WHO CARES AND WHO ACTS? DIFFERENT TYPES OF OUTDOOR RECREATIONISTS EXHIBIT DIFFERENT LEVELS OF ENVIRONMENTAL CONCERN AND BEHAVIOR[1]

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Abstract: The relationship between a person's level of environmental concern and behavior, and their participation in different types of outdoor recreational activities has been a matter of study for approximately 25 years. However, most of the research occurred in the mid- to late seventies and, until recently, there has been relatively little research performed since then. A recent study notes that the weak associations found in earlier studies between environmental concern/behavior, and outdoor recreation participation may explain the drop in research effort. We revisit the issue because it has important policy dimensions. The results generally support the idea that participation in outdoor recreation can have a significant positive impact on the level of environmental concern and behavior. In addition, the level of environmental concern and behavior depends upon the type of recreational activity. The general trend is that appreciative activities, such as wildlife watching and nature photography, are consistently associated with higher levels of environmental concern and behavior. However, the relative effects of the different recreation activities differ across our measures of environmental concern and behavior. Thus, the idea that the direction of the effects is consistent across alternative measures is not supported.

Introduction

The relationship between a person's level of environmental concern and behavior, and their participation in different types of outdoor recreational activities, has been a matter of study for approximately 25 years. The studies have primarily examined the following two hypotheses elicited by Dunlap and Heffernan. First, there exists a positive association between participation in outdoor recreation activities and environmental concern, and second, that the strength of this association is different across types of outdoor recreation. A major difference between the various studies is how different recreational activities are grouped.

Most of the research occurred in the mid- to late-seventies with relatively little research performed since then. A recent study notes that the weak associations found in earlier studies between environmental concern and behavior, and outdoor recreation participation may explain the drop in research effort. We revisit the issue because it has important policy dimensions; if environmental concern and behavior is significantly impacted by participating in various outdoor recreational activities, then policies and programs promoting these activities may be effective in furthering environmental agendas.

Notably, the relatively weak associations found in previous work may depend critically upon the method in which recreational activities were grouped. We examine the statistical relationship between pro-environmental behavior or attitudes and participation in different types of outdoor recreation. Further, we do not group activities so that we can test if the relationships are significantly different across recreation type.

Relevant Literature

Dunlap and Heffernan (DH, hereafter) (1975) classified recreation activities into two categories: 'consumptive' defined as those activities (such as hunting and fishing) which involve "taking something from the environment and thus reflect a 'utilitarian' orientation toward it" (p. 19) and "appreciative" defined as those activities (e.g., hiking, camping and nature photography) which involve "attempts to enjoy the natural environment without altering it...thus compatible with the 'preservationist' orientation which attempts to maintain the environment in its natural state" (pp. 19-20). Using this grouping scheme DH found that the first hypothesis received only weak support and that the second received substantial support. They discovered that the association between various indicators of environmental concern was always stronger with appreciative activities than with consumptive activities.

Geisler et al. (1977) altered the original DH approach by including a third category of outdoor recreation activities, "abusive." Recreation activities such as ATV riding, snowmobiling, and mountain biking are classified as "abusive" by DH, although not specifically examined in their study, and defined in their paper as activities which produce "severe environmental degradation" (p. 27). Using their approach, Geisler et al. found significant support for the first hypothesis albeit the effects measured were relatively small. They also found some statistical support for the assertion that participation in appreciative activities has a stronger positive association with environmental concern than participation in consumptive activities. However, the results were decidedly mixed when considering abusive activities; the effect of abusive activities was similar to the effect of appreciative activities and similar to or greater than the effect of consumptive activities.

Van Liere and Noe (1981) also examined the DH hypotheses but their study differed by using different measures of participation intensity. They did not find strong support for the first DH hypothesis; only about 40 percent of the associations between environmental concern and recreational participation were significant and positive.

[1] Maine Agriculture and Forest Experiment Station No. 2482.

In addition, about 15 percent were significant and negative. The results did provide support for the second hypothesis; all of the significant positive associations were with respect to appreciative activities.

Theodori et al. (1998) also examined the second DH hypothesis with an even more significant alteration to the grouping of outdoor recreation activities. They identified a limitation of prior studies' classification of recreational activities; some activities (such as camping or hiking) may transcend two or more categories. While some of these activities had been historically categorized as "appreciative", these activities were also impact intensive and could therefore fall into the "consumptive" definition. They re-classified the various outdoor recreation activities into 2 categories: "Appreciative-Slight Resource Utilization" characterized by participation in activities such as hiking/backpacking, picnicking, and bird watching and "Moderate-Intensive Resource Utilization" identified as participation in such activities as fishing, hunting, and ATV riding. The study found considerable support for the first Dunlap-Heffernan hypothesis and showed mixed results for the second hypothesis.

