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Factors Affecting Consumer Valuation of Environmentally Labeled Forest Products

Kelly Ann O'Brien

FACTORS AFFECTING CONSUMER VALUATION OF ENVIRONMENTALLY LABELED FOREST PRODUCTS

By

Kelly Ann O'Brien

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Advisory Committee:

Mario F. Teisl, Assistant Professor of Resource Economics and Policy, Advisor

Kathleen P. Bell, Assistant Professor of Resource Economics and Policy

George K. Criner, Professor of Resource Economics and Policy

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Thesis Advisor: Dr. Mario F. Teisl

An Abstract of the Thesis Presented
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The recognition and acknowledgement of how personal purchasing decisions affect the environment may increase the desire to buy products advertised as "environmentally-friendly." Effective and credible advertising and marketing of products deemed ecologically sound, as well as, the specific environmental qualities embodied by such products presumably weighs on the effectiveness of environmentally conscious shopping. To that end, consumers are unable to fully utilize purchase power as a means of protecting the environment if they are unaware that such options exist. The public's apparent willingness to use its purchasing power as a means to protect the environment provides an opportunity for manufacturers and policy makers to benefit.

Using a nationally representative sample of the U.S. population surveyed during the summer of 2000, I explore how the disclosure of different environmental attributes impact consumer choices of environmentally labeled

wood products. My analysis is differentiated so that consumer choices and values are analyzed with respect to differences in 1) the amount of information the individual receives regarding the environmental labeling criteria, 2) the organization monitoring compliance with environmental labeling criteria and 3) individual characteristics (i.e. demographics, such as age and education, as well as, measures of exposure to the forest resource through work and play). We specifically examine whether exposure to the forest environment through employment, forestland ownership, and leisure pursuits, such as forest-based recreation participation, contributes to pro-environmental purchasing behavior and enhanced values for environmentally preferred forest management attributes.

It was found that the environmental attributes of an environmentally labeled wood product are significant to the purchase decision. In addition to the level of information provided on environmental labels themselves, supplementary advertising campaigns and marketing initiatives may enhance understanding of a product's environmental friendliness. Furthermore, because environmental management claims are not readily verifiable by consumers, the purchase decision becomes largely one of faith, to which the credibility of the certifying organization is found to be an important contributing factor.

The analysis provides important information for policy makers and firms. An examination of the levels of environmental information provided and its influence on consumer choices of environmentally labeled wood products provides the information necessary to maximize a firm's marketing effectiveness. The relationship between valuation and levels of environmental attributes is

significant to both policy makers and firms in that it provides guidelines for possible certification criteria. Varying certifying agencies responsible for the environmental labeling of wood products provides information regarding the perceived credibility of particular agencies and the marketability of products certified by such agencies.

The examination of the relationship between independent consumer characteristics and pro-environmental purchasing preferences is important for several reasons. A consumer profile may be provided by associating demographic characteristics, such as education, with valuation of environmentally labeled wood products. Furthermore, higher valuation of environmentally labeled wood products by individuals with higher levels of exposure to the resource through employment and leisure-time pursuits may imply that those individuals are more likely than their counter-parts to be environmentally concerned and engage in pro-environmental behaviors.

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"Education is not merely a means for earning a living
or an instrument for the acquisition of wealth.
It is an initiation into life of spirit,
a training of the human soul in the pursuit
of truth and the practice of virtue."
~ Vijaya Lakshmi Pandit ~

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~Dorothy C. Fisher~

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"Love is the ultimate outlaw. It just won't adhere to any rules.
The most any of us can do is sign on as its accomplice."
~Tom Robbins~

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Chapter 1

INTRODUCTION

Public concern for issues affecting the environment has grown since the 1970's (Mainieri, et al., 1997). As individuals' environmental concern grows, it may affect their desire to buy products determined to be "environmentally-friendly." In fact, consumers have cited increasing importance on the environmental characteristics of the products they buy. A study reveals that a majority of respondents participate in some type of environmental consumerism, such as buying products made from or packaged in recycled materials (Chase, 1991). Environmental consumerism is also evidenced by the sale and purchase of recycled oil, mercury-free batteries, dolphin-safe tuna, chlorine-free and recycled-content paper products, and non-toxic household cleaning agents (International Institute for Sustainable Development, 2000).

The public's apparent willingness to use its purchasing power as a means to protect the environment provides an opportunity for manufacturers, policy makers, and environmentalists to benefit. Although the majority of the wood products manufacturing industry has cited no belief in the need for environmental certification and labeling of their products[1], there is increasing and documented concern for sustainable forest management practices by consumers (Vlosky and

[1] There are two levels of environmental certification in the forest products industry; *forest* certification, involves an assessment of forest management practices against specified social, ecological, and economic standards. Forest *product* certification requires a chain-of-custody audit to confirm that wood from certified forests is used in product lines

Ozanne, 1998). As a result, some sectors of the forest products industry have adopted these practices as a business strategy to take advantage of specialized product markets and potential product premiums. Consumers willing to express their concern for the environment through their wallets benefit greatly from the increasing availability of environmentally certified forest products.

However several elements could delay or derail the potential benefits of forest product certification programs. In order for forest product certification programs to achieve policy objectives, not only must consumers hold preferences for certain environmental amenities, they must understand, believe and care about the specific information presented to them by the forest product manufacturer. Unlike other quality attributes which consumers can verify before purchase or shortly after purchase, the promise of improved forestry practices is impossible for most consumers to verify. Hence, the success of forest product certification programs uniquely hinges on forest product companies being able to credibly communicate to the consumer that forestry practices have been altered.

Although consumers may claim to strongly support environmental protection through "environmentally conscious" consumerism, many have indicated little knowledge about or trust of the environmental claims of products (Chase, 1991). Because environmental forest-management claims are not readily verifiable by consumers (i.e., they are a credence attribute), the consumer's purchase decision is based upon environmental perceptions. The level of information provided to consumers and the credibility of the organization providing the information may be an important factor to the consumer's purchase

decision. The question for firms and policy makers then is how best to inform consumers of the existence of such products, as well as, the best mechanism by which to target the "environmentally conscious" consumer. These questions are explored through information regarding consumer valuation of environmentally labeled products and the relationship between valuation and consumer characteristics. Specifically, I examine how consumers value "environmentally friendly" products and how this valuation differs across consumer profiles, various degrees of "environmental friendliness," and various levels of information disclosure with respect to a product's "environmental friendliness."

With respect to the amount of information provided, current environmental certification information for forest products is primarily provided through ISO (International Organization for Standardization) Type I labels or eco-seals, as employed by the non-profit Forest Stewardship Council[2] and the American Forest and Paper Association, a national trade association of the U.S. and Canadian forest products industry in the U.S. and Canada. Type I labels are essentially "seals-of-approval" that convey very little information regarding the "environmental friendliness" of a product. However, Scientific Certification Systems[3], an independent testing and certification organization based in Oakland,

[2] Initiated in 1993 in Oaxaca, Mexico, the FSC establishes principals and criteria for sustainable forest management practices, as well as, coordinates with government entities to develop national forestry standards for certification of forestlands and products. The FSC, while not providing direct certification of forestlands and products, accredits other organizations to certify, such as the Rainforest Alliance Smartwood program.

[3] An FSC accredited organization, SCS has introduced two certification and labeling options for wood products. The "Forest Conservation Program" provides an environmental certification label for evaluated and certified forestry operations and forest product companies while the "Certified Eco-Profile" program allows producers of forest products to communicate comprehensive "cradle to grave" environmental information in an ISO type III comprehensive label format. (Rhodes, 1997)

CA, favors Type III comprehensive eco-labels, which provide the most detailed information in a continuous or categorical format.

According to the International Institute for Sustainable Development, environmental labeling provides informed consumer choice. "Eco-labeling is an effective way of informing consumers about the environmental impacts of selected products and the choices they can make. Eco-labels thus empower people to discriminate between products that are harmful to the environment and those judged to be more compatible with environmental objectives." (IISD, 2000) However, previous labeling research in other product markets indicate that simple labels, such as Type I eco-seals, are less effective than more detailed labels (Teisl and Roe, 2000). As a result, this study uses more detailed Type III labels to ascertain consumers willingness to pay for improvements in specific forest-management attributes. In addition to providing more effective labels, the explicit presentation of environmental attributes allows me the opportunity to study the values consumers hold for specific forest management outcomes. This information is significant to both policy makers and firms in that it provides guidelines for possible certification criteria.

Environmental knowledge is a key component in determining consumer preferences for environmentally certified forest products. For example, one would expect that the greater the level of familiarity and knowledge regarding current forest management practices and the subsequent environmental benefits of altered management practices, the greater the influence of environmental certification programs promoting sustainable forest management. In addition to

the level of information provided on environmental labels themselves, supplementary advertising campaigns, marketing initiatives, and new media may enhance knowledge about a product's environmental friendliness. That is, the relatively small size of most labels do not allow a detailed explanation of the environmental certification criteria. Thus, even if the label is explicit in terms of outcomes, consumers may still not have a full understanding of the specific environmental attributes. Therefore, I analyze how supplemental information explaining the environmental attributes affects consumer behavior. Specifically, does the presence of supplemental environmental attribute information affect consumer choice of environmentally labeled forest products?

The credibility of environmental certification claims has also been identified as a significant factor in "environmentally conscious" purchasing decisions (Chase, 1991). Varying certifying agencies responsible for the environmental labeling of wood products provides information regarding the perceived credibility of particular agencies and the marketability of products certified by such agencies. Today, the certification of wood products in the United States is typically undertaken by independent third party certifying organizations. I examine various possible certifying entities, such as government agencies and environmental organizations, to determine if the certification agency affects consumer purchase behavior for these environmentally certified products.

Consumer awareness of environmental management practices through certification programs is only half of the issue. A fundamental understanding of the factors influencing consumer preferences for environmentally certified forest

products is also an essential component of the marketing, promotion, and standardization of the environmental certification and product labeling process. The specific socio-economic characteristics of consumers may well affect preferences for environmentally labeled forest products. In addition, exposure to the resource through work or leisure activities may influence concern for forest management practices, which may influence behavior.

Previous research focusing on how socio-economic characteristics and levels of exposure to the resource contribute to concern for environmental issues have produced widely varied results. Furthermore, there is a lack of information regarding how these concerns contribute to pro-environmental purchasing behavior. I attempt to determine the connection between these individual characteristics and consumer preferences for the environmental attributes of certified wood products.

As consumers become increasingly aware of and concerned for the sustainability of forest management practices, an opportunity becomes available to the forest products industry to address these concerns and provide the means by which consumers can satisfy them. A fundamental understanding of the concerns of consumers and what factors possibly motivate these concerns is imperative to the success of such a market. Past studies have provided information regarding consumer demand for environmentally certified forest products. Limited study, however, has been conducted on the factors impacting the effectiveness of forest certification and labeling programs. Ultimately, environmental certification programs are successful if they effectively communicate aspects of forest

management practices of most concern to the consumer, as well as, the compliance of certified forest product companies with those management practices. Furthermore, environmental certification programs are more successful if they effectively address the issue of credence in environmental certification programs by employing credible organizations to oversee such programs.

An understanding of the product, individual, and informational factors influencing consumer preferences for environmentally certified forest products is helpful in designing marketing, promotion, and labeling programs. In this study, I examine consumers' willingness to pay for improvements in specific forest management attributes as specified on environmentally labeled wood products. This study differs from previous work in that I pay particular attention to whether respondents' level of exposure to the forest resource contributes to pro-environmental purchasing behavior and enhanced values for environmentally preferred forest-management attributes.

To examine the preferences for and valuation of environmentally friendly goods, I explore consumer decisions regarding environmentally labeled forest products. First, a wide and diverse variety of goods are produced from wood, from raw lumber to paper products to household goods and furniture. This provides a broad base of product markets to examine. In addition, wood products provide a vast opportunity for environmental attribute examination of a renewable resource in that forestry and forest product manufacturing employ an extensive array of social, economic, and environmental management practices. Moreover, the environmental labeling of these products provide numerous marketing and

information schemes by which to compare how varying levels of information, mode of presentation, credibility of claims, and specific environmental attributes affect consumer decisions and valuation.

I examine the factors affecting environmental preferences, as demonstrated by those attributes of forest management practices of most concern to consumers, with respect to socio-economic characteristics. In addition to demographic variables such as age, gender, and education, I examine whether exposure to the resource contributes to pro-environmental purchasing behavior and enhanced values for environmentally preferred forest management attributes. Specifically, I explore such factors as the contribution of exposure to the forest environment through forestland ownership and participation in different types of outdoor recreation and how these contribute to pro-environmental purchasing behavior, as well as, the socio-economic variables theorized to contribute to enhanced values for environmentally preferred forest management attributes.

Chapter 2

REVIEW OF LITERATURE

Forests, as a renewable resource, have the opportunity to provide service flows, such as wood products and recreation, on a continuum with proper sustainable management practices. As such, specific attributes of forest resources, and hence, forest resource management, may be valued differently, and the values associated with any specific forest management attribute may also vary across individuals. Individuals' values for specific management attributes is presumed to differ according to the individual's socio-demographic characteristics and their experience with forests and forest management. Further, individuals' values for specific management attributes may differ according to the amount of information the individual has with respect to forest attributes and their management.

Valuation of Environmentally Preferred Forest Management Practices

Although several studies have been conducted regarding supply side perspectives on the value and viability of environmental certification programs[4], studies on the demand for environmentally certified wood products is limited.

[4] Vlosky also examined perspectives on forest certification of various stakeholders, such as foresters and retailers. Most of the respondents did not agree that there is a need for environmental certification of temperate forests in the U.S. It was the contention of the respondents that consumers will not pay a price premium for environmentally certified forest products. Furthermore, most respondents indicated that they unlikely to embrace environmental certification of forest products unless there is a demonstrated willingness of consumers to pay a premium to offset implementation costs.

According to a study by Ozanne and Vlosky (1997), 40 percent of respondents view certification as important. A 1992 *Advertising Age* survey indicates that 60 percent said, "they are now 'more likely to buy a product because of its environmental claims than they were three years earlier.'" (Rhodes, 1997) In the same study, 73 percent of respondents believe that environmental marketing claims, such as those made by environmental certification efforts, "'sometimes or very often influenced their purchasing decisions.'" (Rhodes, 1997)

With respect to the willingness of consumers to pay for environmentally certified products, Vlosky et. al. (1999) found that, on average, US residents were willing to pay a premium of 12.5 percent for environmentally certified forest products. A similar study by Ozanne and Smith (1995) indicated that 50 percent of sample respondents would purchase environmentally certified wood products with 34 percent indicating that they would be willing to pay a price premium for them. Furthermore, Ozanne and Vlosky (1997) discovered that the willingness to pay for environmentally certified wood product premiums varied across products when comparing such goods as a 2x4 stud, a ready to assemble chair, and a new $100,000 house. The price at which these products are valued obviously affects the additional premium to which a consumer is willing to pay. For example, respondents indicated that they would be willing to pay an average of 18.7 percent more for an environmentally certified stud with a base price of $1.00 versus only 4.4 percent more, on average, for a $100,000 new home. This discrepancy, however, may have more to do with the value-added nature of a fully constructed

home, which consists of much more than just lumber, compared to basic certified stud grade lumber with essentially no value added.

It should be noted, that in the above studies the specific forest management attributes of the certified wood products were not presented to consumers. Instead, individuals are asked to respond to questions regarding "environmentally certified" forest products with no specification of the certification criteria. Consumers were provided a basic definition of environmental certification, indicating the forests were sustainably managed and harvests were environmentally sound. However, consumers were, for the most part, left to their own devices to determine what environmental qualities these products hold. The willingness to pay for specific sustainable forest management practices, therefore, cannot be determined by the results of these studies.

Two studies have attempted to measure the willingness to pay for specific sustainable forest management practices. Hanley and Ruffell (1991) found that willingness to pay increased for some aesthetic and utilitarian forest characteristics (e.g. mean height of trees, views, facilities) while other such characteristics had no significant effect on valuation (e.g. presence of water and open space). Boyle and Teisl (1999) examined public preferences for timber harvesting practices on public lands and found that respondents were more concerned with the actual practices employed in harvesting areas than with the actual sizes of the harvest areas. This was reflected not only in their stated forest practice preferences but their willingness to pay to sustain or alter current forest management practices on public lands. Specifically, respondents preferred a

balance of conservation and harvesting with a higher willingness to pay assigned to such forest management practices as smaller harvest openings and the removal of slash.

Individual Factors Influencing Consumer Preferences for Environmentally Labeled Forest Products

Socio-economic factors such as age, gender, income and occupation may affect consumers' perceptions of forest management practices and environmental labeling policies. In addition, exposure to forests and forest management practices, and the way individuals use forests are likely to affect preferences for forest attributes. The level of an individual's concern, however, may or may not affect their willingness to engage in pro-environmental behaviors such as purchasing environmentally labeled products. Previous research, in fact, has shown an ambiguous relationship between stated environmental *concern* and engagement in pro-environmental *behavior*. Although some studies (e.g., Simmons & Widmar, 1990) have found a positive relationship between concern and behavior, a large body of research (e.g., Tracey and Oskamp, 1983, Oskamp et. al, 1991, Tarrant and Green, 1999) has reported weak relationships between environmental attitudes and pro-environmental behavior. With respect to the pro-environmental behavior of "environmental consumerism," Mainieri et. al. (1997) found that environmental concern among survey respondents did not usually carry over to their reported environmental buying habits. However, they posited that conceivable reasons that the respondents' pro-environmental consumerism fell

behind their environmental attitudes may include inadequate availability, labeling, and marketing of environmentally beneficial products, as well as, higher prices for such products.

Factors and environmental concern

The few studies that have examined how socio-economic characteristics influence an individual's preferences for, or concern over, forest management attributes have produced mixed results. Van Liere and Dunlap (1980) found age and education to be consistently associated with environmental concern; income and gender were not systematically correlated with environmental concern. Samdahl and Robertson (1989) found education to have a negative effect on perceptions of environmental regulations while age was shown to be positively associated with ecological behaviors and to a less degree on environmental concern..

One of the proposed explanations for the variation in previous research with respect to the association of socio-demographic characteristics on environmental concern is that environmental issues are "necessarily measured, explicitly or implicitly, in relation to other concerns." (Klineberg, et. al., 1998) Specifically, the Klineberg et. al study reports that two different attitudes are being measured by the way questionnaire items are phrased in previous studies: the perceived importance of environmental quality itself and the value to the respondent of the specific trade-offs that are associated, either explicitly or implicitly, with environmental protection in the wording of the questionnaire

item. In an analysis of four different aspects of environmental concern, only two demographic variables were found to be consistently correlated with environmental concern, age and education. Otherwise, the determinants of environmental concern varied greatly depending upon the wording and framing of the questionnaire items. Ultimately, respondents differed in the resources available to them and in the kinds of trade-offs they were willing to accept.

The possible existence of a relationship between concern for the environment and exposure to and use of the resource rests primarily on studies that examine the relationship between environmental concern and participation in those leisure activities that depend on the environment. Initiated by Dunlap and Heffernan (1975), most of the research has examined some variation of the original three main hypotheses: a) that there exists a positive association between participation in outdoor recreation activities and environmental concern, b) that there exists a stronger association between certain specific types of outdoor recreation activities and environmental concern than with other types of outdoor recreation activity participation, and c) that the association between participation in outdoor recreation activities and concern for protecting those aspects of the environment necessary for pursuing such activities is stronger than concern for more remote environmental problems.

