.org/pub/WWW/Journal/3/s3.urken.html> (4-May 1997).
- Van Bastelaer, A. M. L.; F. A. M. Kerssemakers; D. Sikkel. (1987). A test of the Netherlands continuous labour force survey with hand-held computers: interviewer behavior and data quality. In CBS-Select 4, Automation in survey processing. Den Haag: Staatsuitgeverij.
- View from Internet valley "The Roads and Crossroads of Internet 's History"  
<http://www.internetvalley.com/intval.html> (1- April 1997)
- View from Internet valley "The Roads and Crossroads of Internet 's History"  
<http://www.internetvalley.com/intval.html> (1- April 1997).
- Walsh, J. P.; S. Kiesler; L. S. Sproull; B. W. Hesse. (1992). Self-selected and randomly selected respondents in a computer network survey. *Public Opinion Quarterly*. 56:241-244.
- Waterton, J. J. and J. C. Duffy. (1984). A comparison of computer interviewing techniques and traditional methods in collection of self-report alcohol consumption data in a field survey. *International Statistical Review*. 52(2):173-182.
- Watson, A. (1980) Technology transfer: Lateral diffusion of innovation in forest recreation planning and management. Unpub. Master's thesis. University of Virginia Polytechnic Institute and State University.
- Watson, A., J.W. Roggenbuck, R. M. Muth. (1983) Diffusion of a campsite inventory system. *Journal of Forestry* 83:308-311.
- Webster's II New Riverside University Dictionary, (1984)
- Wherrett, J. "Track 3: Informatics in Planning Natural Landscape Scenic Preference: Predictive Modeling and the World Wide Web"  
<http://bamboo.mluri.sari.ac.uk/~jo/athens/paper.html> (4-May 1997).
- Williams, F. R., R. E. Rice, E. M. Rogers, (1988) Research methods and the new media, New York, Free Press.
- Yin, R. K. 1978. Production efficiency versus bureaucratic self-interest. *Policy Sci.* 8:381-389.

## APPENDIX 1 THE ONLINE SURVEY

NETSCAPE: [WILDERNESS INFORMATION NEEDS ASSESSMENT] 3/15  
 FILE EDIT VIEW GO BOOKMARKS OPEN NEW DIRECTORY WINDOW HELP  
 Location: http://wilderness.net/survey.htm

### Wilderness Information Needs Assessment

*You are respondent #362 since February 3.*

This survey is a first step in a cooperative venture of the **Wilderness Institute** at the University of Montana, the **Aldo Leopold Wilderness Research Institute**, the **Arthur Carhart National Wilderness Training Center**, and the **National Forests of Florida**.

We are currently in the process of gathering wilderness information to make available through the **Wilderness Information Network** site. Please take a few moments to give us your input about what we should provide. Your participation in this survey will help guide the content of the page and help us better understand our audience.

Please fill this survey out only if you are someone who feels that you would benefit from obtaining information about wilderness, and you are over the age of 18. Also, please fill this survey out *only once*. Your responses will be kept strictly confidential.

When you have completed all of the questions, **press the submit button** at the end of the form. If you have any questions about this survey, please e-mail **Chuck Burgess**, [here](mailto:here).

The following is a list of wilderness related information that we could potentially make available through the world wide web (WWW). Please indicate how beneficial this information would be for you. (click button)

	No Benefit	Some Benefit	Highly Beneficial	Don't Know
• Wilderness management policies of agencies and tribes	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Discussion area for various wilderness issues	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Wilderness training calendar	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Ecological research	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Wilderness curriculum guide for all grade levels	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Bulletin board to post notices	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Wilderness education college courses by correspondence	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
	No Benefit	Some Benefit	Highly Beneficial	Don't Know
• Wilderness ecology issues	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Leave No Trace program information	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Current conditions (i.e. weather, fire, trail etc.) for specific areas	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Management issues and potential solutions	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Economic impact research	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Recreation impacts/ecology research	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Maps of wilderness areas	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Wilderness philosophy	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Wilderness management training materials	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Recreation behavior research	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK

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NETSCAPE [WILDERNESS INFORMATION NEEDS ASSESSMENT]

FILE EDIT VIEW GO BOOKMARKS CONTENT DESIGNER WINDOW HELP

Location: <http://wilderness.net/survey.htm>

	No Benefit	Some Benefit	Highly Beneficial	Don't Know
• Social conflict research	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Monitoring issues/procedures	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Site restoration techniques	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Solitude/crowding research	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Rules and regulations for specific wilderness areas	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Recreation use trends	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Wilderness related legislation	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Wilderness curriculum from various universities (degree programs, syllabi)	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Fire management issues	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
	No Benefit	Some Benefit	Highly Beneficial	Don't Know
• Geographic Information Systems of specific wilderness areas	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Wilderness history	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Wilderness/nature writing	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Current events in wilderness	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Current events in wilderness	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Wilderness Study Area issues	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• International wilderness areas, systems and issues	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Agency management plans	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Interactive databases	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK
• Issue positions of major environmental groups	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> DK

If including issue positions of environmental groups is something you believe would be beneficial, please list which environmental groups you would like to see represented on the Internet. (list only three)

\_\_\_\_\_

**How often do you use the world wide web?**

☐ 4 or more times per day    ☐ 1-2 times per week

☐ 2-3 times per day    ☐ twice per month

☐ once per day    ☐ once per month or less

☐ 3-5 times per week

**Approximately how long have you used the world wide web?**

(number of months)

Document: Conn

NETSCAPE [WILDERNESS INFORMATION NEEDS ASSESSMENT]

File Edit View Go Bookmarks Options Database Window Help

Location: <http://wilderness.net/survey.htm>

**Please check categories that best describe your status. (Check all that apply)**

☐ College student   ☐ Lobbyist  
☐ Land Manager   ☐ Activist  
☐ Educator   ☐ Planner  
☐ Scientist   ☐ Other (please describe) \_\_\_\_\_

**Please rate your agreement to the following statements about the World-Wide-Web (WWW).**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't Know
Using the WWW requires a large investment of money.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
For most people, using the WWW requires a large investment of time.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
Information is quickly retrieved using the WWW.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
The WWW contributes to more efficient professionals.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
Information on the WWW is more current than most other sources.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
There is a greater variety of information on the WWW compared with other information sources.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
The general quality of information on the WWW is greater than other information sources.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't Know
Access to the WWW is easier than other information sources.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
The WWW is a suitable format for transferring wilderness information.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
I prefer my information in digital form rather than paper format.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
The amount of information on the WWW is overwhelming.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
Most people must develop new skills to be able to use the WWW.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK
The WWW is too complicated.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> DK



NETSCAPE [WILDERNESS INFORMATION NEEDS ASSESSMENT]

File Edit View Go Bookmarks Options Developer Window Help

Location: <http://wilderness.net/survey.htm>

**Have you read any of the following in the past year?**

(Check all that apply)

☐ Professional Journals (e.g. *Journal of Leisure Research, International Journal of Wilderness, Conservation Biology, Environmental Management*)

☐ Environmental-oriented newsletters (e.g. *National Parks, Sierra, High Country News*)

☐ Recreation-oriented magazines (e.g. *Backpacker, Outside, Family Camping*)

**What level of education have you completed so far?**

☐ none ☐ some college

☐ grade school ☐ 2-year college degree

☐ high school ☐ 4-year college degree

☐ some trade/technical school ☐ graduate degree

☐ trade/technical school

**What is your age?**

(number of years)

**Are you...**


☐ Female

☐ Male

**How did you find out about this questionnaire?**

**Please write any additional comments below.**

**Thank you for taking the time to complete this questionnaire!**

 [Go back to wilderness.net home page.](#)

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