In summary, the various studies examining the DH hypotheses show varied results possibly due to the somewhat arbitrary classification of outdoor recreation activities. Rather than arbitrarily classify the various outdoor recreation activities into delineated categories based on the so-called environmental impact of these activities, the recreation activities should be examined individually to ascertain the connection between them and environmental concern and behavior.

Model

We are interested in estimating the relationship between an individual's level of environmental interest, opinions and behavior with their participation in different forest recreational activities. In turn we estimated four different equations, each with similar sets of independent variables but with different dependent measures of environmental interest, opinions or behavior. More specifically, the equations estimate the relationship between participation in forest-based recreation and 1) the individual's level of interest in how forests are managed, 2) the individual's opinion as to what percent of U.S. forests are managed in an 'environmentally friendly' manner, 3) the individual's level of membership or support of environmental groups, and 4) the individual's likelihood to purchase an environmentally certified and labeled wood product.

The general form of the equations is:

$$DEP = (\Sigma\alpha_{INT}INT) + (\Sigma\beta_{ACT}ACT) + (\Sigma\delta_{SOC}SOC) + (\Sigma\phi_{REG}REG) + (\Sigma\gamma_{RTREAT}TREAT) + e$$

where the dependent variable differs across equations (explained in more detail below) and the INT denotes the equation intercept(s).[2] ACT denotes a set of variables that denote whether the individual did or did not participate in forest-based recreation (NOREC) and if they did, what specific forest-based recreational activity (HIKE, FISH, XSKI, WATCH, ATV, CAMP, HUNT, SNOW, PHOTO, BOAT) they participated in (hiking, fishing, cross-country skiing, wildlife watching, riding all-terrain vehicles, camping, hunting, snowmobiling, nature photography or boating/canoeing, respectively). When the individual did not participate in any forest-based recreational activities then NOREC was coded 1; 0 otherwise. All other ACT variables were coded 1 if the individuals participated in the specific activity; 0 otherwise. SOC denotes a vector of variables (GEN, RACE, AGE, ED, INC, ACRES) that denote the individual's socioeconomic characteristics (gender, race, age, education, household income, and acres of forestland owned, respectively). GEN is coded 1 if the individual is male; 0 otherwise and RACE is coded 1 if the individual is white; 0 otherwise. ED and INC are categorical variables that have been recoded to measure the individual's level of education (in years) and income (in dollars), respectively. AGE and ACRES are continuous variables that measure the individual's age (in years) and ownership of forestland (in acres). REG denotes a vector of variables that denote where the individual lives. TREAT denotes a vector of variables (used only in equation four) that are used to control for any experimental treatments used within the survey design. More specifically, the information presented on the environmentally labeled wood product differed across individuals; in total there were 16 different information treatments.[3]

The equations differed in terms of the dependent variables (and corresponding treatment of intercept terms). In the first equation we estimate the relationship between the individual's level of interest in how forests are managed and the independent variables. For this equation the dependent variable is based upon responses made on a rating (Likert-type) scale where 1 denoted that the individual was 'not at all interested', 3 denoted that the individuals was 'somewhat interested' and 5 denoted that they were 'very interested'. In the second equation we estimate the relationship between the individual's opinion as to what percent of U.S. forests are managed in an 'environmentally friendly' manner. Here, the dependent variable is based upon responses made on a rating scale with five-points: 0, 25, 50, 75 and 100 percent. In the third equation we estimate the relationship between the individual's level of membership or support of environmental groups and the independent variables mentioned above. For this equation the dependent variable is coded 1 if the individual stated that they donated money to, or belonged to, any environmental groups; 0 otherwise. In the final equation we estimate the relationship between an individual's likelihood to purchase an environmentally certified wood product. The dependent variable here is based upon responses made on a rating scale where 1 denoted that the individual was 'highly unlikely' to buy the product, 3 denoted the individual had 'no opinion either

[2] The number of intercepts is different across equations and is dependent upon the form of the dependent variable.

[3] For brevity we will not fully discuss the experimental design for equation four (which is the subject of an entirely different analysis). Interested reader can contact the first author for more information.

way' and 5 denoted they were 'very likely' to buy the product.