Dunlap and Heffernan (1975) found that the assertion of the general hypothesis of a positive association between participation in outdoor recreation and environmental concern received only weak support. A stronger association between participation in certain types of recreation activities and environmental

concern, received substantial support. Support was also found for a stronger positive association between participation in recreation activities and those environmental concerns most closely related to the recreation activities than more distant environmental problems. Most of the subsequent studies (e.g.,Van Liere and Noe, 1981, Theodori and Luloff, 1998, Teisl and O'Brien, 2001a) are re-examinations or re-studies of the Dunlap-Heffernan hypothesis with widely varied results in all three parts of the original hypothesis.

With respect to other factors thought to influence environmental concern, Theodori et al. (1999) examined differences between forest landowners and the general public with respect to attitudes toward forest management policies. The sample, in fact, consisted of recreationists that were either forest landowners or non-landowners and, therefore, the results seem to reflect the influence of both landownership and participation in outdoor recreation activities. Although an overwhelming majority of both groups supported efforts in forest education and planning for conservation, there were measured differences between the two groups with respect to specific issues of forest management policy.

Factors and environmental behavior

Several studies have examined how socio-economic characteristics may influence an individual's choices of environmentally preferred forest management practices and subsequently labeled wood products. Hanley and Ruffel (1991) found that the willingness to pay for forest characteristics was affected by the socio-demographic characteristics of the respondents. Specifically, willingness to

pay was strongly and positively related to an individual's income but negatively related to the respondents' age. Ozanne and Vlosky (1997) finds that being female is positively related to an increased willingness to pay for environmentally labeled forest products. Overall, there have been mixed results with respect to the affect of socio-demographic characteristics and measures of environmental behavior.

In a meta-analyses of pro-environmental behavior studies, Hines et. al. (1987) found that the prediction of responsible environmental behavior appears to "involve a number of variables, none of which are likely to operate without interacting with others." Of the demographic characteristics examined (age, income, education, and gender), none were found to be significantly associated with pro-environmental behavior. Similarly, Balderjahn (1988) found some particular pro-environmental activities to be associated with socio-demographic characteristics, however, "no general picture of the ecologically concerned consumer can be drawn from the results."

Only two studies examine the relationship between a person's level of environmental *behavior* and their participation in outdoor recreation. Theodori et. al (1998) found considerable support for a positive association between participation in outdoor recreation and pro-environmental behavior. Teisl and O'Brien (2001a) find that participation in outdoor recreation is positively associated with stated environmental behavior. In addition, the level of behavior depends upon the type of recreational activity. However, the relative effects of the different recreation activities differ across separate measures of behavior.

Environmental Certification of Forest Products and Labeling Initiatives

The environmental certification labeling debate is largely about how much information to supply to consumers and who should be in charge of providing the information (Teisl and Roe, 1998). More specifically, producers have the ability to make environmental certification easy to read and comprehend, but there is little information regarding how producers should approach environmental certification labeling to provide such a service. In addition to how the information should be applied, the question arises as to who should be the supplier of the environmental certification information, specifically, who is deemed the most credible entity to oversee certification. There are few published studies examining these issues for certified forest products and those that exist provide little guidance to answer the above questions.

How much information should be provided?

It is unclear whether consumer demand changes with specific forest management practices or whether consumers are satisfied with a general assurance of the environmental quality of the product. One of the reasons for this is that most studies have presented respondents with either a vague description of the forest management practices associated with certification (e.g., Ozanne & Vlosky, 1997) or do not state the information provided to survey respondents regarding the practices associated with certification (e.g., Forsyth et. al, 1999). Recently, Teisl, O'Brien, and Peavey (2001) suggests that more detailed

environmental labels are more effective possibly due to increased credibility. In addition, more explicit labels provided the information necessary to allow consumers the most flexibility in applying their own value judgements.

Who should provide the information?

The success of labeling programs is partially contingent upon the perceived credibility of the information; one factor that can influence the label's credibility is the provider of the information. Regarding the credibility of environmental claims, Vlosky and Ozanne (1998) indicates that consumers regard non-governmental environmental organizations as receiving the highest vote of confidence to certify. However, in focus group research by Teisl et. al (2000), participants felt that independent organizations would be the most credible as environmental certifiers of wood products, followed by environmental groups. Government and industry groups were not highly favored. However, when participants were actually presented with a list of such organizations, government agencies were considered the most credible. (Teisl et al., 2000)

This is consistent with further research by Teisl, O'Brien, and Peavey (2001), which showed that when respondents were presented with a list of potential certifying organizations, most respondents chose a federal agency, followed by environmental groups and independent certifiers. Although only six percent of the respondents favored industry groups for environmental certification some environmental organizations fared little better; for example, only five percent of respondents wanted the FSC in charge of an environmental

certification and labeling program (Teisl and O'Brien, 2001b). Familiarity with the certifying organization, the widespread recognition of the US EPA versus the Forest Stewardship Council, seems to affect the consumer perception of the credibility of environmental certification policies.[5] Indeed, Teisl and O'Brien (2001b) found that familiarity was a primary factor in respondents' choice of certifying organization. Although, respondents explicitly stated preferences for government organizations in the certification process, actual simulated market experiments showed that respondents regarded the Sierra Club, a non-profit environmental organization, as a more credible certifier than the U.S. EPA.

The analysis in this study regarding factors influencing consumer preferences is differentiated so that consumer choices and values are analyzed with respect to differences in: 1) the amount of information the individual receives regarding the eco-labeling criteria; specifically, the presence of supplemental attribute information not displayed on the label, 2) the organization monitoring compliance with eco-labeling criteria, and 3) individual characteristics (i.e. personal demographics such as age, education, participation in forest recreation activities, and acres of forestland owned). I specifically examine demographics and whether exposure to the forest environment through land ownership, forestry and wood product industry occupations, and/or participation in outdoor recreation activities contributes to pro-environmental purchasing

[5] For the supply side, US wood products manufacturers fell that they themselves are the most trusted group to certify forest management and harvesting. (Vlosky and Ozanne, 1997.) Of the wood products retailers, the federal government proved to be the least trusted organization to certify forest management practices while independent third party organizations were viewed as the most trusted.

behavior and enhanced values for environmentally preferred forest management attributes.

Chapter 3

THEORETICAL MODEL

To provide a modeling framework to measure changes in consumer choice behavior and welfare due to changes in specific credence attributes (e.g., changes in the environmental quality of specific forest management practices) one first needs to know how perceptions of environmental quality enters an individual's utility function (here defined in terms of a purchase occasion or decision). The utility evaluation can be represented by the indirect utility function

1) $V = v\{\mathbf{A}_1, \mathbf{p}, M, \mathbf{D}\}$

where **A** denotes a vector of perceived environmentally related assessments for m products, **p** is a corresponding vector of prices and M denotes income. **D** denotes of vector of individual characteristics (such as age, education and the individual's level of exposure/use of forest attributes) that explain differences in utility functions across individuals. V^S is increasing in **A** and M, decreasing in **p**.

The technology that extracts and translates environmental information into an assessment of a product's environmental impact can be viewed as a 'household production' process by which an individual combines her prior environmental knowledge, cognitive abilities, time and the environmental information presented during the purchase decision. Thus, we could model the assessment process during the purchase decision as:

2) $A^S_j = f(S_j, G, \mathbf{D})$

where A^S_j denotes the (subjectively) assessed environmental impact of purchasing good j given information set S (i.e., $\mathbf{A}^S = [A^S_1,...A^S_m]$), S_j is the environmental

information displayed about product j at the point of purchase, and G denotes the consumer's prior stock of environmental information which may include information from news accounts, firm-provided advertising and public education campaigns.

The objective level of the environmental impact characteristics represented by the information variable S is denoted by θ. For example, if S represents a dolphin-safe claim on a canned tuna label, then θ denotes that the production of the tuna led to no actual dolphin deaths. θ is separate from the assessment function because the individual does not observe it at the time of purchase except through the variable S. Although θ may be unobservable to the consumer at the time of the purchase decision, we include it within the discussion to distinguish between the factor that affects consumer decisions, S, and the one that ultimately determines the environmental impact of production, θ.

We can model the individual's utility, once a choice is made as:

3) $V_l = v(\mathbf{A_l}(S_l), M\text{-}p_l)$ if y_l is chosen

where $\mathbf{A_l}$ is a vector of product attributes for the chosen alternative y_l, $\mathbf{S_l}$ represents the vector of information about the product attributes, and p_l is the price of the choice y_l (other arguments as defined; some arguments dropped for simplicity).

Under a random-utility framework, there are unobservable components of the utility functions of individuals that can be contained in the attributes of the individual, the choice set or both. Therefore, the utility function of the individual is treated as random with a given distribution such that:

4) $V_i = \nu \{ \mathbf{A}_i(S_j), M\text{-}p_i \} + \varepsilon_i$

where ε_i is the unobservable component of the individual's utility function. Therefore, the choice of alternative y_1 by the individual indicates that the utility associated with y_1 is greater than the alternative such that:

5) $\nu \{ \mathbf{A}_1(S_1), M\text{-}p_1 \} + \varepsilon_1 > \nu \{ \mathbf{A}_0(S_0), M\text{-}p_0 \} + \varepsilon_0$

The probability that the individual will choose alternative y_1 is equal to the probability that the utility associated with y_1 is greater than the utility of the alternative, y_0:

6) $\Pr(y_1) = \Pr [\nu \{ \mathbf{A}_1(S_1), M\text{-}p_1 \} + \varepsilon_1 > \nu \{ \mathbf{A}_0(S_0), M\text{-}p_0 \} + \varepsilon_0]$

Welfare changes can be calculated directly through compensating variation:

7) $\nu \{ \mathbf{A}_1(S_1), M\text{-}p_1 - CV, \mathbf{A}_1 (\mathbf{I}_1)\} = \nu \{ \mathbf{A}_0(S_0), M\text{-}p_0 \}$

where CV is the amount of money the individual would require to make him/her indifferent between the preferred alternative, y_1, and the lesser desired alternative, y_0.

Chapter 4

METHODS

Previous research has provided some information regarding consumer demand for environmentally certified forest products. Limited study, however, has been conducted on the consumer perspective of and preferences for forest product certification and labeling programs. Ultimately, environmental certification programs are successful if they effectively communicate aspects of forest management practices of most concern to the consumer. In addition, a fundamental understanding of those product, individual, and informational factors influencing consumer preferences for environmentally certified forest products is an essential component of the marketing, promotion, and standardization of the environmental certification and product labeling process. To gain insight into these important questions we designed and administered a mail survey.

Survey Sampling and Administration

We obtained a sample of 3,290 U.S. adult residents from International Communications Research of Media, Pennsylvania (ICR). ICR conducted a telephone screening survey, using random-digit dialing (RDD), during the spring of 2000 to identify potential mail survey respondents. The sample design consisted of a nationally representative group of adults with an additional over-sample of New England and Maine residents. Except for the over-sampling, the randomness of the dialing process should produce a sample similar to one drawn

through the use of probability sampling if there is no telephone non-coverage bias in the area under study and there is no non-response bias. For all analysis the data are weighted to adjust for the over-sample.

During the summer of 2000, we conducted a mail survey of the pre-recruited respondents. The survey was administered in three waves according to modified Dillman method involving survey mailings and reminder cards. In addition, a five-dollar incentive (paid when individuals returned their survey) was provided to increase response. In total 1,948 individuals responded to the mail survey and 36 were returned as undeliverable for a response rate of 60 percent (1,948/3,290-36).

In general, the overall resulting sample of the total 1,948 survey respondents is relatively representative of the characteristics of the U.S. adult population (Table 1). Our sample is slightly older, more likely to be white and have slightly more education on average. Respondents ranged in age from 17 to 88 years and had a minimum of 10 years of education.

Table 1. Socio-economic Characteristics of Survey Respondents and of U.S. Adult Population.

	Survey respondents	U.S. adults
Gender (percent male)	48	48
Average age	46	44
Race (percent white)	84	80
Average education	14.2 years	12.9 years
Average household income	$54,400	$54,800
Average acres of owned forestland	5.0	-.-

-.- indicates missing information

Survey Design and Implementation

The survey design was based largely on results obtained from focus group studies conducted during the fall of 1999 (Teisl et. al., 2000). Conducted with individuals who had purchased one or more wood products in the previous six months, moderators attempted to ascertain consumer opinion regarding such issues as the characteristics of the wood product considered in the purchase decision, including environmental concerns related to wood products and their influence on the purchase decision. The consideration of products being classified as "wood" products and the frequency of purchase and variation of price of particular wood products contributed to the selection of paper towels, birdhouse, and wooden chair in the survey instrument. Additionally, focus group opinion of certifying organizations, label format, and level of information provided also contributed instrumentally to the survey design process. (Teisl & Roe, 2000)

The mail survey instrument consisted of twenty-five questions in six sections (the complete survey instrument is attached as appendix A). Sections I - IV, not utilized in this study, involved questions regarding respondent perceptions of forest management practices and various environmental labeling programs and prior history of wood product purchase. Specifically, Section I elicited respondents' general perceptions of forest management practices. Section II focused on obtaining respondent reactions to different environmental labels on wood products. Respondents were shown an environmental label with differing levels of information and certifying organizations. Respondents were asked to rate the label in terms of credibility, perceived environmental friendliness of the

product, satisfaction with the level of information provided, and the likelihood of purchase.

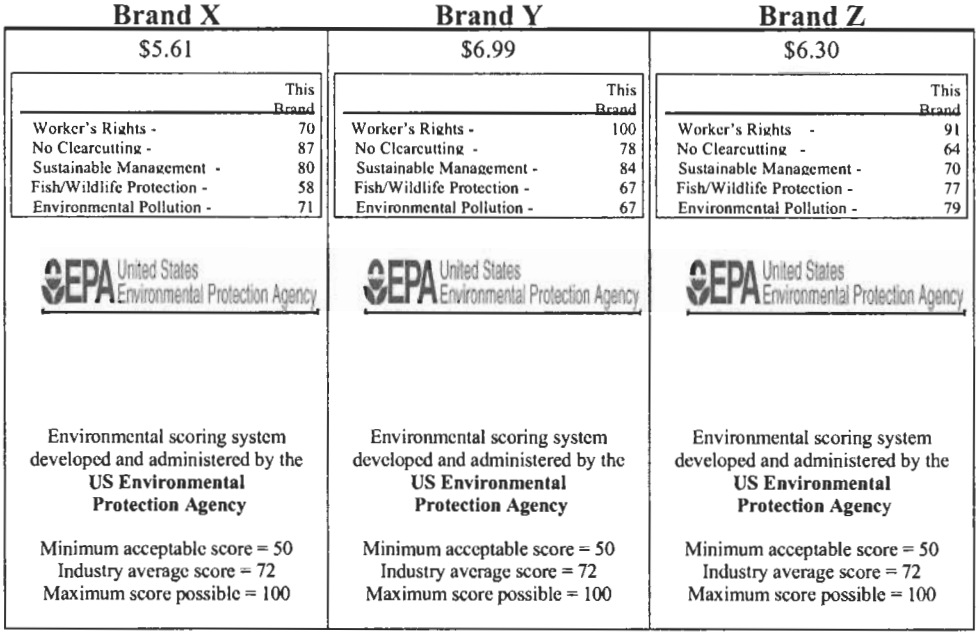
In Section III, respondents were asked questions to document the frequency and dollar value of purchases for various wood products. In Section IV, respondents were provided with descriptions of three wood products. Products differed in terms of price and whether it displayed an environmental certification label. Environmental labels differed in terms of the amount of information and who acted as the certification organization. Among the three product labels displayed, respondents were asked to choose the most desirable.

Section V is the basis of the analysis undertaken in this paper. In this section, respondents were asked to respond to 3 separate product choice scenarios. In each choice scenario respondents were asked to view information about 3 brands of either a six-pack of paper towels, a birdhouse, or a wooden chair. The brands for each choice scenario differed in terms of the price and the environmental information displayed (Figure 1 illustrates an example). To counter any ordering effects the order of presenting the product choice scenarios was varied across the survey instruments.

After viewing the three brands, respondents were asked to assume that they were in a store looking to purchase the particular product (i.e., I assume that all respondents are 'in the market' for the good). Respondents were then asked to indicate which of the three brands they would choose; importantly, respondents were also allowed the option of not choosing any of the displayed brands. The rejection of all three brands in a choice set was interpreted as a rejection of the

product attribute bundles rather than respondent non-participation in that product's market.

Figure 1. Environmental Certification Labels for a 6-Pack of Paper Towels



Although each respondent was provided with three choice scenarios, I only analyze and discuss two of them; paper towels and wooden chair.[6] These two choice scenarios were selected for two reasons. First, the products vary greatly in base price (Table 1) and frequency of purchase (paper towels are a

[6] Not all respondents answered both the paper towel and wood chair scenarios. To ease the comparison of results across the two choice scenarios I tested whether the demographic characteristics of the respondents answering the two choice scenarios were different. There were not significant differences across the two sets of respondents for all characteristics tested.

frequently purchased household product whereas chairs are not).[7] Thus, analysis of these two products allows us the opportunity to observe changes in respondent reactions to the environmental information across a range of prices.

I do not include the birdhouse data in the analysis due to the reasonableness of maintaining the 'in the market' assumption. To determine whether my market assumption was reasonable, I first analyzed the respondents who stated that they rejected all products within a choice scenario. Of the 10 percent of respondents who chose not to 'purchase' a six-pack of paper towels, 96 percent had purchased paper products at least once in the past year. Likewise, of the 16 percent who chose not to purchase a wooden chair, over sixty percent had purchased wooden furniture in the past year. Thus, the 'in market' assumption seemed reasonable for these two product sets. However, this assumption seemed unreasonable for the birdhouse choice scenarios. Close to one-quarter of the respondents chose not to purchase a birdhouse. Further a relatively large percentage of these rejections (32 percent) were made by respondents who had not purchased a wooden household item, like a birdhouse, in the past year.

The choice scenarios use an environmental labeling scheme that mimics a mandatory labeling program where each label provides detailed environmental information (i.e., a Type III label) that is standardized across the products in the choice set. There are several reasons for this approach. First, one goal of this section is to determine the values individuals have for different forest

[7] Approximately ninety-four percent of respondents indicated that they had purchased paper products, such as paper towels, in the last year while only sixty-four percent indicated that they had purchased wood furniture, such as a wooden chair, in the last year.

management practices; this requires the presentation of detailed attribute information. Further, we wanted the information in the choice scenarios to appear credible and to be easy to use. Previous evidence suggests that consumers favor Type III labels and find these labels more credible (Teisl, O'Brien and Peavey, 2001). Further, there are many studies indicating that label information presented in a standardized format is easier for consumers to use when making cross-product comparisons.

Five forest management attributes were displayed on the labels (Figure 2),. The specific attributes displayed were determined by the results of focus group studies (Teisl, et. al, 2000) and the general criteria currently used by existing forest certification programs (i.e., the Forest Stewardship Council and the American Forest and Paper Association). Focus group research indicated the most important forest management criteria to respondents to be: "worker health and safety are assured," "clearcutting is not allowed," "forest management ensures long-term sustainability of harvests," "forest operations involve minimum waste," and "forest operations do not harm threatened/endangered species and their habitats" and "bird and animal nesting habitat is protected." From these, the environmental attributes used in the simulated market experiment were: "Worker's Rights," "No Clearcutting," "Sustainable Management," "Fish and Wildlife Protection," and "Environmental Pollution." The actual values for the price and environmental attributes (the 'scores') displayed on each label were generated from a normal distribution (Table 2); attribute values were randomly assigned across surveys.

Table 2. Product Attribute and Price Information.

	Paper Towels			Chair		
	Avg.	Max.	Min.	Avg.	Min.	Max.
Price	$6.00	$2.87	$9.22	$150.77	$70.00	$237.00
A1 – Worker's Rights	74.8	39	100	74.9	39	100
A2 – No Clearcutting	75.1	38	100	74.9	38	100
A3 – Sustainable Management	74.9	42	100	74.9	42	100
A4 – Fish & Wildlife Protection	75.0	35	100	75.0	39	100
A5 – Environmental Pollution	74.6	37	100	74.6	37	100

Studies have provided mixed results regarding consumer perspectives on the credibility of environmental certification organizations. To determine whether respondent choices and the resulting willingness to pay for environmental attributes would be affected, we varied the certification agency displayed on the label. The certification organization varies across surveys (and is randomly assigned to the survey) but is constant within a single survey. The three certifiers used were the Environmental Protection Agency, the Forest Stewardship Council, and the Forest Stewardship Council with an additional 'Made in Maine' logo from the Maine Wood Products Association (Table 3).

Table 3. Label Format and Content.

	Paper Towels	Chair
Certification Organization (% displaying)		
EPA	34.5	34.3
Forest Stewardship Council	35.8	35.9
FSC + Made in Maine	29.8	29.8
Presence of Additional Attribute Information (% displaying)	35.3	34.9

Although the environmental scores vary across brands within a choice set, and varied across individuals, the displayed scoring parameters did not vary. Specifically, each label presented the same information regarding the "Industry Average Score" (an attribute score of 72 is indicated in the survey instrument as average for the wood products industry), and the minimum acceptable and maximum possible scores. These certification parameters were held constant to provide a status quo option from which to measure differences in willingness to pay for improvements in attribute values.

Because some of the environmental attributes covered a range of environmental management issues, additional attribute information was provided to some respondents to determine if the additional information affected choice decisions and the resulting valuation estimates. Specifically, an additional section that provided more information about the five attributes (Figure 2) was randomly assigned to a third of the survey respondents.

Figure 2. Attribute Information

Below is a description of the environmental scoring program:

- **Worker's Rights** – This score indicates the degree to which forest management operations maintain or enhance the social and economic well-being of forest workers and local communities. Companies obtain higher scores if they employ workers from the local community, ensure adequate worker safety, allow worker's to unionize and provide fair pay to workers.
- **No Clear-cutting** – This score indicates the degree to which the company's forests are harvested without the use of clear-cutting. Clear-cutting is the practice of harvesting all trees in a given area at the same time; and cover areas greater than 1 acre.
- **Sustainable Management** – This score indicates the degree to which the company manages forests so that they are not depleted or permanently damaged. Companies obtain higher scores if they practice selective cutting methods, replant harvested areas, encourage timber stand improvement, and actively prepare harvested areas for natural regeneration.
- **Fisheries and Wildlife Protection** – This score indicates the degree to which the company's forest operations protect fish and wildlife species and their ecosystems. Companies obtain higher scores if they actively document and protect any naturally occurring species or ecosystems, especially if they are rare or fragile.
- **Environmental Pollution** – This score indicates the degree to which the company's forest operations reduces air, water and land pollution. Companies obtain higher scores if they reduce or eliminate the use of chemical pesticides, herbicides, and fungicides and/or take steps to minimize soil erosion.

The last section of the survey was dedicated to questions of the socio-economic and demographic nature. Such questions as gender, age, level of education completed, household income, and participation in outdoor recreation activities were asked in Section VI. This section is also significant to the objectives of this study as I am examining factors that affect environmental wood products purchasing decisions and willingness to pay. Specifically, I am looking at those socio-economic and demographic characteristics such as age, gender,

land ownership, and education which are thought to influence the decision to purchase such products, as well as, the premium willingness to pay for environmentally labeled wood products.

Chapter 5

THE EMPIRICAL MODEL

A fundamental understanding of the factors influencing consumer preferences for environmentally certified forest products is an essential component of the marketing, promotion, and standardization of the environmental certification and product labeling process. I, therefore, examine the relationship between independent consumer characteristics and pro-environmental purchasing preferences and, thereby, assess a potential consumer profile by associating demographic characteristics, such as age and education, with valuation of environmentally labeled wood products.

Previous research focusing on how socio-economic characteristics contribute to concern for environmental issues have produced widely varied results. Furthermore, there is a lack of information regarding how these concerns contribute to pro-environmental purchasing behavior. I attempt to establish the connection between these individual characteristics and consumer preferences for the environmental attributes. In addition, I examine the association of consumer attributes and environmental attribute preferences in an attempt to identify forest management practices of most concern to specific consumer profiles and derive the larger implications of environmental concern by such individuals.

In addition to demographic variables such as age, gender, and education, I examine whether exposure to the resource contributes to pro-environmental purchasing behavior and enhanced values for environmentally preferred forest

management attributes. Environmental knowledge is a key component in determining consumer preferences for environmentally certified forest products. For example, one would expect that the greater the level of familiarity and knowledge regarding current forest management practices and the environmental benefits of altered management practices, the greater the influence of environmental certification programs promoting sustainable forest management. Therefore, I specifically explore such factors as the contribution of exposure to the forest environment through forestland ownership, employment in the wood products and industry and participation in different types of outdoor recreation to pro-environmental purchasing behavior.

I attempt to address the specific preferences for environmentally certified forest products and subsequent attribute scores by socio-economic factors including age and education, and work and leisure time pursuits and the degree of exposure to the forest environment by the nature of these pursuits. In addition, this study differs from previous examinations of consumer perceptions and preferences for environmentally certified forest products in the particular attention is paid to the socio-economic characteristics of respondents and how changes in these characteristics affect consumer preferences for explicitly labeled forest products and environmental attributes of these products and whether respondents' level of exposure to the forest resource contributes to pro-environmental purchasing behavior and enhanced values for environmentally preferred forest-management attributes.

The primary goal of this study is to estimate respondents' willingness to pay for perceived improvements in the environmental quality of wood products. In addition I am interested in determining the influence that different individual and informational factors have on respondents' choice behavior, and values for perceived improvements in the environmental quality. Given the available data I operationalize the theoretical model as:

$$8)\ C_{ik} = \alpha_1 + \alpha_2\, price_{ik} + \sum_j \alpha_{3j}\,(a_{ijk}) + \sum_j \alpha_{4j}\,(vector_i * a_{jk}) + \sum_j \alpha_{5j}\,(epa * a_{jk}) + \sum_j \alpha_{6j}\,(fsc * a_{jk}) + \sum_j \alpha_{7j}\,(ed_i * a_{jk}) + \sum_j \alpha_{8j}\,(age2_i * a_{jk}) + \sum_j \alpha_{9j}\,(occ_i * a_{jk}) + \sum_j \alpha_{10j}\,(own_i * a_{jk}) + \sum_j \sum_m \alpha_{11j}\,(part_{im} * a_{jk}) + \sum_j \alpha_{12j}\,(sex_i * a_{jk})$$

where C_{ik} is a dummy variable denoting individual i's choice of the kth product (either product X , Y , Z) within a specific choice set (paper towels or wood chair); 1 denotes the product was chosen, 0 otherwise. Price is the price of the kth product. a_{jk} is a vector of environmental certification scores presented on the kth's product label (j = Worker's Rights, No Clearcutting, Sustainable Management, Fish and Wildlife Protection, or Environmental Pollution); vector denotes the presence of the information treatment (Figure 2); epa denotes E.P.A. certification; fsc denotes Forest Stewardship Council certification; ed is the level of education of the respondent in terms of years; age2 denotes the age of the respondent (divided by 10); occ indicates whether or not the respondent works in a field pertinent to working forests or the wood products industry such as logging, paper manufacturing, or carpentry (0 = no, 1 = yes); own denotes whether the respondent owns forest land or not (0 = no, 1 = yes); part is a vector of dummy

variables indicating whether or not the individual participated in particular outdoor recreation activities (defined below) (1 = participated in the specified outdoor recreation activity, 0 otherwise); and sex is the gender of the respondent (0 = male, 1 = female);with i denoting that the variable remains constant across observations for the individual.

In the survey respondents were asked about participation in 10 different forest-based recreational activities. Since each recreation activity variable is interacted with the five forest management attributes, including all 10 recreational activities would lead to 50 additional parameters to be estimated. Four recreation activities (snowmobiling, atv riding, cross-country skiing or "other recreation activities,") were dropped from the analysis due to the small number of participants; respondents who solely participated in these activities were also dropped from the analysis. In addition, preliminary research indicates that participating in some recreational activities are similar in terms of their impact on an individual's level of environmental concern, interest and potential purchase behavior (O'Brien and Teisl, 2001); similarities across groups of recreational activities reduces the need to analyze them separately. As a result the following recreational activities were grouped together: hunting with fishing and hiking with camping.

To further reduce the number of variables in the final estimated model, I ran several initial split-sample regressions and used likelihood-ratio tests to determine if the vector of estimated parameters were different across the split sample. For example, to test the influence of gender I ran the above model

(without the gender variables) three times, once for males in the sample, once for females and then once with a pooled sample of males and females. A likelihood-ratio test can then be used to determine if the estimated parameters were different across males and females. I used this procedure to test the influence of three separate sets of variables: SEX (denotes whether the respondent was male or female), OWN (denotes whether the respondent owns forest land or not) and OCC (indicates whether or not the respondent works in a field pertinent to working forests or the wood products industry). Gender was found to be insignificant in both equations (Table 4) and was, therefore, dropped from further analysis. The variables OWN and OCC, while not significant in the paper towels equation, were found to be significant in the chair equation and were, therefore, retained in the final model.

Table 4. – Chi-square Test Results for Indeterminate Variables

Variable	Paper Towels		Chair	
	Chi-square	P–value	Chi-square	P–value
Own = Forest land ownership	42.4	0.99	87.5	0.04
Occ = Employment in the forest products industry	68.2	0.40	100.2	0.00
Sex = Gender of the respondent	69.1	0.37	77.2	0.16

It is expected that the parameter estimate on price will be negative. Alternatively, it is expected that the parameter estimates on the five attributes will be positive. That is, consumers will be less likely to purchase a product as the price increases but more likely to purchase a product as its "environmental friendliness" increases as indicated by higher environmental attribute scores.

With respect to the information treatments for the environmental labels, it is believed that individuals will respond favorably to additional information that may help to define or clarify the five environmental attributes. Therefore, it is believed that the parameter estimates on vector information will be positive. I am uncertain how respondents will react to the three certifying organization formats. There are essentially only two certifying entities presented, a government organization and an independent third party organization. The third certification format is simply an extension of the independent third party certification, a logo indicating that the product was made in Maine.

There are mixed results stemming from previous research with respect to individual characteristics. Age has produced mixed results thus it is unclear whether age will have a positive or negative relationship with purchasing environmentally labeled forest products. Education is hypothesized to positively affect purchasing preferences of environmentally labeled forest products. Measures of exposure through land ownership and participation in outdoor recreation is thought to also contribute positively to preferences. That is, if a person owns and/or recreates on forestland, he/she is presumed to have a better understanding of forest management issues and this may possibly contribute to

enhanced levels of environmental concern. Therefore, heightened environmental concern regarding forest management issues by these populations is expected to increase the likelihood of purchasing goods that are labeled as "environmentally friendly." Occupation may or may not lead to enhanced values for particular forest management practices. It is expected that, at the very least, occupation in forest based industries would contribute to enhanced values for "worker's rights."

The choice scenarios had respondents choose among a set of three alternative wood products. Because the choice of one product was contingent upon the rejection of the two remaining products in the choice set, estimation using conditional or discrete choice logit techniques would be appropriate. However, discrete choice estimation of the full model did not lead to convergence As a result, final estimation of the full model was with binomial logit.[8]

It should be noted that the coefficients that are estimated by the logit model cannot be interpreted as the marginal effect on the dependent variable. Specifically, the coefficients do not indicate that a one-unit increase in any of the explanatory variables will increase the probability of a particular value for y, in this case 0 for "no" and 1 for "yes." The amount of an increase in the probability of a particular binary value for y depends on the initial values of all of the explanatory variables and their subsequent coefficients. The equation is written as:

$$9)\quad \frac{\partial P_i}{\partial x_{ij}} = \frac{\beta_j e^{(-xi'\beta)}}{[1 + e^{-xi'\beta}]^2}$$

[8] A simpler version of the model estimated with conditional logit techniques did converge. We compared results from this estimation with a similar model estimated with binomial logit; results (signs and significance levels) were similar between the two estimation procedures.

Or the marginal effect of x_j on the conditional probability of y can be written as[9]:

$$10) \quad \frac{\partial E(y_i | x_i\beta)}{\partial x_i} = f(-x'\beta)\beta_j$$

Willingness to pay estimates were derived from the binomial logit model estimation as follows:

$$11) \quad WTP = \frac{n}{2j} * x_n$$

where n are the parameter estimates on the right hand side variables with the exception of the parameter estimate on price, 2j is the parameter estimate on price and x n are the right hand side variables including the attribute scores, label format and information variables, and personal attributes.

To calculate willingness to pay one needs to calculate changes based upon some baseline scenario for all the regression variables (except price). The baseline scenario with respect to the forest management attributes is the status quo attribute score of 72 (as indicated in the survey instrument as the "Industry Average Score"). In addition, the baseline scenario assumes no additional attribute information (i.e., no 'vector' information) and the certifying agency is assumed to be the Forest Stewardship Council certification with an additional Made in Maine endorsement. The baseline consumer profile, derived from year 2000 census information, is a 44 year old respondent with 12.9 years of education, who does not participate in outdoor recreation activities, is not a landowner, and does not work in the forest or wood products industry. Numerous willingness to

[9] For this equation, the direction of the effect of a change in x_j depends only on the sign of the β_j coefficient. Positive values of β_j imply that increasing x_j will increase the probability of the response; negative values imply the opposite.

pay measures were obtained by increasing attribute scores by one point for various consumer profiles such as landowners, and participants in various outdoor recreation activities.

Chapter 6

RESULTS

The results will be presented in several sections. To allow a broader discussion of the regression results I first present descriptive statistics on measures of environmental concern and behavior, and measures of the credibility of alternative certifying organizations that were asked in other areas of the survey instrument. I then follow with a presentation of the regression analysis and discuss select parameter estimates and statistical tests. I complete the results with a presentation of the estimated marginal effects and willingness-to-pay estimates.

Descriptive Analysis

To ascertain the level of familiarity of respondents with environmentally labeled wood products, respondents were asked whether or not they had seen any wood products displaying an environmental certification label in the last year. In general, respondents are not that familiar with environmentally labeled wood products; only about six percent of our sample had recently seen an environmentally labeled wood product.

Respondents were also asked both how interested they were in how forests are managed and what percent of U.S. forests, in their opinion, were managed in an environmentally friendly manner (Table 5). I am interested in respondents' views on these two issues because if respondents are relatively satisfied with forest management practices in this country they may not feel the need for, or be receptive to, an environmental certification initiative. Furthermore, if they are

simply not interested in the topic, responses to the simulated market experiment may reflect this indifference. However, we found that over 90 percent of our sample were at least "somewhat interested" in forest management issues and less than one-quarter were satisfied that forests in the U.S. are managed in an environmentally friendly manner.

Table 5. Respondents' Level of Interest in, and Opinions of, Forest Management.

	Percent Stating
Level of interest in forest management	
1 = Not at all interested	2.2
2	6.1
3 = Somewhat interested	36.0
4	25.8
5 = Very interested	29.2
No response	0.7
Opinions regarding the percent of U.S. forests managed in an environmentally friendly manner	
0 = None	0.8
25 = Some	37.3
50 = Half	37.2
75 = Most	22.0
100 = All	1.4
No response	1.3

- Columns may not sum to 100 due to rounding

Preferences for environmentally labeled forest products are hypothesized to be a function of exposure to the forest resource. As we specifically asked about interest and opinions regarding forest management practices, I wanted to determine if there were, in fact, differences between individuals exposed to the

resource through work or play and those individuals who have relatively little interaction with the forest resource (Tables 6.1 – 6.3).

Table 6. Respondents' Level of Interest in, and Opinions of, Forest Management;
1. Split by Forestland Ownership.

	Own forestland	Does not own forestland
	Percent stating:	
Level of interest in forest Management		
1 = Not at all interested	1	2
2	4	6
3 = Somewhat interested	22	38
4	26	26
5 = Very interested	48	27
No response	0	1
Opinions regarding the percent of U.S. forests managed in an environmentally friendly manner		
0 = None	1	1
25 = Some	44	37
50 = Half	32	38
75 = Most	21	22
100 = All	1	1
No response	1	1

- Columns may not sum to 100 due to rounding

Table 6. Continued;

2. Split by Whether the Respondent Works in the Wood Products Industry.

	Works in industry	Does not work in industry
	Percent Stating:	
Level of interest in forest management		
1 = Not at all interested	2	2
2	1	7
3 = Somewhat interested	20	37
4	28	26
5 = Very interested	49	27
No response	1	1
Opinions regarding the percent of U.S. forests managed in an environmentally friendly manner		
0 = None	3	1
25 = Some	40	37
50 = Half	34	37
75 = Most	20	22
100 = All	3	1
No response	1	1

- Columns may not sum to 100 due to rounding

I found significant differences between: landowners and non-landowners (χ^2_5=40.0457, p=<0.0001), individuals who work in the forest products industry and those who do not (χ^2_5=37.4381, p=<0.0001), and recreationists and non-recreationists (χ^2_5=51.8348, p=<0.0001) with respect to interest in forest management practices. I found the majority of these three exposure groups, for the most part, to be "very interested" in how forests are managed, while the majority of their counter-parts reported to be only "somewhat interested" in how

forests are managed. With respect to their opinions regarding the environmental friendliness of U.S. forests, landowners (χ^2_5=4.2969, p=0.5075) and recreationists (χ^2_5=6.4355, p=0.2661) were not significantly different from non-landowners and non-recreationists, however, workers in the wood products industry did differ significantly from non-industry workers (χ^2_5=9.3151, p=0.0971).

Table 6. Continued;
3. Split by Whether Respondent Participates in Forest-based Recreation.

	Participates	Does not participate
	Percent responding:	
Level of interest in forest management		
1 = Not at all interested	2	4
2	5	9
3 = Somewhat interested	33	46
4	28	19
5 = Very interested	32	21
No response	1	1
Opinions regarding the percent of U.S. forests managed in an environmentally friendly manner		
0 = None	1	1
25 = Some	38	35
50 = Half	37	38
75 = Most	22	23
100 = All	1	1
No response	1	3

- Columns may not sum to 100 due to rounding

Although approximately 24 percent of respondents did not participate in any outdoor recreation; of those who did participate, almost 80 percent

participated in more than one recreational activity (Table 7). Hiking and camping were listed as the activities individuals participated in most often; approximately 60 percent of those who recreate hike and/or camp. Additionally, of those who recreate, approximately 40 percent hunt and/or fish and approximately 35 percent participated in wildlife watching. Likewise, approximately 35 percent participated in boating/canoeing while only 18 percent participated in nature photography.

Table 7. Percent of Sample Participating in Different Numbers of Forest-based Recreation Activities.