Given the dependent variable in the third equation is binary we estimate this equation using binary logit regression. The dependent variables in the remaining equations are ordered and thus we use ordered logit techniques. Typically, binary logit models have one intercept while ordered logit models have one less intercept than the total number of ordered categories in the dependent variable. Thus, the first equation would have one intercept and the other three equations would have four intercepts. However, the vector of region variables creates singularity problems if the full complement of intercepts is allowed. As a result, one intercept is dropped from each of the four equations.

The estimated equation parameters with appropriate variable coding can be used to provide estimates of the various dependent variables for different types of forest recreation participants while holding all other modeled variation constant. That is, we use the equations to estimate how participation in different types of forest-based recreation affects the individual's level of environmental concern and behavior while controlling for other individual (e.g., socioeconomic and residence) and experimental variation. Furthermore, we test the equivalence of individual pairs of parameters (e.g., $\beta_{FISH} = \beta_{HUNT}$), to determine if the effects of recreational activities are significantly different from each other.

Data

We obtained a sample of 3,290 U.S. adult residents from International Communications Research of Media, Pennsylvania. They 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.[4]

During the summer of 2000 we conducted a mail survey of the pre-recruited respondents. The survey was administered in three waves; 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).[5]

[4] All analysis is weighted to correct for the over-sampling.

[5] The surveys were mailed under a nonprofit organization permit and thus we were not supposed to receive undeliverable returns (unlike a first class mailing). As a result, the count of 36 undeliverables is likely to be an underestimate of the actual number of undeliverables.

Results

The presentation of the results is divided into two sections. The first section presents a descriptive overview of the data used in the regressions. The second section presents results derived from the regression equations

Descriptive Overview

In general our resulting sample of 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.

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 number of acres of owned forestland	5.0	-.-

Almost all of the respondents were somewhat to very interested in how forests are managed and almost three-quarters of the respondents indicated that they thought that at most half of the forests in the U.S. are managed in an environmentally friendly manner (Table 2). However, less than a quarter of the respondents indicated that they donate money, or belong to, an environmental organization. Most respondents stated that they were likely to consider buying an environmentally certified wood product assuming that the product quality and price are equal to products not environmentally certified.

Regression Results

The presentation of the results will follow in five subsections; the first four subsections will present specific findings relevant to each of the four equations. The last section will then present general findings cuttings across all of the equations. Given the number of parameters involved and the difficulty in interpreting individual parameter estimates we will not present a fully detailed presentation of each equation. Instead, we use the estimated regression equations, with appropriate variable coding, to provide estimates of the probability that a particular value will occur for the dependent variable (e.g., to predict the probability that the dependent variable for the first equation is 1, 2, 3, 4 or 5). The coding for the recreation variables vary across each of the recreational activities, however, the variable coding is constant for all other variables, generally being set at the mean values. Once the probabilities for each of the dependent values are calculated across recreation activities then we use these probabilities, along with the associated values of the dependent variables, to calculate the expected value for the dependent variables for each recreation type.

Table 2. Characteristics of the Measures of Environmental Concern and Behavior

Level of interest in forest management	(percent stating)
1 = Not at all interested	2
2	6
3 = Somewhat interested	36
4	26
5 = Very interested	30
Opinions regarding the percent of U.S. forests managed in an environmentally friendly manner	(percent stating)
0 = None	1
25 = Some	37
50 = Half	38
75 = Most	22
100 = All	2
Percent donating money or belonging to an environmental organization	23
Likelihood of purchasing an environmentally labeled wood product	(percent stating)
1 = Highly unlikely	4
2	6
3 = No opinion either way	28
4	26
5 = Very likely	36

Before continuing to the results, it is important to understand that the above procedure provides the expected value of the dependent variables across recreational activities while *holding all other variation constant.* Income, age etc. does not vary across recreation types. In addition, one must be careful to understand that the results of the analysis assume that a participant in a particular recreation activity does not participate in any of the other activities. Differences in the expected values across recreation activities are solely driven by changes in the type of recreation. 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. For example, one should not take the result for 'hunting' and interpret this result as being indicative of hunters; hunters may also fish, camp or hike. Further, it is 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 'wildlife watching' results as being indicative of differences between the average hunter or wildlife watcher because hunters and wildlife watchers differ significantly in terms of gender (74 percent of hunters and 48 percent of wildlife watchers are male). 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 level of environmental interest and behavior.