	Percent Stating
Percent not participating:	24
Percent participating in:	
One activity	16
Two activities	18
Three activities	16
Four activities	12
Five activities	8
Six activities	4
Seven activities	1

- Columns may not sum to 100 due to rounding

In addition to other measures of environmental concern and behavior, respondents were asked which certifying organization would they most prefer to oversee an environmental certification labeling program (Table 8). Overall, respondents felt government organizations to be the most trusted organization to oversee environmental certification, followed by environmental organizations and

independent third party organizations. Industry groups were viewed as the least desired certification organization.

Table 8. Respondent Preferences for Organizations Certifying Environmental Labeling Programs for Wood Products.

	Percent stating:	
Government agencies	49	
U.S. Forest Service		62
U.S. Environmental Protection Agency		38
Other		1
Environmental organizations	30	
National Wildlife Federation		34
Nature Conservancy		27
Sierra Club		17
Forest Stewardship Council		14
National Audubon Society		6
Other		1
Independent certifier	15	
Scientific Certification Systems		58
Consumer's Union		36
Other		5
Industry group	6	
American Forest and Paper Association		91
Other		9

- Columns may not sum to 100 due to rounding

With respect to certifying organizations, the US Forest Service was specified as the most preferred organization by both sub-samples, followed by the EPA. Of the five environmental organizations listed in the survey, the National Wildlife Federation was deemed the most preferred by both groups; it was the third most preferred certification organization. Only two independent third party

organizations were provided in the survey with Scientific Certification Systems, SCS, considered the fourth most preferred. Overall, industry groups were regarded with the least propensity with respect to preferences for environmental certification programs; only American Forest and Paper Association was provided as an example of an industry group. It was listed in seventh place among preferred environmental certification organizations behind the Nature Conservancy and the Consumer's Union. It was, in fact, more highly regarded than the Forest Stewardship Council, which was used in our simulated market experiment. The FSC was the second to least trusted certification organization.

To help determine if familiarity was an influence I analyzed respondent choice of certifier by their reasons motivating their choice. The results indicate that familiarity is indeed a significant factor (Table 9). Government agencies and environmental organizations have a high degree of familiarity relative to independent and industry-based certifiers.

Table 9. Percent of Respondents Citing Reasons for Choosing a Particular Environmental Certifier, by Certifier Chosen.

	Government agency	Environmental organization	Independent certifier	Industry group
I'm familiar with the organization	42[a]	43	13	6
It is a government agency	64	1	0	2
It is an environmental organization	22	80	2	1
It is an independent organization	2	5	90	4
It is an industry group	1	0	1	78

a - Columns do not sum to 100 percent because multiple responses were allowed.

Regression Analysis

As is expected, price is negative and significant in both equations (Table 10). In addition, all of the parameter estimates on the environmental attribute variables are positive although the significance of these parameters varies across the two equations.[10] In the chair equation all of the five environmental attributes are significant whereas in the paper towels equation, only "Worker's Rights" and "Fish and Wildlife Protection" are significant. Hypothesis testing[11] reveals that the estimated parameters associated with the attribute variables are significantly different from one another in the paper towels equation ($\chi^2_4 = 8.2133$, $p = 0.0841$) but not in the chair equation ($\chi^2_4 = 3.4859$, $p = 0.4800$).

The presence of the additional information (VECTOR) increases the importance of the "Fish and Wildlife Protection" attribute in the paper towel equation and the "Sustainable Management" attribute in the chair equation. However, the additional information (VECTOR) decreases the importance of the "No Clearcutting" attribute in the paper towel equation. Joint tests of significance indicate that for individuals viewing the VECTOR information, "Fish and Wildlife Protection" positively impacts the purchase decision ($\chi^2_1 = 8.8266$, $p = 0.0030$). Likewise, a higher score on "Sustainable Management" positively

[10] Due to the interaction variables, the parameter estimates for the environmental attributes reflect the impact of these attribute scores for the 'baseline' respondent. The baseline respondent is one who does not own forestland, does not work in the forest products industry and does not participate in forest recreation. Further the baseline respondent is viewing the environmental scores on a FCS-certified label with no additional VECTOR information.

[11] When testing hypotheses in statistical analysis, the probability of a Type 1 error, rejecting a true null hypothesis, is equal to the significance level of the test. Therefore, at $\alpha=0.10$, there is a 10 percent chance of spurious relationships in our hypothesis tests.

impacts the purchase decision for a wooden chair for individuals who viewed the VECTOR information ($\chi^2_1 = 4.9466$, $p = 0.0261$). A joint test indicates that "No Clearcutting" has no impact on the purchase decisions of individuals who viewed the VECTOR information ($\chi^2_1 = 1.2765$, $p = 0.2585$).

Certification by the EPA had a positive impact on the importance of "Environmental Pollution" in the paper towels equation. However, this attribute was still not important to the purchase decision for the individuals viewing an EPA certification ($\chi^2_1 = 1.4530$, $p = 0.2281$). EPA certification had no significant impact on the other environmental attributes in the paper towel equation. Hypothesis testing of significant differences across the effects of EPA certification revealed that these impacts are not significantly different from one another ($\chi^2_4 = 4.5066$, $p = 0.3418$) in the paper towels equation.

In the chair equation, certification by the EPA had significant effects on the importance of all the attributes except "Fish and Wildlife Protection." EPA certification had a positive impact on the importance of "Environmental Pollution" and "No Clearcutting," and a negative effect on "Worker's Rights" and "Sustainable Management." Joints tests indicate that the "Environmental Pollution" ($\chi^2_1 = 11.5950$, $p = 0.0007$) and "No Clearcutting," ($\chi^2_1 = 8.2353$, $p = 0.0041$) attributes are important to the purchase decision. However, the presence of EPA certification decreased the importance of "Sustainable Management" to the point of non-significance ($\chi^2_1 = 2.2462$, $p = 0.1339$). Although the importance of "Worker's Rights" was significantly decreased by the presence of EPA certification, the attribute was still significant ($\chi^2_1 = 5.4382$, $p = 0.0197$).

Table 10. Likelihood to Purchase Environmentally-labeled Products.

	Paper Towels		Wooden Chair	
Variable	**Parameter Estimate**	**Standard Error**	**Parameter Estimate**	**Standard Error**
INTERCEPT	**-15.3323**	8.3563	**-23.7102**	8.8247
PRICE	**-1.8487**	0.8028	**-0.1048**	0.0328
A1-Worker's Rights	**0.0970**	0.0409	**0.1151**	0.0435
A2-No Clearcutting	0.0587	0.0409	**0.1079**	0.0434
A3-Sustainable Management	0.0592	0.0409	**0.0764**	0.0428
A4-Fish&Wildlife Protection	**0.1065**	0.0418	**0.0834**	0.0425
A5-Environmental Pollution	0.0174	0.0416	**0.1315**	0.0423
A1VECTOR	-0.00336	0.00706	0.00833	0.00721
A2VECTOR	**-0.0126**	0.00705	-0.00913	0.00716
A3VECTOR	-0.00197	0.00692	**0.0185**	0.00704
A4VECTOR	**0.0178**	0.00704	-0.00510	0.00718
A5VECTOR	0.00147	0.00697	-0.0116	0.00706
A1EPA	0.000278	0.00705	**-0.0146**	0.00724
A2EPA	-0.00251	0.00701	**0.0162**	0.00717
A3EPA	-0.00989	0.00695	**-0.0120**	0.00702
A4EPA	-0.00116	0.00703	-0.00397	0.00715
A5EPA	**0.0125**	0.00694	**0.0130**	0.00706
A1FME	-0.0132	0.00821	-0.00989	0.00847
A2FME	0.00171	0.00815	-0.00672	0.00829
A3FME	**-0.0153**	0.00794	0.00681	0.00848
A4FME	0.00370	0.00811	0.00167	0.00836
A5FME	**0.0246**	0.00835	0.00778	0.00812
A1ED	-0.00070	0.00128	-0.00084	0.00131
A2ED	0.000577	0.00126	-0.00070	0.00128
A3ED	0.00137	0.00125	0.000647	0.00134
A4ED	**-0.00327**	0.00130	0.00132	0.00131
A5ED	0.00210	0.00130	-0.00045	0.00129
A1AGE2	-0.00253	0.00191	0.000927	0.00199
A2AGE2	0.00109	0.00193	0.00218	0.00199
A3AGE2	0.000574	0.00190	0.000323	0.00201
A4AGE2	0.000115	0.00192	0.000995	0.00200
A5AGE2	0.000915	0.00196	**-0.00439**	0.00196

Table 10. (Con't). Likelihood to Purchase Environmentally-labeled Products.

	Paper Towels		Wooden Chair	
Variable	**Parameter Estimate**	**Standard Error**	**Parameter Estimate**	**Standard Error**
A1OCC	-0.00889	0.0114	0.00355	0.0115
A2OCC	-0.00294	0.0108	0.00258	0.0113
A3OCC	0.00965	0.0116	-0.0133	0.0114
A4OCC	-0.00495	0.0116	0.0148	0.0112
A5OCC	0.00619	0.0121	-0.0113	0.0111
A1OWN	0.00407	0.00950	0.00839	0.00978
A2OWN	-0.00631	0.00949	0.00893	0.00969
A3OWN	0.000328	0.00916	0.000245	0.00961
A4OWN	0.00271	0.00948	-0.00861	0.00958
A5OWN	-0.00021	0.00978	-0.00852	0.00947
A1WILD	**-0.0117**	0.00710	0.00971	0.00717
A2WILD	0.00418	0.00710	-0.0105	0.00698
A3WILD	**0.0118**	0.00697	**-0.0125**	0.00696
A4WILD	0.00246	0.00694	0.00894	0.00709
A5WILD	-0.00748	0.00710	0.00426	0.00708
A1PHOTO	**0.0163**	0.00820	0.00633	0.00849
A2PHOTO	-0.0109	0.00841	-0.00760	0.00830
A3PHOTO	-0.00955	0.00803	0.00214	0.00817
A4PHOTO	0.00279	0.00822	-0.00579	0.00844
A5PHOTO	0.00129	0.00810	0.00463	0.00809
A1HIKECAMP	**-0.00874**	0.00697	-0.0109	0.00703
A2HIKECAMP	**0.0138**	0.00682	0.00611	0.00692
A3HIKECAMP	-0.0118	0.00668	**0.0119**	0.00695
A4HIKECAMP	-0.00084	0.00696	0.000283	0.00701
A5HIKECAMP	0.00762	0.00705	-0.00594	0.00684
A1HUNTFISH	**0.0128**	0.00689	-0.00038	0.00682
A2HUNTFISH	-0.00576	0.00681	-0.00653	0.00669
A3HUNTFISH	-0.00556	0.00672	0.00150	0.00677
A4HUNTFISH	0.00557	0.00683	0.000737	0.00689
A5HUNTFISH	-0.00641	0.00686	0.00501	0.00671
A1BOAT	-0.00026	0.00707	-0.00249	0.00715
A2BOAT	-0.00668	0.00698	0.00486	0.00699
A3BOAT	-0.00841	0.00695	0.00519	0.00714
A4BOAT	-0.00083	0.00707	0.000363	0.00721
A5BOAT	**0.0157**	0.00706	-0.00710	0.00710

- Estimates in **BOLD** denote parameters significant at the 10% level

The additional 'Made in Maine' logo decreased respondent importance on "Sustainable Management" while increasing the importance of "Environmental Pollution" in the paper towels equation. As these two attributes were not significant to the baseline individual, the addition of the Made in Maine logo did not change their importance. The made in Maine logo had no significant effect in the chair equation.

There are also mixed results with respect to the demographic characteristics. Age produced essentially no significant impact on respondent choice of products save for a significant and negative affect on "Environmental Pollution" in the chair equation. Education also had a negative and significant affect on respondents' views on "Fish and Wildlife Protection" in the paper towels equation. However, none of these effects changed the importance of the attributes for either equation. There were no significant differences across the impacts of education on attribute importance for the chair equation. There were significant differences across education for the paper towels estimation ($\chi^2_4 = 8.1841$, $p = 0.0851$).

In general, landowners and individuals working in the wood products industry were not significantly different from the baseline individual. As a result, the importance of the attributes to landowners and wood products industry workers are similar to the baseline group. However, joint tests indicate that, in the chair equation, the "Sustainable Management" attribute is not important to workers in the wood products industry ($\chi^2_1 = 2.0309$, $p = 0.1541$)

The various recreation activities not only had significant effects, these effects differed across recreation types, attributes, and even equations estimated. Before further interpreting the effects of the recreation participation variables it is important to understand that the regression technique *holds all other variation constant.* Age, education, etc. does not vary across recreation types. In addition, one must be careful to understand that the parameter estimates on any particular recreation variable measures the marginal effect of participating in that one activity (it assumes that a participant in a particular recreation activity does not participate in any of the other activities). Thus, it is incorrect to take the result for any recreation type and interpret this result as being indicative of participants in that activity because they have the ability to participate in multiple activities as is, in fact, revealed to be the case for approximately 80 percent of our recreationist sample.

Further, it would be incorrect to interpret differences across recreation types as being indicative of differences between participants in those activities; the reason is that the average participant for each of the activities may be quite different in terms of other individual characteristics. For example, one should not interpret differences between 'hunting and fishing' and 'wildlife watching' results as being indicative of differences between the average hunter or wildlife watcher because hunters and wildlife watchers may differ significantly in other ways. The strength of the analysis here is this ability to hold other variation constant; it allows the identification and measurement of the marginal effect of participating

in each recreational activity on the likelihood of purchasing an environmentally labeled wood product.

In the paper towels equation, participation in wildlife watching contributed significantly to the value of "Worker's Rights" and "Sustainable Management" scores in the purchase decision but in completely opposite directions. Although, participation in wildlife watching had a negative impact on the importance of "Worker's Rights," this attribute is still important ($\chi^2_1 = 4.2372$, $p = 0.0395$). The "Sustainable Management" attribute was not important in the purchase decision for non-recreationists. However, participation in wildlife watching significantly increased the importance of this attribute so that the attribute is now important to wildlife watchers' purchase decisions ($\chi^2_1 = 2.91702$, $p = 0.0876$). .

For those individuals responding to the chair question, "Sustainable Management" was important to non-recreationists, however this importance is significantly less for participants in wildlife watching ($\chi^2_1 = 2.1652$, $p = 0.1412$). In fact, for those who participate in wildlife watching, "Sustainable Management" is no longer significant to the purchase decision. It is important to note that there are differences in the baseline of the attributes across both equations. Because of this, there may be discrepancies in the effects of the various attributes on the purchase decisions when compared to one another. In contrast to participation in wildlife watching, participation in nature photography significantly increases the importance placed on "Worker's Rights" in the purchase decision for paper towels, although both groups find this attribute to be important ($\chi^2_1 = 7.3246$, $p = 0.0068$).

Participation in hiking and camping increases the importance of the "No Clearcutting" attribute in the paper towels equation. Non-recreationists did not find this attribute to be significantly important. Participants in hiking and camping, however, find this attribute to be significantly important to the purchase decision in this equation. ($\chi^2_1 = 3.1080$, $p = 0.0779$). The "Worker's Rights" attribute was less important to individuals who participate in hiking and camping, although this attribute was still important ($\chi^2_1 = 4.5713$, $p = 0.0325$). In the chair equation, the effect of participation in hiking and camping was such that "Sustainable Management" scores were of significantly greater importance to these participants ($\chi^2_1 = 4.1655$, $p = 0.0413$), although non-recreationists found this attribute to also be significantly important to the purchase decision.

Non-recreationists and participants in hunting and fishing ($\chi^2_1 = 7.2872$, $p = 0.0069$) both placed significant importance on "Worker's Rights" scores in the decision to purchase an environmentally labeled six-pack of paper towels. However, participants in hunting and fishing placed significantly greater importance on this attribute's score than non-recreationists. The effect of participation in boating/canoeing had essentially no effect on the significance of the attributes in the purchase decision for either equation. Specifically, participation in boating/canoeing had no significant effect on the importance of the attributes apart from a positive effect on "Environmental Pollution" in the paper towels equation. This effect, however, was not so great as to render this attribute significant to the purchase decision; neither participants in

boating/canoeing nor non-recreationists found this attribute important to the decision to purchase an environmentally labeled six-pack of paper towels.

Differences in the importance of the environmental attributes between non-recreationists and those who participate in different recreational activities can be determined by the significance of the estimated coefficients on the environmental attribute/recreational activity interaction variables (reported in Table 10). However, these results do not tell us whether the estimated coefficients on the environmental attribute/recreational activity interaction variables differ across recreation types. In turn, I perform these joint tests which reveal that differences exist across various recreation types with respect to the importance respondents place on the different forest management practice attributes (Table 11).

Table 11. Results of Whether Parameter Estimates on the Environmental Attributes are Significantly Different Across Participation in Various Outdoor Recreation Activities.

	Wildlife Watching	Nature Photography	Hiking/ Camping	Hunting/ Fishing	Boating/ Canoeing
Paper Towels					
A1-Worker's Rights	**-0.0117**^{A*}	**0.0163**^{B}	**-0.00874**^{A}	**0.0128**^{B}	-0.00026^{AB}
A2-No Clearcutting	0.00418^{AB}	-0.0109^{A}	**0.0138**^{B}	-0.00576^{A}	-0.00668^{AB}
A3-Sustainable Management	**0.0118**^{A}	-0.00955^{B}	-0.0118^{B}	-0.00556^{B}	-0.0084^{B}
A4-Fish&Wildlife Protection	0.00246^{A}	0.00279^{A}	-0.00084^{A}	0.00557^{A}	-0.00083^{A}
A5-Environmental Pollution	-0.00748^{A}	0.00129^{AB}	0.00762^{AB}	-0.00641^{A}	**0.0157**^{B}
Wood Chair					
A1-Worker's Rights	0.00971^{A}	0.00633^{AB}	-0.0109^{B}	-0.00038^{AB}	-0.00249^{B}
A2-No Clearcutting	-0.0105^{A}	-0.0076^{A}	0.00611^{A}	-0.00653^{A}	0.00486^{A}
A3-Sustainable Management	**-0.0125**^{A}	0.00214^{AB}	**0.0119**^{B}	0.0015^{AB}	0.00519^{B}
A4-Fish&Wildlife Protection	0.00894^{A}	-0.00579^{A}	0.000283^{A}	0.000737^{A}	0.000363^{A}
A5-Environmental Pollution	0.00426^{A}	0.00463^{A}	-0.00594^{A}	0.00501^{A}	-0.0071^{A}

* Parameter estimates sharing the same letters across recreation types are not significantly different from one another; parameter estimates with different letters across recreation types are significantly different from one another.
- Bolded coefficients are significantly different than the no-recreational baseline

Marginal probabilities

Although there is a large discrepancy between probability effects of price on paper towels versus chair, this discrepancy makes sense as it reflects large differences in base price of these two products (Table 12). Specifically, a $1 increase in price for a six-pack of paper towels (average price of $6.00) decreases

the likelihood to purchase paper towels by approximately 19 percent whereas a similar increase in the price of a wooden chair (average price of $150) only decreases the likelihood to purchase by approximately one percent. To provide a more equal comparison I convert these $1 changes into comparable one-percent price increases. Under this scheme a one-percent increase in the price of paper towels leads to a 1.19 percent drop in the probability of purchase; a one-percent increase in the price of a chair leads to a 1.18 percent drop.