Effect on the interest in forest management - Wildlife watching, nature photography, snowmobiling and hunting are the activities that have the strongest effect on increasing an individual's interest in how forests are managed (Figure 1). In addition to the above, participating in hiking, fishing and camping also increases an individual's interest in how forests are managed relative to not participating in any forest-based recreation. The interest in forest management associated with the other activities (ATV riding, boating and cross-country skiing) is no different than the interest level of an individual who does not participate in any forest recreation. Wildlife watching and nature photography are activities associated with significantly higher interest levels than fishing, camping, ATV riding and boating. In addition, the effect of wildlife watching is also significantly higher than that of hiking.

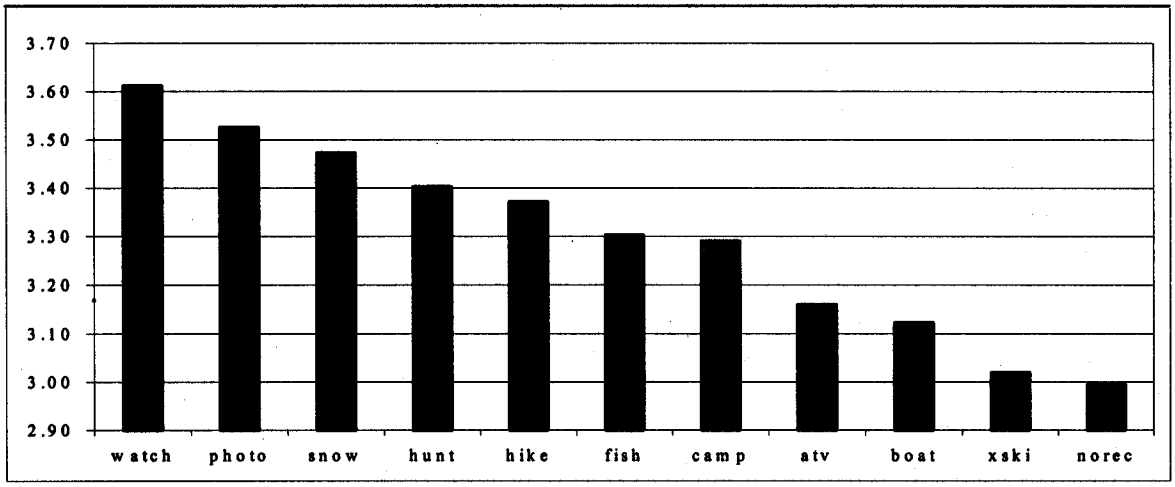

Figure 1. Level of Interest in Forest Management across Forest-based Recreational Activities
5 = Very interested, 3 = Somewhat interested, 1 = Not at all interested

With respect to previous work, we find that activities that have been traditionally classified as appreciative (wildlife watching and nature photography) have a greater positive impact on the interest level for the ways forests are managed. However, the effects of snowmobiling, an 'abusive' activity and hunting, a 'consumptive' activity, are not significantly different than the two appreciative activities.[6] Further, we find that camping and hiking, sometimes classified as appreciative, are significantly different than wildlife watching and/or nature photography.

Effect on respondent opinions regarding management of U.S. forests - Snowmobiling and fishing are activities associated with increasing respondent opinions that a greater percentage of U.S. forests are managed in an environmentally friendly manner, all else equal (Figure 2). Wildlife watching, cross-country skiing, camping, nature photography and hiking are associated with individuals thinking that a lower percentage of U.S. forests managed in an environmentally friendly manner. However, only hiking is associated with an effect that is significantly different than not participating an any forest-based recreation.

Effect on the likelihood to participate in an environmental organization - Again, wildlife watching is the activity that has the strongest effect on increasing the individual's likelihood to donate money to, or belong to, an environmental organization (Figure 3). In fact, except for snowmobiling, participating in any forest-based recreation is significantly associated with increasing the individual's likelihood to donate money to, or belong to, an environmental organization. In addition, wildlife watching, cross-country skiing, hunting, nature photography, hiking and boating are all significantly different than fishing and snowmobiling in increasing the likelihood that an individual donates money to, or belongs to, an environmental organization. In addition, the effect of wildlife watching is significantly greater than the effect of ATV riding, camping, boating and hiking.

Again we find that activities that have been traditionally classified as appreciative (wildlife watching and nature photography) have a strong positive impact on environmental behavior or concern. However, the effect of hunting, a 'consumptive' activity, is not significantly different than the two appreciative activities. Further, we find that camping and hiking, sometimes classified as appreciative, are significantly different than wildlife watching. Finally, hunting is found to be significantly different than fishing, another consumptive activity.