A one-point increase in the attribute scores (which is similar to a one-percent change in the attribute) for both products results in an increase in the likelihood to purchase ranging from half a percent to about one percent. Thus, in percentage terms, a change in the environmental attributes causes a reaction that is somewhere between one-half of, or equal to, the reaction driven by a similar change in the product's price.

Altering the levels of information treatments affects the probability of purchasing environmentally labeled wood products in various ways. However, when comparing estimates across information treatments we see that they are generally small changes relative to the baseline. With respect to the additional attribute information, the likelihood of purchase significantly increased for those individuals provided attribute information with respect to "Fish and Wildlife Protection" for paper towels and "Sustainable Management" for wooden chair. Although these attributes were already considered important in the purchase decision, the presence of vector information significantly contributed to increasing the probability of purchase.

Table 12. Marginal Changes in the Probability of Purchasing a Product for One-point Increases* in Product Attributes Under Different Information Treatments.

	Paper Towels	Wooden Chair
PRICE	**-18.98%**	**-0.80%**
Baseline: no additional information and product is certified by the Forest Stewardship Council		
A1- Worker's Rights	**1.00%**	**0.88%**
A2 – No Clearcutting	0.60%	**0.82%**
A3 – Sustainable Management	0.61%	**0.58%**
A4 – Fish and Wildlife Protection	**1.09%**	**0.64%**
A5 – Environmental Pollution	0.18%	**1.00%**
Baseline with additional information		
A1- Worker's Rights	**0.97%**	**0.94%**
A2 – No Clearcutting	0.47%	**0.75%**
A3 – Sustainable Management	0.59%	**0.72%**
A4 – Fish and Wildlife Protection	**1.27%**	**0.60%**
A5 – Environmental Pollution	0.20%	**0.91%**
Baseline except environmental information is certified by the Environmental Protection Agency		
A1- Worker's Rights	**1.00%**	**0.77%**
A2 – No Clearcutting	0.57%	**0.94%**
A3 – Sustainable Management	0.51%	0.49%
A4 – Fish and Wildlife Protection	**1.08%**	**0.61%**
A5 – Environmental Pollution	0.31%	**1.10%**
Baseline except environmental label carries a 'Made in Maine' Logo		
A1- Worker's Rights	**0.86%**	**0.80%**
A2 – No Clearcutting	0.62%	**0.77%**
A3 – Sustainable Management	0.45%	**0.63%**
A4 – Fish and Wildlife Protection	**1.13%**	**0.65%**
A5 – Environmental Pollution	0.43%	**1.06%**

- Probability estimates in bold are based upon significant parameter estimates, or, if based upon combinations of parameters, are reflective of significant joint tests.
*Unit increase in price reflects a $1 dollar increase; a unit increase in environmental attributes reflect a one-point increase.

The effects of EPA certification reflect the increase in importance this certification lends to particular attributes while decreasing the importance of others. For the chair equation, EPA certification decreased the likelihood of purchase by approximately 0.1 percent with respect to scores on "Worker's Rights" and "Sustainable Management" but increased the likelihood of purchase by about the same for "No Clearcutting" and "Environmental Pollution." The addition of the made in Maine logo did not significantly increase or decrease the probability of purchasing either of the environmentally labeled wood products.

The effect of participating in recreational activities affects the probability of purchasing the products (Table 13). The effects vary across recreation type but in general are relatively small. Participation in wildlife watching increased the probability of purchasing eco-labeled paper towels by 0.12 percent with respect to "Sustainable Management" while decreasing by the same percentage the probability of purchase with respect to "Worker's Rights." The effect of participation in hiking and camping had the same effect on "No Clearcutting" and "Sustainable Management." That is, participation in hiking and camping increased the probability of purchase by approximately 0.1 percent for "No Clearcutting" while decreasing the probability of purchase by approximately the same percentage with respect to "Sustainable Management."

Table 13. Marginal Changes in the Probability of Purchasing a Product for One-point Increases in Product Attributes Under Varying Participation in Forest-based Recreation

	Paper Towels	Wooden Chair
Non-recreationists		
A1- Worker's Rights	**1.00%**	**0.88%**
A2 – No Clearcutting	0.60%	**0.82%**
A3 – Sustainable Management	0.61%	**0.58%**
A4 – Fish and Wildlife Protection	**1.09%**	**0.64%**
A5 – Environmental Pollution	0.18%	**1.00%**
Participates in wildlife watching		
A1- Worker's Rights	**0.88%**	**0.95%**
A2 – No Clearcutting	0.64%	**0.74%**
A3 – Sustainable Management	**0.73%**	**0.48%**
A4 – Fish and Wildlife Protection	**1.12%**	**0.71%**
A5 – Environmental Pollution	0.10%	**1.03%**
Participates in nature photography		
A1- Worker's Rights	**1.17%**	**0.93%**
A2 – No Clearcutting	0.49%	**0.76%**
A3 – Sustainable Management	0.51%	**0.60%**
A4 – Fish and Wildlife Protection	**1.12%**	**0.60%**
A5 – Environmental Pollution	0.19%	**1.04%**
Participates in hiking & camping		
A1- Worker's Rights	**0.91%**	**0.80%**
A2 – No Clearcutting	**0.74%**	**0.87%**
A3 – Sustainable Management	0.49%	**0.67%**
A4 – Fish and Wildlife Protection	**1.08%**	**0.64%**
A5 – Environmental Pollution	0.26%	**0.95%**
Participates in hunting & fishing		
A1- Worker's Rights	**1.13%**	**0.88%**
A2 – No Clearcutting	0.54%	**0.77%**
A3 – Sustainable Management	0.55%	**0.59%**
A4 – Fish and Wildlife Protection	**1.15%**	**0.65%**
A5 – Environmental Pollution	0.11%	**1.04%**
Participates in boating/canoeing		
A1- Worker's Rights	**1.00%**	**0.86%**
A2 – No Clearcutting	0.53%	**0.86%**
A3 – Sustainable Management	0.52%	**0.62%**
A4 – Fish and Wildlife Protection	1.08%	**0.64%**
A5 – Environmental Pollution	**0.34%**	**0.95%**

- Probability estimates in bold are based upon significant parameter estimates, or, if based upon combinations of parameters, are reflective of significant joint tests.

Willingness to pay

It is important to note that for both the paper towels and chair willingness to pay estimations, the baseline was that of an individual 44 yrs. of age with 12.9 yrs. of education. No additional attribute information was provided and the label displayed the Forest Stewardship Council certification with no additional made in Maine logo. All forest management attributes were assigned a score of 72, the status quo as indicated on the experiment labels. For paper towels, the baseline willingness to pay was $4.97; for a chair, it was $127.00. The baseline was not a participant in any forest based outdoor recreation activities. Likewise, with respect to exposure measures, the baseline was not a landowner nor did he work in the forestry or wood products field.

Willingness to pay estimations for improvements in the environmental attributes were relatively consistent across the two products (Table 14). Unlike previous research which found that willingness to pay was related to the base price of the product in that percent premium willingness to pay for environmentally labeled products decreased as the price of those products increased, we find that the willingness to pay a price premium for one-point increases in the attributes is relative constant across paper towels and a wooden chair. Specifically, the percent premium willingness to pay for a one-point increase in all of the environmental attributes across the board was 3.6 percent for paper towels and 3.8 percent for wooden chair. The percent premiums for each one-point increase ranged for both products from 0.5 percent to 0.8 percent.

Table 14. Mean Willingness to Pay for a One-point Increase in Various Environmental Attributes Under Different Information Treatments*

	Paper Towels	Chair
Baseline: no additional information and environmental information is certified by the Forest Stewardship Council		
A1- Worker's Rights	**$0.042**	**$1.03**
A2 – No Clearcutting	$0.038	**$1.03**
A3 – Sustainable Management	$0.042	**$0.82**
A4 – Fish and Wildlife Protection	**$0.035**	**$1.00**
A5 – Environmental Pollution	$0.026	**$1.01**
Baseline with additional information		
A1- Worker's Rights	**$0.039**	**$1.11**
A2 – No Clearcutting	$0.032	**$0.94**
A3 – Sustainable Management	$0.042	**$1.00**
A4 – Fish and Wildlife Protection	**$0.045**	**$0.95**
A5 – Environmental Pollution	$0.027	**$0.90**
Baseline except environmental information is certified by the Environmental Protection Agency		
A1- Worker's Rights	**$0.041**	**$0.89**
A2 – No Clearcutting	$0.038	**$1.19**
A3 – Sustainable Management	$0.038	$0.71
A4 – Fish and Wildlife Protection	**$0.034**	**$0.96**
A5 – Environmental Pollution	$0.033	**$1.14**
Baseline except environmental label carries a 'Made in Maine' Logo		
A1- Worker's Rights	**$0.034**	**$0.93**
A2 – No Clearcutting	$0.039	**$0.97**
A3 – Sustainable Management	$0.035	**$0.88**
A4 – Fish and Wildlife Protection	**$0.037**	**$1.02**
A5 – Environmental Pollution	$0.039	**$1.09**

* Baseline of individual with 12.9 years of education, 44 years in age, score of 72 for all environmental attributes with FSC certification, and WTP of $4.97 for paper towels and $127.00 for wooden chair.
- WTP estimates in bold are based upon significant parameter estimates, or, if based upon combinations of parameters, are reflective of significant joint tests.

Willingness to pay changes for VECTOR information were observed in both the paper towel and chair equations for the five environmental attributes. For a one-point increase in "Worker's Rights," the willingness to pay decreased

by 7 percent for paper towels and increased by the same percentage for a wooden chair with the presence of VECTOR information. Although there was no change in willingness to pay for a one-point increase in "Sustainable Management" for individuals provided additional information and purchasing a six-pack of paper towels, the presence of VECTOR information increased the willingness to pay for a one-point improvement in this attribute by 22 percent. Furthermore, VECTOR information increased by 29 percent the willingness to pay for a one-point increase in "Fish and Wildlife Protection" in the paper towels equation but had the opposite effect in the wooden chair equation, decreasing willingness to pay for this improvement by 5 percent.

Varying the content of the certification label with respect to its effect on product attributes also produced different willingness to pay across the measures. Most profound was the effect of EPA certification on willingness to pay for one-point improvements in "Worker's Rights" and "Sustainable Management" in the chair equation. Specifically, the willingness to pay for these improvements decreased by 186 percent with EPA certification. This decrease was mirrored by the paper towels equation but to a much lesser degree. Specifically, EPA certification decreased the willingness to pay for these improvements by 2 percent and 10 percent respectively. The only consistently positive increase in willingness to pay for one-point improvements in both equations was that of "Environmental Pollution." The presence of EPA certification increased respondent willingness to pay for a one-point improvement in this attribute by 27 percent for paper towels and 13 percent for a wooden chair.

The addition of a made in Maine logo provided relatively small changes in willingness to pay estimates for improvements in the attributes across both equations. However, the addition of the 'Made in Maine' logo did increase the willingness to pay for a one-point improvement in "Environmental Pollution" by 50 percent in the paper towels equation. The willingness to pay for this improvement in the chair equation was increased by 8 percent with the addition of the 'Made in Maine' logo. The presence of this logo decreased willingness to pay for a one-point increase in "Worker's Rights" for both products. Specifically, the willingness to pay for an improvement in this attribute was approximately 19 percent less for a six-pack of paper towels and 10 percent less for a wooden chair.

The effect of participating in recreational activities affects the willingness to pay for increases in environmental attribute scores (Table 15). The effects vary across recreation type but in general are relatively small. Based upon the paper towel equation, participating in wildlife watching decreases the willingness to pay for improved workers rights and increases the willingness to pay for a better sustainability score. Participating in nature photography or hunting and fishing increases the willingness to pay for improved workers rights. Hiking and camping increases the willingness to pay for a better score on "No Clearcutting." Boating increases the willingness to pay for a better environmental pollution score, although this attribute for even these individuals is not significant. With respect to the chair equation, participating in wildlife watching decreases the willingness to pay for a better sustainability score whereas hiking and camping increases the willingness to pay for a better score on "Sustainable Management."

Table 15. Mean Willingness to Pay for a One-point Increase in Various Environmental Attributes Under Varying Participation in Forest-based Recreation Activities

	Paper Towels	Wooden Chair
Non-recreationists		
A1- Worker's Rights	**$0.042**	**$1.03**
A2 – No Clearcutting	$0.038	**$1.03**
A3 – Sustainable Management	$0.042	**$0.82**
A4 – Fish and Wildlife Protection	**$0.035**	**$1.00**
A5 – Environmental Pollution	$0.026	**$1.01**
Participates in wildlife watching		
A1- Worker's Rights	**$0.035**	**$1.12**
A2 – No Clearcutting	$0.041	**$0.93**
A3 – Sustainable Management	**$0.049**	$0.70
A4 – Fish and Wildlife Protection	**$0.036**	**$1.08**
A5 – Environmental Pollution	$0.022	**$1.06**
Participates in nature photography		
A1- Worker's Rights	**$0.050**	**$1.09**
A2 – No Clearcutting	$0.032	**$0.96**
A3 – Sustainable Management	$0.038	**$0.84**
A4 – Fish and Wildlife Protection	**$0.037**	**$0.94**
A5 – Environmental Pollution	$0.027	**$1.06**
Participates in hiking & camping		
A1- Worker's Rights	**$0.037**	**$0.93**
A2 – No Clearcutting	**$0.046**	**$1.09**
A3 – Sustainable Management	$0.037	**$0.94**
A4 – Fish and Wildlife Protection	**$0.035**	**$1.00**
A5 – Environmental Pollution	$0.030	**$0.96**
Participates in hunting & fishing		
A1- Worker's Rights	**$0.048**	**$1.03**
A2 – No Clearcutting	$0.035	**$0.97**
A3 – Sustainable Management	$0.040	**$0.84**
A4 – Fish and Wildlife Protection	**$0.038**	**$1.01**
A5 – Environmental Pollution	$0.022	**$1.06**
Participates in boating/canoeing		
A1- Worker's Rights	**$0.041**	**$1.01**
A2 – No Clearcutting	$0.035	**$1.08**
A3 – Sustainable Management	$0.038	**$0.87**
A4 – Fish and Wildlife Protection	**$0.035**	**$1.00**
A5 – Environmental Pollution	$0.035	**$0.95**

Probability estimates in bold are based upon significant parameter estimates, or, if based upon combinations of parameters, are reflective of significant joint tests.

* Baseline of individual with 12.9 years of education, 44 years in age, score of 72 for all environmental attributes with FSC certification, and WTP of $4.97 for paper towels and $127.00 for wooden chair.

Chapter 7

DISCUSSION AND CONCLUSIONS

The results provide several insights. First, consumers are generally willing to pay for forest products that have improved environmental attributes. However, unlike previous studies in which the proportional willingness to pay was affected greatly by the base price of the product, we find that the willingness to pay is relatively constant across products with vastly different price profiles. In particular, I observed that respondents were willing to pay, on average, an approximately 0.7 percent premium for a 1-point increase in any of the environmental attributes for an environmentally certified six-pack of paper towels. Likewise, respondents indicated an average of approximately 0.8 percent premium for a similar improvement in any of the environmental attributes for an environmentally certified wooden chair.

An across the board improvement by one-point in all of the attributes increased willingness to pay for paper towels by 3.4 percent while increasing the willingness to pay for a wooden chair by 3.8 percent. Contrary to the reported views of stakeholders in the forest products industry, there not only appears to be a demand for environmentally certified forest products, but, in fact, consumers are willing to pay additional premiums for these products. This finding is significant to such stakeholders in that additional premiums for these products may help to offset the various costs involved in the certification of forest products.

The size of the price premium is surprisingly large given that anecdotal evidence from industry sources indicate that there is no price premium. One

reason that the premiums may be large is the hypothetical nature of the market experiment. As intuition would suggest and as externally validated experiments often confirm, when respondents do not face a real budget constraint they are not as sensitive to price differences as they are in real markets. While progress has been made in calibrating environmental donation intentions stated in contingent valuation surveys to real world donation behavior (Champ and Bishop, 2000; Byrnes et al., 1999) and in calibrating green pricing program participation intentions revealed in conjoint experiments to real world participation (Bala et al., 1998), this survey has no real-world validity component. Further caution is warranted because hypothetical biases may be exacerbated when the respondent has little experience with the product in question and, to date, respondents have had little real-world experience in choosing among environmentally labeled forest products.

An alternative reason that the willingness to pay numbers seem relatively large is that price enters linearly into the model. It may be that price should have been non-linearly interacted with the environmental attributes. This would allow an increased sensitivity to price as the attribute scores increased. It intuitively makes sense that individuals would be willing to pay less for marginal improvements to a relatively high environmental score than they would for a similar improvement in a relatively low score. Further research is warranted on this front.

Finally, it may be that the willingness to pay estimates are, in fact, not high but that the anecdotal evidence put forth by industry experts are being

incorrect interpreted. That is, it may be the case that currently a price premium is not being seen due to the nature of current eco-labeling strategies. Currently, the strategy has focused on displaying an eco-seal (Type-I label) logo from the Forest Stewardship Council. Previous research has indicated that Type-I labels are not necessarily effective. Furthermore, few individuals are familiar with the Forest Stewardship Council, or with the criteria they use in awarding the certification. As a result, the current eco-labeling situation may preclude the collection of an actual premium.

Furthermore, from the social and environmental management characteristics provided to respondents, "Worker's Rights" and "Fish and Wildlife Protection" were revealed to be regarded as the most important on the environmental purchase decision. The attributes, overall, were significantly more important in the decision to purchase an environmentally labeled wooden chair than a six pack of paper towels; only two attributes were revealed to impact the purchase decision for a six pack of paper towels, whereas, all of the attributes were equally and significantly important to the purchase decision for an environmentally labeled wooden chair. This may have something to do with the frequency of purchase of these products and the amount of time individuals take in the purchase decision process.

Specifically, paper towels are purchased quite frequently, and therefore might be more beneficial to sustainable management efforts with respect to certification. However, the decision process for paper towels is presumed to be relatively short. That is, paper towels presumably do not require a large time

investment because they are relatively inexpensive, purchased often, and are usually purchased in concert with a fair amount of other household products and food items. The decision to purchase a wooden chair with an average price of $150, on the other hand, would presume to command more attention in the decision making process as the item is considerably more expensive. In addition to cost, other considerations such as quality, craftsmanship, style, comfort and a range of other attributes are considered in the purchase decision that may not necessarily be as relatively important in the purchase of paper towels. It is assumed that the greater level of interest placed on the purchase of a wooden chair elevates the importance of all product characteristics. As the product quality attributes are held constant in the simulated market experiment, the effect of this importance is captured in the significance of the attributes in the wooden chair purchase decision as compared to the significance of the attributes in the paper towels purchase decision. As furniture items, such as a wooden chair, are largely considered investments, closer attention may be paid to all of the product's attributes, including associated social and environmental management attributes.

As sufficient demand for environmentally labeled forest products becomes evident, the question for policy makers and the forest products industry becomes how best to inform consumers of the existence of environmentally friendly products and how best to target consumers by whom these products are preferred. With respect to how the consumer should be informed about the existence of such products, we found that providing additional information regarding product attributes can contribute to the importance consumers place on them. For

example, the presence of additional information contributed positively to the importance of "Fish and Wildlife Protection" for those individuals purchasing paper towels and also contributed positively to the importance of "Sustainable Management" for those purchasing a chair. Because the environmental attribute titles can actually encompass a broad range of management practices and because some of these titles may appear unclear or ambiguous to consumers, it may be beneficial to forest products manufacturers and retailers to incorporate various media and marketing techniques in an effort to provide sufficient information to the purchasing public.

The effect of the various certification organizations on the purchase decision differed across both products and attributes. For example, certification by the Environmental Protection Agency had a positive and significant effect on the importance of "Environmental Pollution" for both equations but had negative and significant effects on "No Clearcutting" & "Sustainable Management" for the chair equation. Although, respondents revealed in earlier sections of the survey that government agencies were considered the most credible organization to oversee the certification of forest products, respondents also indicated that the U.S. Forest Service was preferred to a much higher degree than the E.P.A. for this responsibility. The question then is whether the presence of U.S.F.S. certification in the simulated market experiment would have made a difference in the way that the attributes are viewed in comparison with the baseline of Forest Stewardship Council certification. Further investigation of this topic with the incorporation of U.S.F.S. certification is recommended.

The addition of the made in Maine logo increased the importance of "Environmental Pollution" but decreased the importance of "Sustainable Management" for the paper towels equation. None of the effects of the made in Maine logo, however, significantly altered respondents' views of the five environmental attributes. The addition of the made in Maine logo had no effect on the purchase decision in the chair equation. While not contributing significantly to the purchase decision above Forest Stewardship Council certification, the presence of the made in Maine logo did not significantly detract from the importance of the attributes, either.

Further preliminary investigation of the regional effects of the additional made in Maine logo revealed that its presence increased the likelihood of purchase overall for residents of the New England states (excluding Maine) but decreased the likelihood of purchase for Maine residents. One possible explanation for this is that products bearing this logo may imply to consumers that not only the product is made in Maine but the wood used in the manufacturing of the product is also from Maine. For Maine residents, products made from wood from Maine may be undesirable in that Maine residents do not want their trees cut for manufacturing, whereas, for other New England states, the logo may provide some degree of comfort that the product is produced locally.

In regard to targeting consumers by whom these products are most preferred, the socio-demographic characteristics of the individual did not appear to influence the purchase decision significantly. Specifically, the respondents' gender, age and level of education, for the most part, had no real effect on

consumer purchasing preferences for the environmentally labeled forest products provided in this survey. A general profile of the "environmentally conscious" wood products consumer, therefore, cannot be derived from this study.

However, with respect to levels of exposure to the resource, respondents differed in terms of the importance placed on the five environmental attributes and the likelihood of purchase of environmentally labeled wood products. In general, participation in outdoor recreation activities did alter respondent purchase behavior, depending largely upon the activity. Overall, the effects of the different activities contributed positively to the importance of the environmental attributes. This would seem to support the first part of the Dunlap-Heffernan hypothesis that there exists a positive association between participation in outdoor recreation activities and environmental concern. Furthermore, the effects of recreation participation varied according to the activity involved and the attribute regarded. For example, participation in nature photography contributed to significantly greater importance on "Worker's Rights" than non-recreationists, however, participation in wildlife watching had the opposite effect. Participants in wildlife watching were significantly less interested in "Worker's Rights." This would seem to support the second part of the Dunlap-Heffernan hypothesis, that there exists a stronger association between certain specific types of outdoor recreation activities and environmental concern than with other types of outdoor recreation activity participation.

Furthermore, people who participated in hiking and camping and who purchased a six-pack of paper towels placed significantly greater importance on

"No Clearcutting" than non-recreationists. This result would seem to support the third part of the Dunlap-Heffernan hypothesis, which asserts that the association between participation in outdoor recreation activities and concern for protecting those aspects of the environment necessary for pursuing such activities is stronger than concern for more remote environmental problems. As participants in hiking and camping placed the greatest importance on "No Clearcutting" versus the more broad attributes of "Sustainable Management" or "Environmental Pollution," this would seem to be the case.

The other measures of exposure to the resource, that of landowners and individuals employed in the forest products industry, were not significantly different in their reactions to the attributes. These groups were significantly different, however, in their level of interest in how forests are managed. Although, these two groups state greater interest in how forests are managed, this interest did not translate into enhanced values for environmentally certified wood products. This may have something to do with the motives behind the interest in forest management practices rather than concern for the state of forests in this country. Specifically, landowners and workers in the wood products industry are stakeholders in the management of forests in the U.S. Landowners are presumably highly interested in how forests are managed because they may be directly impacted by forest management policies. Likewise, as employees in the wood products industry also have a financial stake in forest management policies, they, too, may be largely interested in how forests are managed in this country. These motives, however, may be generated from these interests rather than

concern for the environmental management and well being of forest resources in the United States.

An important distinction must be made with respect to the results of this study. This study examines the preferences and valuation of the average *retail* consumer. The preferences for certified wood products by large-scale consumers such as building contractors or wood products retailers and wholesalers, is not examined in this study. Wood products retailers and commercial and industrial purchasers were the focus of a previous study by Vlosky (1997). Five hundred companies consisting of home center retailers, building contractors, and architects were surveyed. Only architects strongly agreed with the need for environmental certification of temperate forests; home center retailers disagreed while building contractors were indifferent. Unlike the stated consumer preferences in this study, the federal government proved to be the least trusted organization to certify forest management practices while independent third party organizations were viewed as the most trusted.

Regarding the willingness to pay of the three groups for environmentally certified wood products, the Vlosky (1997) study revealed that home center retailers were the least willing, by far, to pay extra for certified products. Architects showed moderate willingness to pay for such products while contractors fell somewhere in between. Because these three populations serve as middlemen between environmentally certified wood products and consumers in the public, questions were also asked regarding opinions on consumer willingness to pay for certified wood products. All three sectors responded with little

agreement that their customers would be willing to pay a price premium for certified products. Furthermore, if the additional costs of certification cannot be directly passed on to the consumer by charging premium prices for such products, all respondents stated they were "not likely to volunteer to absorb these costs." (Vlosky, 1997) The Vlosky (1997) study is similar to previous studies in that specification of altered management practices is not provided. Respondents are asked their opinions regarding environmental certification, in general. As these individuals have the potential to comprise a large percentage of the market for environmentally certified wood products, further investigation of preferences for and valuation of environmental attributes of certified wood products may be warranted.

The results of my research on consumer preferences have significant implications for several sectors concerned with advancing a pro-environmental forest management agenda. Of most significance is the indication of those forest management practices of most concern to consumers of environmentally labeled forest products. This information would be significant to any certifying organizations, forest product manufacturers and retailers, and forestland owners. For instance, certifying organizations could focus information campaigns on those aspects of sustainable forest management considered most critical by consumers. Certifying organizations may better address the concerns of consumers by focusing certification efforts toward these issues, which would have significant implications for forestland owners seeking environmental certification. Furthermore, those environmental attributes of most concern to consumers could

serve as the focus of media and marketing campaigns by manufacturers and retailers.

With respect to the link between exposure through outdoor recreation and certified forest product valuation, retail markets whose sales focus on "environmentally friendly" products would do well with the knowledge that participants in outdoor recreation place higher values on environmentally certified forest products than those who do not participate in such activities. More advertising revenue could then possibly be directed at marketing campaigns which target such an audience, such as print advertisements in outdoor and recreation magazines, television commercials appearing on outdoor living and travel focused channels, and involvement in tradeshows with an outdoor recreation or related theme. Also, retailing of these products could be diversified to include less conventional stores such as recreation equipment retail shops and outfitter and resort base lodges and gift shops.

Furthermore, the enhanced values associated with environmentally labeled forest products by particular consumer profiles implies increased environmental concern by these individuals and provides the opportunity for outreach by entities with an environmental focus. Environmental organizations, political referendums, and candidates for office could benefit from the discovery of a positive connection between the larger implications of pro-environmental behavior and concern, as measured by preferences for environmentally certified products, and specific consumer profiles, such as outdoor recreation participation. Environmental organizations could expand outreach by acquiring mailing lists for

outdoor and recreation magazines and newsletters or attending tradeshows with a recreation or leisure focus. Additionally, canvassing and literature distribution to local outdoor recreation equipment and gear stores, base lodges, and resorts such as ski mountains would create more focused outreach efforts with possibly greater positive response. Finally, referendums with an environmental focus could be promoted to those individuals most directly affected by it.

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APPENDICES

Appendix A

Complete Survey

Section I

Thank you for agreeing to complete this survey. In this section, we are interested in learning about your perceptions of forest management.

1. How interested are you in how forests are managed? (PLEASE **CIRCLE** YOUR ANSWER)

1	2	3	4	5
NOT AT ALL INTERESTED		SOMEWHAT INTERESTED		VERY INTERESTED

2. **In your opinion**, what percentage of forests **in the U.S.** are managed in an environmentally friendly manner? (PLEASE **CIRCLE** YOUR ANSWER)

0%	25%	50%	75%	100%
NONE	SOME	HALF	MOST	ALL

3. **In your opinion**, what percentage of forests **in other countries** are managed in an environmentally friendly manner? (PLEASE **CIRCLE** YOUR ANSWER)

0%	25%	50%	75%	100%
NONE	SOME	HALF	MOST	ALL

Section II.

In this section, we are interested in your reactions to different environmental labeling programs for wood products.

We would like you to read the following passage before continuing the survey.

Something that is currently occurring in the wood products market is that some people would like to have wood products labeled so that you could determine which wood products came from forests that were managed in an environmentally friendly manner. How this would work is that trained forest auditors would be sent to a company's forests and they would evaluate the company's forest management based upon a set of criteria. Once the audit is done, the information from the audit could be used on product labels or in product advertising.

4. **In the past year** have you seen any wood products display a label indicating that the product is made from wood that was harvested from forests that were managed in an environmentally friendly manner? (PLEASE **CHECK** YOUR ANSWER)

   NO
   YES

5. If wood products were to be labeled "environmentally friendly", which organization would you prefer to oversee the labeling program? (PLEASE **CHECK ONE BOX** FOR YOUR ANSWER)

GOVERNMENT AGENCIES -
US ENVIRONMENTAL PROTECTION AGENCY
US FOREST SERVICE
OTHER GOVERNMENT AGENCY -
PLEASE SPECIFY:_____
ENVIRONMENTAL ORGANIZATIONS -
FOREST STEWARDSHIP COUNCIL
NATIONAL WILDLIFE FEDERATION
NATURE CONSERVANCY
NATIONAL AUDUBON SOCIETY
SIERRA CLUB
OTHER ENVIRONMENTAL ORGANIZATION –
PLEASE SPECIFY:_____
INDEPENDENT CERTIFYING AGENCY -
SCIENTIFIC CERTIFICATION SYSTEMS
CONSUMER'S UNION
OTHER INDEPENDENT AGENCY –
PLEASE SPECIFY:_____
INDUSTRY GROUP -
AMERICAN FOREST AND PAPER ASSOCIATION
OTHER INDUSTRY GROUP –
PLEASE SPECIFY:_____

6. Why did you choose this organization? (PLEASE **CHECK ALL BOXES** THAT APPLY)

I'M FAMILIAR WITH ORGANIZATION
IT IS A GOVERNMENT AGENCY
IT IS AN ENVIRONMENTAL ORGANIZATION
IT IS AN INDEPENDENT CERTIFYING ORGANIZATION
IT IS AN INDUSTRY GROUP
OTHER: (PLEASE SPECIFY) _____
_____

7. Please review the following environmental label and answer the questions listed on the facing page:

Forest Management Rating:

72

	This Brand
Worker's Rights	62
No Clearcutting	72
Sustainable Management	88
Fish/Wildlife Protection	82
Environmental Pollution	56

MEMBER MAINE MADE AMERICA'S BEST MWPA

FSC

Environmental scoring system developed and administered by the Forest Stewardship Council.

Minimum acceptable score = 50
Industry average score = 72
Maximum score possible = 100

To learn more about forest certification,
call FSC at 1-800-555-TREE
or go to
www.fscoax.org

a. **In your opinion**, how credible is this label? (PLEASE **CIRCLE** APPROPRIATE RESPONSE)

1	2	3	4	5
NOT CREDIBLE				VERY CREDIBLE

b. **In your opinion,** how environmentally friendly is this product? (PLEASE **CIRCLE** APPROPRIATE RESPONSE)

1	2	3	4	5
NOT ECO-FRIENDLY				VERY ECO-FRIENDLY

c. How much information does this label provide so you can make an educated product choice? (PLEASE **CIRCLE** APPROPRIATE RESPONSE)

1	2	3	4	5
NOT ENOUGH INFORMATION		JUST ENOUGH INFORMATION		TOO MUCH INFORMATION

d. If you were to see this label displayed on a wood product that you normally buy, what is the likelihood that you would buy this product if the price and quality was the **same** as your regular brand? (PLEASE **CIRCLE** APPROPRIATE RESPONSE)

1	2	3	4	5
HIGHLY UNLIKELY		NO OPINION EITHER WAY		VERY LIKELY

8. Please review the following environmental label and answer the questions listed on the facing page:

Forest Management Rating:

68

	This Brand
Worker's Rights	62
No Clearcutting	86
Sustainable Management	68
Fish/Wildlife Protection	56
Environmental Pollution	74

SIERRA CLUB
FOUNDED 1892

This product is certified by the Sierra Club as receiving greater than the minimum accepted score for environmental certification, ensuring that your purchase contributes toward preserving and maintaining our nation's forests.

Minimum acceptable score = 50
Industry average score = 72
Maximum score possible = 100

To learn more about forest certification and other Sierra Club programs,
Please call 415-977-5500
Or go to
www.sierraclub.org

a. **In your opinion**, how credible is this label? (PLEASE **CIRCLE** APPROPRIATE RESPONSE)

1	2	3	4	5
NOT CREDIBLE				VERY CREDIBLE

b. **In your opinion**, how environmentally friendly is this product? (PLEASE **CIRCLE** APPROPRIATE RESPONSE)

1	2	3	4	5
NOT ECO-FRIENDLY				VERY ECO-FRIENDLY

c. How much information does this label provide so you can make an educated product choice? (PLEASE **CIRCLE** APPROPRIATE RESPONSE)

1	2	3	4	5
NOT ENOUGH INFORMATION		JUST ENOUGH INFORMATION		TOO MUCH INFORMATION

d. If you were to see this label displayed on a wood product that you normally buy, what is the likelihood that you would buy this product if the price and quality was the **same** as your regular brand? (PLEASE **CIRCLE** APPROPRIATE RESPONSE)

1	2	3	4	5
HIGHLY UNLIKELY		NO OPINION EITHER WAY		VERY LIKELY

Section III

In this section, we are interested in knowing your history of buying wood products such as paper, construction materials, furniture and household products.

9. **In the last year**, how often have you bought the following wood products? (PLEASE PLACE A **CHECK** UNDER THE APPROPRIATE RESPONSE FOR **EACH** PRODUCT)

	Never	Once	Few Times	Monthly	Weekly	Don't Know
• **PAPER PRODUCTS** (SUCH AS PAPER TOWELS, COPIER PAPER, OR OTHER OFFICE PRODUCTS)						
• **CONSTRUCTION MATERIALS** (SUCH AS LUMBER, PLYWOOD, OR PRESSURE-TREATED DECKING)						
• **FURNITURE** (SUCH AS LAWN FURNITURE, DINETTE SETS, OR ENTERTAINMENT CENTERS)						
• **HOUSEHOLD PRODUCTS** (SUCH AS CUTTING BOARDS, PICTURE FRAMES, AND BIRDHOUSES AND FEEDERS)						

10. **In the last year**, how much would you estimate you have spent on the following wood products? (PLEASE PLACE A **CHECK** UNDER THE APPROPRIATE RESPONSE FOR **EACH** PRODUCT)

- **PAPER PRODUCTS** (SUCH AS PAPER TOWELS, COPIER PAPER, OR OTHER OFFICE PRODUCTS)
- **CONSTRUCTION MATERIALS** (SUCH AS PLY-WOOD, PRESSURE-TREATED DECKING, OR LUMBER)
- **FURNITURE** (SUCH AS LAWN FURNITURE, DINETTE SETS, OR ENTERTAINMENT CENTERS)
- **HOUSEHOLD PRODUCTS** (SUCH AS CUTTING BOARDS, PICTURE FRAMES, AND BIRDHOUSES AND FEEDERS)

$0-$49	$50-$99	$100-$249	$250-$499	$500+	Don't Know

Section IV

In this section we would like you to imagine that you are in a store looking to buy a wood product and you find three different brands available. You will be asked to indicate which brand you would buy.

You are to assume that all three brands are exactly the same **except** for the price of the product and the information presented on the environmental labels. Sometimes the environmental labels may be blank; for these brands there is no information about the product's level of environmental friendliness. Products with blank labels may or may not be better for the environment than the other products available to you.

11. Assume that you need to buy a wood product and faced with the following choices, which brand would you choose? (PLEASE **CHECK ONE BOX** BELOW FOR YOUR CHOICE)

BRAND X BRAND Y BRAND Z

Brand X	**Brand Y**	**Brand Z**
$20.00	$25.00	$15.00
EPA United States Environmental Protection Agency	EPA United States Environmental Protection Agency	
This wood product comes from a forest which has met all environmental certification criteria as developed and administered by the USEPA	This wood product comes from a forest which has met all environmental certification criteria as developed and administered by the USEPA	
For more information on forest product certification, call 212-555-2122 or go to www.epa.gov	**For more information on forest product certification, call** 212-555-2122 or go to www.epa.gov	

Section V

This section is similar to the last section in that we are going to ask you to imagine that you are in a store looking to buy three types of products (a 6-pack of paper towels, a wood birdhouse and a wood chair). For each type of product you will be asked to indicate which product you would buy from a selection of three brands.

Again, you are to assume that all the products are exactly the same **except** for the price of the product and the information presented on the environmental labels. However, this section is different than the last section in that none of the labels will be blank and you now have the option of not buying any of the products.

Below is a description of the environmental scoring program:

- **Worker's Rights** – This score indicates the degree to which forest management operations maintain or enhance the social and economic well-being of forest workers and local communities. Companies obtain higher scores if they employ workers from the local community, ensure adequate worker safety, allow worker's to unionize and provide fair pay to workers.
- **No Clear-cutting –** This score indicates the degree to which the company's forests are harvested without the use of clear-cutting. Clear-cutting is the practice of harvest
-ing all trees in a given area at the same time; and cover areas greater than 1 acre.
- **Sustainable Management** – This score indicates the degree to which the company manages forests so that they are not depleted or permanently damaged. Companies obtain higher scores if they practice selective cutting methods, replant harvested areas, encourage timber stand improvement, and actively prepare harvested areas for natural regeneration.
- **Fisheries and Wildlife Protection** – This score indicates the degree to which the company's forest operations protect fish and wildlife species and their ecosystems. Companies obtain higher scores if they actively document and protect any naturally occurring species or ecosystems, especially if they are rare or fragile.
- **Environmental Pollution** – This score indicates the degree to which the company's forest operations reduces air, water and land pollution. Companies obtain higher scores if they reduce or eliminate the use of chemical pesticides, herbicides, and fungicides and/or take steps to minimize soil erosion.