Effect on the likelihood to purchase an environmental product - Wildlife watching is the activity that has the strongest effect on increasing the individual's likelihood to purchase an environmentally labeled wood product (Figure 4). Further, wildlife watching is significantly different than camping, fishing, ATV riding, hunting, and snowmobiling. However, boating, hiking and nature photography all have significant impacts relative to not participating in any forest-based recreational activity, and are also different than hunting and snowmobiling. Camping and fishing are also significantly different than hunting and snowmobiling. Again we find that hunting is found to be significantly different than fishing, another consumptive activity.

General results - Several results can be obtained when comparing the results across each of the four equations. First, the results generally support DH's first hypothesis; participation in outdoor recreation can have a significant positive impact on both the level of environmental concern and on the level of environmental behavior. In all four equations, there were several forest-based recreational activities that had effects significantly different than that of the no recreation case. Second, the level of environmental concern and behavior depends upon the type of recreational activity. For example, the effect of wildlife watching was significantly different than that of fishing in all four equations. Third, the relative effects of different recreation activities differ across our measures of environmental concern and behavior. For example, we find that hunting is associated with a greater level of environmental behavior relative to fishing when the measure is the likelihood of donating money or belonging to an environmental group. However, the opposite is true when the measure is the likelihood of purchasing an environmentally labeled wood product.

Thus, the second DH hypothesis is only partially supported. That is, the idea that different recreational activities have different effects on the level of environmental concern and behavior is supported. Further, the general trend is that appreciative activities such as wildlife watching and nature photography are consistently associated with higher levels of environmental concern and behavior. However, the idea that the direction of the effects is consistent across alternative measures is not supported.

Finally, the effects of the second and third points above imply that the traditional approach of aggregating activities may be of concern. For example, in previous studies hunting and fishing were combined together as 'consumptive activities'. However, here we find that for two of our four measures the effects of hunting and fishing are significantly different from each other. This suggests that specific recreation activities should be analyzed individually so as to accurately determine how different recreational activities effect the level of environmental concern and pro-environmental behavior.

[6] Of course the reason that these four activities increase interest levels may not be the same across the activities. For example, the positive effect of hunting and wildlife watching may both be due to concerns about forest management's effect on animal populations, however, the object of interest may be quite different. The positive effect of snowmobiling may be due to concerns about land access.

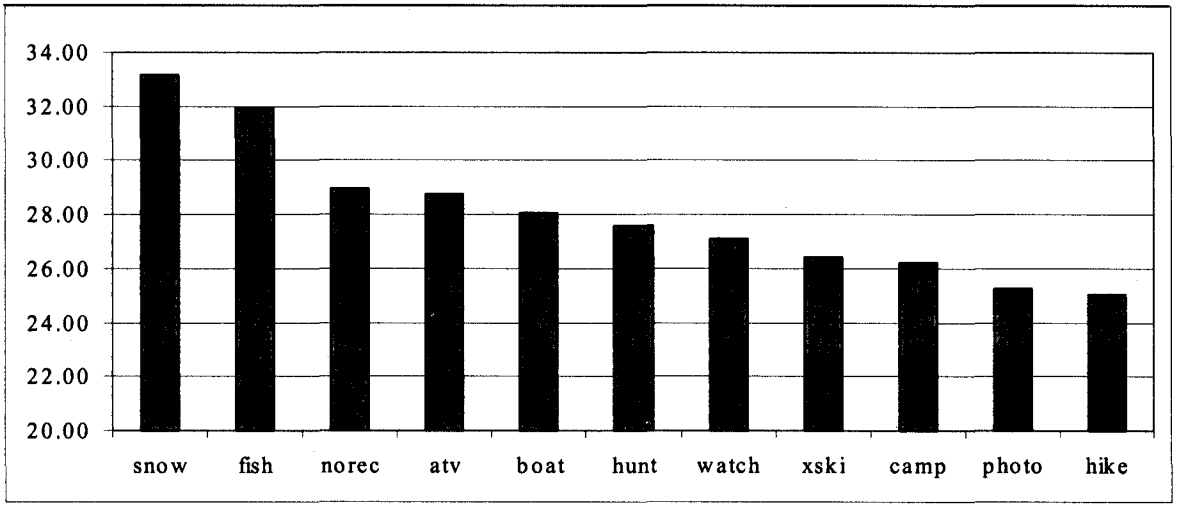

Figure 2. Respondent Opinion Regarding the Percent of U.S. Forests Managed in an Environmentally Friendly Manner across Forest-based Recreational Activities