12. Assume that you were going to buy a **6-PACK OF PAPER TOWELS** and faced with the following three choices, which brand would you choose? (PLEASE **CHECK ONE BOX** BELOW)

BRAND X	BRAND Y	BRAND Z	I WOULD NOT BUY ANY OF THESE

6-PACK OF PAPER TOWELS

Brand X	Brand Y	Brand Z
$5.61	$6.99	$6.30
This Brand Worker's Rights - 70 No Clearcutting - 87 Sustainable Management - 80 Fish/Wildlife Protection - 58 Environmental Pollution - 71	This Brand Worker's Rights - 100 No Clearcutting - 78 Sustainable Management - 84 Fish/Wildlife Protection - 67 Environmental Pollution - 67	This Brand Worker's Rights - 91 No Clearcutting - 64 Sustainable Management - 70 Fish/Wildlife Protection - 77 Environmental Pollution - 79
EPA United States Environmental Protection Agency	EPA United States Environmental Protection Agency	EPA United States Environmental Protection Agency
Environmental scoring system developed and administered by the **US Environmental Protection Agency** Minimum acceptable score = 50 Industry average score = 72 Maximum score possible = 100	Environmental scoring system developed and administered by the **US Environmental Protection Agency** Minimum acceptable score = 50 Industry average score = 72 Maximum score possible = 100	Environmental scoring system developed and administered by the **US Environmental Protection Agency** Minimum acceptable score = 50 Industry average score = 72 Maximum score possible = 100

13. Assume that you were going to buy a **BIRD HOUSE** and faced with the following three choices, which brand would you choose? (PLEASE **CHECK ONE BOX** BELOW)

BRAND X	BRAND Y	BRAND Z	I WOULD NOT BUY ANY OF THESE

BIRD HOUSE

Brand X	Brand Y	Brand Z
$40.58	$52.08	$50.08
This Brand Worker's Rights - 55 No Clearcutting - 76 Sustainable Management - 77 Fish/Wildlife Protection - 62 Environmental Pollution - 83	This Brand Worker's Rights - 68 No Clearcutting - 71 Sustainable Management - 48 Fish/Wildlife Protection - 99 Environmental Pollution - 92	This Brand Worker's Rights - 61 No Clearcutting - 74 Sustainable Management - 67 Fish/Wildlife Protection - 86 Environmental Pollution - 87
EPA United States Environmental Protection Agency	EPA United States Environmental Protection Agency	EPA United States Environmental Protection Agency
Environmental scoring system developed and administered by the **US Environmental Protection Agency**	Environmental scoring system developed and administered by the **US Environmental Protection Agency**	Environmental scoring system developed and administered by the **US Environmental Protection Agency**
Minimum acceptable score = 50 Industry average score = 72 Maximum score possible = 100	Minimum acceptable score = 50 Industry average score = 72 Maximum score possible = 100	Minimum acceptable score = 50 Industry average score = 72 Maximum score possible = 100

14. Assume that you were going to buy a **WOODEN CHAIR** and faced with the following three choices, which brand would you choose? (PLEASE **CHECK ONE BOX** BELOW)

BRAND X	BRAND Y	BRAND Z	I WOULD NOT BUY ANY OF THESE

WOODEN CHAIR

Brand X	Brand Y	Brand Z
$152.00	$232.00	$122.00
This Brand Worker's Rights - 71 No Clearcutting - 68 Sustainable Management - 72 Fish/Wildlife Protection - 71 Environmental Pollution - 94	This Brand Worker's Rights - 91 No Clearcutting - 82 Sustainable Management - 96 Fish/Wildlife Protection - 91 Environmental Pollution - 81	This Brand Worker's Rights - 71 No Clearcutting - 61 Sustainable Management - 85 Fish/Wildlife Protection - 64 Environmental Pollution - 68
EPA United States Environmental Protection Agency	EPA United States Environmental Protection Agency	EPA United States Environmental Protection Agency
Environmental scoring system developed and administered by the **US Environmental Protection Agency**	Environmental scoring system developed and administered by the **US Environmental Protection Agency**	Environmental scoring system developed and administered by the **US Environmental Protection Agency**
Minimum acceptable score = 50 Industry average score = 72 Maximum score possible = 100	Minimum acceptable score = 50 Industry average score = 72 Maximum score possible = 100	Minimum acceptable score = 50 Industry average score = 72 Maximum score possible = 100

ABC

Section VI

In this section, we would like to know a little bit about yourself for statistical purposes. We would like to remind you that all of your answers to the survey are treated as strictly confidential. However, we need this information to be able to compare your responses with other Americans. We thank you again for taking the time to complete this survey.

15. What is your gender? (PLEASE **CHECK** YOUR ANSWER)

    MALE
    FEMALE

16. What is your race/ethnicity? (PLEASE **CHECK ALL** THAT APPLY)

    WHITE
    BLACK
    HISPANIC OR OF SPANISH ORIGIN
    ASIAN OR PACIFIC ISLANDER
    AMERICAN INDIAN OR ALASKAN NATIVE
    OTHER, PLEASE SPECIFY _____

17. How old are you? _____ YEARS OLD

18. What is the highest level of education you have completed?
    (PLEASE **CHECK THE MOST APPROPRIATE** ANSWER)

    0-11 YEARS
    12 YEARS (HIGH SCHOOL GRADUATE OR GED)
    1-3 YEARS COLLEGE (SOME COLLEGE)
    COLLEGE GRADUATE (BACHELOR DEGREE OR EQUIVALENT)
    POSTGRADUATE, MASTER'S DEGREE, DOCTORATE, LAW DEGREE, OTHER PROFESSIONAL DEGREE

19. Do you own forest land? (PLEASE **CHECK** YOUR ANSWER)

NO
YES ⟶ How many acres of forest land do you own?
(FILL IN THE BLANK)

_____ACRES

20. Is your land a registered tree farm? (PLEASE **CHECK** YOUR ANSWER)

NO
YES

21. Do you work in any of the fields listed below? (PLEASE **CHECK** YOUR ANSWER)

NO
YES ⟶ Which ones? (PLEASE **CHECK** YOUR ANSWER)
LOGGING/FOREST MANAGEMENT
PAPER MANUFACTURING
MANUFACTURING
CARPENTER OR OTHER WOODWORKER/
CRAFTSPERSON
OFFICE SUPPLY SALESPERSON

22. Do you run a business out of your home? (PLEASE **CHECK** YOUR ANSWER)

NO
YES

23. Do you belong to, or donate money to any environmental groups? (PLEASE **CHECK** YOUR ANSWER)

NO
YES ——→ Which ones? (PLEASE **CHECK ALL** THAT APPLY)
FOREST STEWARDSHIP COUNCIL
NATIONAL WILDLIFE FEDERATION
NATURE CONSERVANCY
NATIONAL AUDUBON SOCIETY
SIERRA CLUB
OTHER ENVIRONMENTAL ORGANIZATION – PLEASE SPECIFY:_____

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24. In the last year, did you participate in any of the following **forest** recreation activities? (PLEASE **CHECK ALL** THAT APPLY)

HIKING	CAMPING
FISHING	HUNTING
CROSS-COUNTRY SKIING	SNOWMOBILING
WILDLIFE WATCHING	NATURE PHOTOGRAPHY
ATV RIDING	BOATING/CANOEING

OTHER – PLEASE SPECIFY:_____
I DO NOT PARTICIPATE IN **FOREST** RECREATION ACTIVITIES

25. What was your total household income before taxes for last year? (PLEASE **CHECK THE MOST APPROPRIATE** ANSWER)

LESS THAN $10,000	$60,000 - $70,000
$10,000 - $20,000	$70,000 - $80,000
$20,000 - $30,000	$80,000 - $90,000
$30,000 - $40,000	$90,000 - $100,000
$40,000 - $50,000	MORE THAN $100,000
$50,000 - $60,000	MORE THAN $250,000

Appendix B

Regression and Hypothesis Testing Results

The SAS System

The LOGISTIC Procedure

Model Information - Paper Towels Equation

Data Set	WORK.TEMPPTC
Response Variable	choice
Number of Response Levels	2
Number of Observations	4851
Weight Variable	wgt12
Sum of Weights	4851.0000284
Link Function	Logit
Optimization Technique	Fisher's scoring

Response Profile

Value	Ordered choice	Total Frequency	Total Weight
1	1	1444	1450.1399
2	0	3407	3400.8601

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	5919.835	5904.695
SC	5926.322	6339.320
-2 Log L	5917.835	5770.695

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	147.1406	66	<.0001
Score	143.5437	66	<.0001
Wald	139.0533	66	<.0001

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > ChiSq
Intercept	1	-15.3323	8.3563	3.3665	0.0665
price	1	-1.8487	0.8028	5.3034	0.0213
a1	1	0.0970	0.0409	5.6353	0.0176
a2	1	0.0587	0.0409	2.0564	0.1516
a3	1	0.0592	0.0409	2.0964	0.1476
a4	1	0.1065	0.0418	6.4905	0.0108
a5	1	0.0174	0.0416	0.1742	0.6764
a1vector	1	-0.00336	0.00706	0.2271	0.6337
a2vector	1	-0.0126	0.00705	3.1756	0.0747
a3vector	1	-0.00197	0.00692	0.0812	0.7757
a4vector	1	0.0178	0.00704	6.3738	0.0116
a5vector	1	0.00147	0.00697	0.0447	0.8325
a1epa	1	0.000278	0.00705	0.0016	0.9686
a2epa	1	-0.00251	0.00701	0.1282	0.7203
a3epa	1	-0.00989	0.00695	2.0233	0.1549
a4epa	1	-0.00116	0.00703	0.0271	0.8693
a5epa	1	0.0125	0.00694	3.2557	0.0712
a1fme	1	-0.0132	0.00821	2.6038	0.1066
a2fme	1	0.00171	0.00815	0.0439	0.8340
a3fme	1	-0.0153	0.00794	3.6954	0.0546
a4fme	1	0.00370	0.00811	0.2082	0.6482
a5fme	1	0.0246	0.00835	8.7028	0.0032
a1ed	1	-0.00070	0.00128	0.2999	0.5839
a2ed	1	0.000577	0.00126	0.2095	0.6471
a3ed	1	0.00137	0.00125	1.1924	0.2748
a4ed	1	-0.00327	0.00130	6.3533	0.0117
a5ed	1	0.00210	0.00130	2.5932	0.1073
a1age2	1	-0.00253	0.00191	1.7573	0.1850
a2age2	1	0.00109	0.00193	0.3216	0.5707
a3age2	1	0.000574	0.00190	0.0914	0.7624
a4age2	1	0.000115	0.00192	0.0036	0.9521
a5age2	1	0.000915	0.00196	0.2177	0.6408
a1occ	1	-0.00889	0.0114	0.6072	0.4358
a2occ	1	-0.00294	0.0108	0.0735	0.7864
a3occ	1	0.00965	0.0116	0.6924	0.4054
a4occ	1	-0.00495	0.0116	0.1811	0.6704
a5occ	1	0.00619	0.0121	0.2609	0.6095
a1own	1	0.00407	0.00950	0.1837	0.6682
a2own	1	-0.00631	0.00949	0.4422	0.5061
a3own	1	0.000328	0.00916	0.0013	0.9715
a4own	1	0.00271	0.00948	0.0814	0.7753
a5own	1	-0.00021	0.00978	0.0005	0.9827
a1wild	1	-0.0117	0.00710	2.7101	0.0997
a2wild	1	0.00418	0.00710	0.3470	0.5558
a3wild	1	0.0118	0.00697	2.8625	0.0907
a4wild	1	0.00246	0.00694	0.1253	0.7233
a5wild	1	-0.00748	0.00710	1.1106	0.2920
a1photo	1	0.0163	0.00820	3.9457	0.0470
a2photo	1	-0.0109	0.00841	1.6801	0.1949
a3photo	1	-0.00955	0.00803	1.4125	0.2346
a4photo	1	0.00279	0.00822	0.1150	0.7345
a5photo	1	0.00129	0.00810	0.0254	0.8734

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > ChiSq
a1hikecamp	1	-0.00874	0.00697	1.5708	0.2101
a2hikecamp	1	0.0138	0.00682	4.0768	0.0435
a3hikecamp	1	-0.0118	0.00668	3.1162	0.0775
a4hikecamp	1	-0.00084	0.00696	0.0145	0.9042
a5hikecamp	1	0.00762	0.00705	1.1690	0.2796
a1huntfish	1	0.0128	0.00689	3.4592	0.0629
a2huntfish	1	-0.00576	0.00681	0.7139	0.3982
a3huntfish	1	-0.00556	0.00672	0.6853	0.4078
a4huntfish	1	0.00557	0.00683	0.6644	0.4150
a5huntfish	1	-0.00641	0.00686	0.8737	0.3499
a1boat	1	-0.00026	0.00707	0.0013	0.9709
a2boat	1	-0.00668	0.00698	0.9136	0.3392
a3boat	1	-0.00841	0.00695	1.4606	0.2268
a4boat	1	-0.00083	0.00707	0.0139	0.9063
a5boat	1	0.0157	0.00706	4.9368	0.0263

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
price	0.157	0.033	0.759
a1	1.102	1.017	1.194
a2	1.060	0.979	1.149
a3	1.061	0.979	1.150
a4	1.112	1.025	1.207
a5	1.018	0.938	1.104
a1vector	0.997	0.983	1.011
a2vector	0.988	0.974	1.001
a3vector	0.998	0.985	1.012
a4vector	1.018	1.004	1.032
a5vector	1.001	0.988	1.015
a1epa	1.000	0.987	1.014
a2epa	0.997	0.984	1.011
a3epa	0.990	0.977	1.004
a4epa	0.999	0.985	1.013
a5epa	1.013	0.999	1.026
a1fme	0.987	0.971	1.003
a2fme	1.002	0.986	1.018
a3fme	0.985	0.970	1.000
a4fme	1.004	0.988	1.020
a5fme	1.025	1.008	1.042
a1ed	0.999	0.997	1.002
a2ed	1.001	0.998	1.003
a3ed	1.001	0.999	1.004
a4ed	0.997	0.994	0.999
a5ed	1.002	1.000	1.005
a1age2	0.997	0.994	1.001
a2age2	1.001	0.997	1.005
a3age2	1.001	0.997	1.004
a4age2	1.000	0.996	1.004

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
a5age2	1.001	0.997	1.005
a1occ	0.991	0.969	1.014
a2occ	0.997	0.976	1.018
a3occ	1.010	0.987	1.033
a4occ	0.995	0.973	1.018
a5occ	1.006	0.983	1.030
a1own	1.004	0.986	1.023
a2own	0.994	0.975	1.012
a3own	1.000	0.983	1.018
a4own	1.003	0.984	1.022
a5own	1.000	0.981	1.019
a1wild	0.988	0.975	1.002
a2wild	1.004	0.990	1.018
a3wild	1.012	0.998	1.026
a4wild	1.002	0.989	1.016
a5wild	0.993	0.979	1.006
a1photo	1.016	1.000	1.033
a2photo	0.989	0.973	1.006
a3photo	0.990	0.975	1.006
a4photo	1.003	0.987	1.019
a5photo	1.001	0.986	1.017
a1hikecamp	0.991	0.978	1.005
a2hikecamp	1.014	1.000	1.028
a3hikecamp	0.988	0.975	1.001
a4hikecamp	0.999	0.986	1.013
a5hikecamp	1.008	0.994	1.022
a1huntfish	1.013	0.999	1.027
a2huntfish	0.994	0.981	1.008
a3huntfish	0.994	0.981	1.008
a4huntfish	1.006	0.992	1.019
a5huntfish	0.994	0.980	1.007
a1boat	1.000	0.986	1.014
a2boat	0.993	0.980	1.007
a3boat	0.992	0.978	1.005
a4boat	0.999	0.985	1.013
a5boat	1.016	1.002	1.030

Association of Predicted Probabilities and Observed Responses

Percent Concordant	59.3	Somers' D	0.192
Percent Discordant	40.0	Gamma	0.194
Percent Tied	0.7	Tau-a	0.081
Pairs	4919708	c	0.596

Linear Hypotheses Testing Results

Label	Wald Chi-Square	DF	Pr > ChiSq
atttest	8.2133	4	0.0841
a1vec	5.2597	1	0.0218
a2vec	1.2765	1	0.2585
a3vec	1.9660	1	0.1609
a4vec	8.8266	1	0.0030
a5vec	0.2032	1	0.6522
vectest	7.8949	4	0.0955
attvectest	11.0513	4	0.0260
a1epa	5.7051	1	0.0169
a2epa	1.8859	1	0.1697
a3epa	1.4530	1	0.2281
a4epa	6.4331	1	0.0112
a5epa	0.5224	1	0.4698
epatest	4.5066	4	0.3418
epaatttest	7.0994	4	0.1307
a1fme	4.2542	1	0.0392
a2fme	2.1976	1	0.1382
a3fme	1.1526	1	0.2830
a4fme	6.9816	1	0.0082
a5fme	1.0277	1	0.3107
fmetest	12.6673	4	0.0130
fmeatttest	5.7842	4	0.2159
a1occ	4.3908	1	0.0361
a2occ	1.7308	1	0.1883
a3occ	2.6335	1	0.1046
a4occ	5.5413	1	0.0186
a5occ	0.2970	1	0.5858
occtest	1.5012	4	0.8264
a1own	5.7115	1	0.0169
a2own	1.5567	1	0.2122
a3own	2.0104	1	0.1562
a4own	6.3894	1	0.0115
a5own	0.1577	1	0.6912
owntest	0.5776	4	0.9655
a1wild	4.2372	1	0.0395
a2wild	2.2878	1	0.1304
a3wild	2.9170	1	0.0876
a4wild	6.5975	1	0.0102
a5wild	0.0549	1	0.8147
wildtest	6.0207	4	0.1976
wildatttest	8.1654	4	0.0857
a1photo	7.3246	1	0.0068
a2photo	1.3126	1	0.2519
a3photo	1.4032	1	0.2362
a4photo	6.5281	1	0.0106
a5photo	0.1904	1	0.6626
phototest	5.8160	4	0.2133
photoatttest	9.4119	4	0.0516
a1hikecamp	4.5713	1	0.0325
a2hikecamp	3.1080	1	0.0779
a3hikecamp	1.3298	1	0.2488
a4hikecamp	6.3373	1	0.0118

Linear Hypotheses Testing Results

Label	Wald Chi-Square	DF	Pr > ChiSq
a5hikecamp	0.3533	1	0.5522
hctest	8.2196	4	0.0839
hcatttest	6.4488	4	0.1680
a1huntfish	7.2872	1	0.0069
a2huntfish	1.7061	1	0.1915
a3huntfish	1.7263	1	0.1889
a4huntfish	7.3589	1	0.0067
a5huntfish	0.0704	1	0.7908
hftest	5.0009	4	0.2872
hfatttest	12.4767	4	0.0141
a1boat	5.5078	1	0.0189
a2boat	1.5592	1	0.2118
a3boat	1.5021	1	0.2204
a4boat	6.2370	1	0.0125
a5boat	0.6211	1	0.4306
boattest	6.0861	4	0.1928
boatatttest	5.9750	4	0.2010
a1ed	5.6985	1	0.0170
a2ed	2.1511	1	0.1425
a3ed	2.2510	1	0.1335
a4ed	6.2671	1	0.0123
a5ed	0.2248	1	0.6354
edtest	8.1841	4	0.0851
edatttest	8.1506	4	0.0862
a1age	5.4455	1	0.0196
a2age	2.1707	1	0.1407
a3age	2.1785	1	0.1400
a4age	6.6219	1	0.0101
a5age	0.1967	1	0.6574
agetest	1.9080	4	0.7527
ageatttest	8.3302	4	0.0802
hikehunt	8.0826	5	0.1517
hikewild	6.7764	5	0.2378
hikephoto	8.1382	5	0.1488
hikeboat	4.1033	5	0.5346
huntwild	8.4454	5	0.1333
huntphoto	1.1958	5	0.9453
wildphoto	8.7530	5	0.1193
wildboat	9.7051	5	0.0840
photoboat	3.3829	5	0.6412
norechike	8.2199	5	0.1445
norechunt	5.5483	5	0.3527
norecwild	6.4254	5	0.2670
norecphoto	5.8173	5	0.3244
norecboat	6.3717	5	0.2717
a1huntwild	5.4456	1	0.0196
a2huntwild	0.9523	1	0.3291
a3huntwild	2.8245	1	0.0928
a4huntwild	0.0935	1	0.7598
a5huntwild	0.0105	1	0.9184
a1hunthike	4.0207	1	0.0449
a2hunthike	3.6384	1	0.0565
a3hunthike	0.3866	1	0.5341

Linear Hypotheses Testing Results

Label	Wald Chi-Square	DF	Pr > ChiSq
a4hunthike	0.3684	1	0.5439
a5hunthike	1.7459	1	0.1864
a1huntboat	1.4220	1	0.2331
a2huntboat	0.0071	1	0.9330
a3huntboat	0.0682	1	0.7939
a4huntboat	0.3378	1	0.5611
a5huntboat	3.9883	1	0.0458
a1huntphoto	0.1143	1	0.7353
a2huntphoto	0.2269	1	0.6338
a3huntphoto	0.1501	1	0.6984
a4huntphoto	0.0720	1	0.7884
a5huntphoto	0.5472	1	0.4595
a1wildphoto	5.1567	1	0.0232
a2wildphoto	1.4257	1	0.2325
a3wildphoto	3.1384	1	0.0765
a4wildphoto	0.0007	1	0.9785
a5wildphoto	0.5088	1	0.4757
a1wildboat	1.2461	1	0.2643
a2wildboat	1.1266	1	0.2885
a3wildboat	3.9260	1	0.0475
a4wildboat	0.0995	1	0.7524
a5wildboat	4.9611	1	0.0259
a1wildhike	0.0762	1	0.7825
a2wildhike	0.7924	1	0.3734
a3wildhike	5.1403	1	0.0234
a4wildhike	0.0960	1	0.7566
a5wildhike	1.9197	1	0.1659
a1hikephoto	4.8543	1	0.0276
a2hikephoto	5.0018	1	0.0253
a3hikephoto	0.0425	1	0.8366
a4hikephoto	0.1049	1	0.7460
a5hikephoto	0.3301	1	0.5656
a1hikeboat	0.6003	1	0.4385
a2hikeboat	3.6241	1	0.0569
a3hikeboat	0.1024	1	0.7490
a4hikeboat	0.0000	1	0.9997
a5hikeboat	0.5483	1	0.4590
a1photoboat	2.2039	1	0.1377
a2photoboat	0.1402	1	0.7081
a3photoboat	0.0112	1	0.9155
a4photoboat	0.1077	1	0.7428
a5photoboat	1.6900	1	0.1936
worknocc	1.2782	1	0.2582
worksus	1.2485	1	0.2638
workfandw	0.0797	1	0.7777
workpoll	5.2353	1	0.0221
noccsus	0.0002	1	0.9881
noccfandw	1.8315	1	0.1759
noccpoll	1.5054	1	0.2198
susfandw	1.9714	1	0.1603
suspoll	1.5459	1	0.2137
fandwpoll	6.7511	1	0.0094

The SAS System

The LOGISTIC Procedure

Model Information

Data Set	WORK.TEMPCHB
Response Variable	choice
Number of Response Levels	2
Number of Observations	4884
Weight Variable	wgt12
Sum of Weights	4883.9999654
Link Function	Logit
Optimization Technique	Fisher's scoring

Response Profile

Value	Ordered choice	Total Frequency	Total Weight
1	1	1362	1361.1337
2	0	3522	3522.8663

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	5781.863	5732.775
SC	5788.357	6167.854
-2 Log L	5779.863	5598.775

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	181.0883	66	<.0001
Score	175.7513	66	<.0001
Wald	169.2140	66	<.0001

The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > ChiSq
Intercept	1	-23.7102	8.8247	7.2189	0.0072
price	1	-0.1048	0.0328	10.2117	0.0014
a1	1	0.1151	0.0435	7.0013	0.0081
a2	1	0.1079	0.0434	6.1860	0.0129
a3	1	0.0764	0.0428	3.1805	0.0745
a4	1	0.0834	0.0425	3.8512	0.0497
a5	1	0.1315	0.0423	9.6757	0.0019
a1vector	1	0.00833	0.00721	1.3346	0.2480
a2vector	1	-0.00913	0.00716	1.6289	0.2018
a3vector	1	0.0185	0.00704	6.9027	0.0086
a4vector	1	-0.00510	0.00718	0.5048	0.4774
a5vector	1	-0.0116	0.00706	2.6828	0.1014
a1epa	1	-0.0146	0.00724	4.0798	0.0434
a2epa	1	0.0162	0.00717	5.1163	0.0237
a3epa	1	-0.0120	0.00702	2.9086	0.0881
a4epa	1	-0.00397	0.00715	0.3080	0.5789
a5epa	1	0.0130	0.00706	3.3958	0.0654
a1fme	1	-0.00989	0.00847	1.3641	0.2428
a2fme	1	-0.00672	0.00829	0.6577	0.4174
a3fme	1	0.00681	0.00848	0.6446	0.4220
a4fme	1	0.00167	0.00836	0.0399	0.8417
a5fme	1	0.00778	0.00812	0.9166	0.3384
a1ed	1	-0.00084	0.00131	0.4069	0.5236
a2ed	1	-0.00070	0.00128	0.2985	0.5848
a3ed	1	0.000647	0.00134	0.2331	0.6292
a4ed	1	0.00132	0.00131	1.0185	0.3129
a5ed	1	-0.00045	0.00129	0.1237	0.7250
a1age2	1	0.000927	0.00199	0.2167	0.6415
a2age2	1	0.00218	0.00199	1.1984	0.2736
a3age2	1	0.000323	0.00201	0.0258	0.8725
a4age2	1	0.000995	0.00200	0.2473	0.6190
a5age2	1	-0.00439	0.00196	5.0226	0.0250
a1occ	1	0.00355	0.0115	0.0960	0.7567
a2occ	1	0.00258	0.0113	0.0519	0.8198
a3occ	1	-0.0133	0.0114	1.3676	0.2422
a4occ	1	0.0148	0.0112	1.7317	0.1882
a5occ	1	-0.0113	0.0111	1.0485	0.3059
a1own	1	0.00839	0.00978	0.7358	0.3910
a2own	1	0.00893	0.00969	0.8489	0.3569
a3own	1	0.000245	0.00961	0.0006	0.9797
a4own	1	-0.00861	0.00958	0.8063	0.3692
a5own	1	-0.00852	0.00947	0.8084	0.3686
a1wild	1	0.00971	0.00717	1.8372	0.1753
a2wild	1	-0.0105	0.00698	2.2483	0.1338
a3wild	1	-0.0125	0.00696	3.2343	0.0721
a4wild	1	0.00894	0.00709	1.5924	0.2070
a5wild	1	0.00426	0.00708	0.3619	0.5474
a1photo	1	0.00633	0.00849	0.5552	0.4562
a2photo	1	-0.00760	0.00830	0.8371	0.3602
a3photo	1	0.00214	0.00817	0.0683	0.7939

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > ChiSq
a4photo	1	-0.00579	0.00844	0.4715	0.4923
a5photo	1	0.00463	0.00809	0.3282	0.5667
a1hikecamp	1	-0.0109	0.00703	2.4242	0.1195
a2hikecamp	1	0.00611	0.00692	0.7800	0.3772
a3hikecamp	1	0.0119	0.00695	2.9338	0.0867
a4hikecamp	1	0.000283	0.00701	0.0016	0.9678
a5hikecamp	1	-0.00594	0.00684	0.7542	0.3852
a1huntfish	1	-0.00038	0.00682	0.0032	0.9551
a2huntfish	1	-0.00653	0.00669	0.9519	0.3292
a3huntfish	1	0.00150	0.00677	0.0493	0.8243
a4huntfish	1	0.000737	0.00689	0.0114	0.9148
a5huntfish	1	0.00501	0.00671	0.5589	0.4547
a1boat	1	-0.00249	0.00715	0.1215	0.7275
a2boat	1	0.00486	0.00699	0.4838	0.4867
a3boat	1	0.00519	0.00714	0.5275	0.4676
a4boat	1	0.000363	0.00721	0.0025	0.9598
a5boat	1	-0.00710	0.00710	1.0005	0.3172

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
price	0.900	0.844	0.960
a1	1.122	1.030	1.222
a2	1.114	1.023	1.213
a3	1.079	0.992	1.174
a4	1.087	1.000	1.181
a5	1.140	1.050	1.239
a1vector	1.008	0.994	1.023
a2vector	0.991	0.977	1.005
a3vector	1.019	1.005	1.033
a4vector	0.995	0.981	1.009
a5vector	0.989	0.975	1.002
a1epa	0.985	0.972	1.000
a2epa	1.016	1.002	1.031
a3epa	0.988	0.975	1.002
a4epa	0.996	0.982	1.010
a5epa	1.013	0.999	1.027
a1fme	0.990	0.974	1.007
a2fme	0.993	0.977	1.010
a3fme	1.007	0.990	1.024
a4fme	1.002	0.985	1.018
a5fme	1.008	0.992	1.024
a1ed	0.999	0.997	1.002
a2ed	0.999	0.997	1.002
a3ed	1.001	0.998	1.003
a4ed	1.001	0.999	1.004
a5ed	1.000	0.997	1.002
a1age2	1.001	0.997	1.005
a2age2	1.002	0.998	1.006

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
a3age2	1.000	0.996	1.004
a4age2	1.001	0.997	1.005
a5age2	0.996	0.992	0.999
a1occ	1.004	0.981	1.026
a2occ	1.003	0.981	1.025
a3occ	0.987	0.965	1.009
a4occ	1.015	0.993	1.037
a5occ	0.989	0.967	1.010
a1own	1.008	0.989	1.028
a2own	1.009	0.990	1.028
a3own	1.000	0.982	1.019
a4own	0.991	0.973	1.010
a5own	0.992	0.973	1.010
a1wild	1.010	0.996	1.024
a2wild	0.990	0.976	1.003
a3wild	0.988	0.974	1.001
a4wild	1.009	0.995	1.023
a5wild	1.004	0.990	1.018
a1photo	1.006	0.990	1.023
a2photo	0.992	0.976	1.009
a3photo	1.002	0.986	1.018
a4photo	0.994	0.978	1.011
a5photo	1.005	0.989	1.021
a1hikecamp	0.989	0.976	1.003
a2hikecamp	1.006	0.993	1.020
a3hikecamp	1.012	0.998	1.026
a4hikecamp	1.000	0.987	1.014
a5hikecamp	0.994	0.981	1.007
a1huntfish	1.000	0.986	1.013
a2huntfish	0.993	0.981	1.007
a3huntfish	1.002	0.988	1.015
a4huntfish	1.001	0.987	1.014
a5huntfish	1.005	0.992	1.018
a1boat	0.998	0.984	1.012
a2boat	1.005	0.991	1.019
a3boat	1.005	0.991	1.019
a4boat	1.000	0.986	1.015
a5boat	0.993	0.979	1.007

Association of Predicted Probabilities and Observed Responses

Percent Concordant	61.5	Somers' D	0.237
Percent Discordant	37.8	Gamma	0.239
Percent Tied	0.6	Tau-a	0.095
Pairs	4796964	c	0.619

Linear Hypotheses Testing Results

Label	Wald Chi-Square	DF	Pr > ChiSq
atttest	3.4859	4	0.4800
a1vec	8.0891	1	0.0045
a2vec	5.1981	1	0.0226
a3vec	4.9466	1	0.0261
a4vec	3.3896	1	0.0656
a5vec	8.0431	1	0.0046
vectest	10.2001	4	0.0372
attvectest	2.4986	4	0.6449
a1epa	5.4382	1	0.0197
a2epa	8.2353	1	0.0041
a3epa	2.2462	1	0.1339
a4epa	3.4583	1	0.0629
a5epa	11.5950	1	0.0007
epatest	12.1214	4	0.0165
epaatttest	6.4938	4	0.1652
a1fme	5.9761	1	0.0145
a2fme	5.4333	1	0.0198
a3fme	3.8159	1	0.0508
a4fme	4.0011	1	0.0455
a5fme	10.7912	1	0.0010
fmetest	3.0252	4	0.5536
fmeatttest	3.4529	4	0.4851
a1occ	6.9732	1	0.0083
a2occ	6.2327	1	0.0125
a3occ	2.0309	1	0.1541
a4occ	4.9703	1	0.0258
a5occ	7.7173	1	0.0055
occtest	3.4128	4	0.4913
a1own	7.6095	1	0.0058
a2own	6.7872	1	0.0092
a3own	2.9968	1	0.0834
a4own	2.9386	1	0.0865
a5own	7.8815	1	0.0050
owntest	2.8144	4	0.5893
a1wild	7.9175	1	0.0049
a2wild	4.9548	1	0.0260
a3wild	2.1652	1	0.1412
a4wild	4.6008	1	0.0320
a5wild	9.9756	1	0.0016
wildtest	7.7826	4	0.0999
wildatttest	4.9261	4	0.2950
a1photo	7.4969	1	0.0062
a2photo	5.1821	1	0.0228
a3photo	3.2439	1	0.0717
a4photo	3.1670	1	0.0751
a5photo	9.8124	1	0.0017
phototest	1.9080	4	0.7527
photoatttest	3.9916	4	0.4071
a1hikecamp	5.6425	1	0.0175
a2hikecamp	6.8570	1	0.0088
a3hikecamp	4.1655	1	0.0413
a4hikecamp	3.8336	1	0.0502
a5hikecamp	8.7423	1	0.0031

Linear Hypotheses Testing Results

Label	Wald Chi-Square	DF	Pr > ChiSq
hctest	5.6598	4	0.2260
hcatttest	1.9390	4	0.7470
a1huntfish	7.0951	1	0.0077
a2huntfish	5.5748	1	0.0182
a3huntfish	3.3703	1	0.0664
a4huntfish	3.9665	1	0.0464
a5huntfish	10.5214	1	0.0012
hftest	1.2999	4	0.8614
hfatttest	4.1253	4	0.3893
a1boat	6.6000	1	0.0102
a2boat	6.5960	1	0.0102
a3boat	3.5618	1	0.0591
a4boat	3.7964	1	0.0514
a5boat	8.5332	1	0.0035
boattest	1.7327	4	0.7848
boatatttest	2.2617	4	0.6878
a1ed	7.0816	1	0.0078
a2ed	6.2619	1	0.0123
a3ed	3.3206	1	0.0684
a4ed	4.0768	1	0.0435
a5ed	9.8414	1	0.0017
edtest	1.6586	4	0.7982
edatttest	3.5986	4	0.4630
a1age	7.2436	1	0.0071
a2age	6.5629	1	0.0104
a3age	3.2690	1	0.0706
a4age	4.0054	1	0.0454
a5age	9.2192	1	0.0024
agetest	5.6781	4	0.2245
ageatttest	3.2835	4	0.5115
hikehunt	4.4810	5	0.4824
hikewild	11.4500	5	0.0432
hikephoto	5.7787	5	0.3284
hikeboat	0.9456	5	0.9668
huntwild	3.1053	5	0.6837
huntphoto	0.7979	5	0.9772
wildphoto	2.6228	5	0.7579
wildboat	7.0095	5	0.2199
photoboat	3.4916	5	0.6247
norechike	7.6015	5	0.1796
norechunt	1.3943	5	0.9249
norecwild	7.7835	5	0.1686
norecphoto	1.9779	5	0.8522
norecboat	2.4306	5	0.7869
a1huntwild	0.9397	1	0.3324
a2huntwild	0.1563	1	0.6926
a3huntwild	1.8900	1	0.1692
a4huntwild	0.6260	1	0.4288
a5huntwild	0.0053	1	0.9422
a1hunthike	1.0309	1	0.3099
a2hunthike	1.4886	1	0.2224
a3hunthike	1.0680	1	0.3014
a4hunthike	0.0018	1	0.9660

Linear Hypotheses Testing Results

Label	Wald Chi-Square	DF	Pr > ChiSq
a5hunthike	1.1633	1	0.2808
a1huntboat	0.0377	1	0.8459
a2huntboat	1.1357	1	0.2866
a3huntboat	0.1104	1	0.7397
a4huntboat	0.0011	1	0.9734
a5huntboat	1.2399	1	0.2655
a1huntphoto	0.4083	1	0.5229
a2huntphoto	0.0112	1	0.9159
a3huntphoto	0.0039	1	0.9501
a4huntphoto	0.3874	1	0.5337
a5huntphoto	0.0014	1	0.9702
a1wildphoto	0.0736	1	0.7861
a2wildphoto	0.0562	1	0.8127
a3wildphoto	1.5171	1	0.2181
a4wildphoto	1.4185	1	0.2337
a5wildphoto	0.0010	1	0.9754
a1wildboat	1.3391	1	0.2472
a2wildboat	2.2125	1	0.1369
a3wildboat	2.8752	1	0.0900
a4wildboat	0.6475	1	0.4210
a5wildboat	1.1941	1	0.2745
a1wildhike	3.6843	1	0.0549
a2wildhike	2.4504	1	0.1175
a3wildhike	5.2734	1	0.0217
a4wildhike	0.6667	1	0.4142
a5wildhike	0.9076	1	0.3408
a1hikephoto	2.2422	1	0.1343
a2hikephoto	1.4494	1	0.2286
a3hikephoto	0.7428	1	0.3888
a4hikephoto	0.2745	1	0.6004
a5hikephoto	0.9305	1	0.3347
a1hikeboat	0.5760	1	0.4479
a2hikeboat	0.0134	1	0.9077
a3hikeboat	0.3756	1	0.5400
a4hikeboat	0.0001	1	0.9942
a5hikeboat	0.0110	1	0.9166
a1photoboat	0.6069	1	0.4360
a2photoboat	1.2372	1	0.2660
a3photoboat	0.0744	1	0.7850
a4photoboat	0.3042	1	0.5813
a5photoboat	1.1407	1	0.2855
worknocc	0.0426	1	0.8365
worksus	1.2310	1	0.2672
workfandw	0.8219	1	0.3646
workpoll	0.2115	1	0.6456
noccsus	0.7733	1	0.3792
noccfandw	0.4790	1	0.4889
noccpoll	0.4905	1	0.4837
susfandw	0.0404	1	0.8406
suspoll	2.4517	1	0.1174
fandwpoll	1.9969	1	0.1576

Biography of the Author

Kelly Ann O'Brien was born in Holyoke, Massachusetts, on June 27, 1973. An Air Force brat, Kelly has lived in almost a dozen states, including Florida, Louisiana, and Nevada, and several countries, including Belgium, Germany, and the United States. After graduating from Goffstown Area Regional High School in Goffstown, New Hampshire in 1991, Kelly moved to Maine to attend Unity College and has been a Maine resident ever since. She received a Bachelor's Degree in Environmental Policy from Unity College in December, 1994 and spent the next 5 years traveling and working in such places as South Carolina and the U.S. Virgin Islands.

During the summers, Kelly returned to Maine from her travels to manage a whitewater rafting company, North Country Rivers. She entered the graduate program of the Resource Economics and Policy Department at the University of Maine in January of 2000. Kelly is a candidate for the Master of Science degree in Resource Utilization in December of 2001.