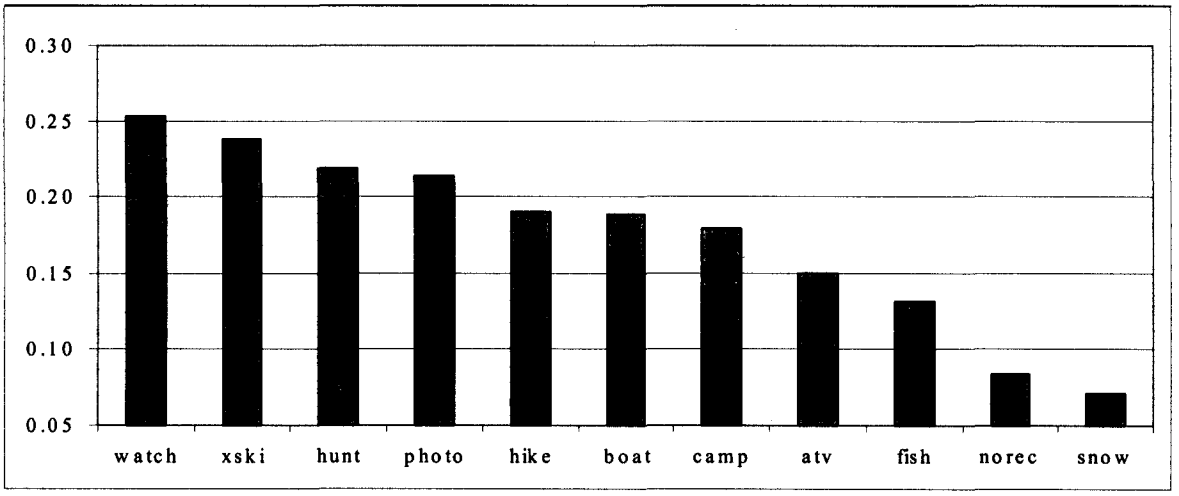

Figure 3. Percent of Respondents Indicating They Belong to, or Donate Money to, Environmental Organizations across Forest-based Recreational Activities

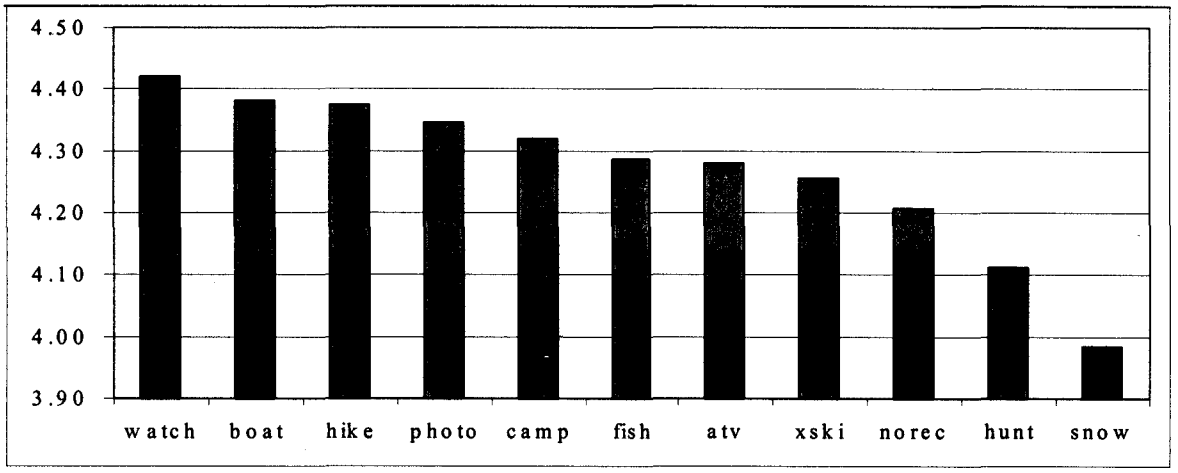

Figure 4. Likelihood of Purchasing an Environmentally Labeled Wood Product across Forest-based Recreational Activities (5 = Very likely, 3 = No opinion either way, 1 = Highly unlikely)

Conclusions

The results are contingent upon our measures of environmental behavior/concern, as well as our measures of participation in recreational activities. Specifically, we asked individuals if they had participated in specific recreational activities during the past year. Although our measures are probably correlated with the intensity of participation, we did not collect data specifically measuring participation intensity. The relative effects of the different recreational activities may be strengthened or weakened if we had accounted for the intensity of participation.

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