

**Concurrent Session 4:**  
**Wednesday, February 4; 2:00 pm - 3:30 pm:**

## **Identifying Changing Public Land Visitor Needs & Wants - B**

Session Chair: Anne Fege, Ph.D.

Presenters:

Steven W. Burr, Ph.D., Dale J. Blahna, Ph.D., Douglas K. Reiter, Michael Butkus\* - The Utah Trails Initiative: Partnerships, Research, and Action

Marni Goldenberg, Ph.D.- Using the Outdoors to Create Community: The Results from the Outward Bound "Unity Project"

Yeong Nain Chi, Jack Coburn Isaacs, Jorge L. Icabalceta, Herb A. Holloway, David R. Lavergne\* - An Analysis of Participation in Bird Watching in the United States

\* Provided a proceedings paper

# The Utah Trails Initiative: Partnerships, Research, and Action

Steven W. Burr      Dale J. Blahna      Douglas K. Reiter      Michael Butkus<sup>1</sup>

## Introduction

As a result of changing social values regarding the development and use of our natural resources, more and more emphasis is being placed on the value of amenity resources, concerning scenery and aesthetics, opportunities for a diversity of recreation experiences, providing habitat for wildlife, and preserving biological diversity (Burr & Blahna, 2000; Siehl, 1990). Many people enjoy a variety of trail-based activities as a source of their recreation. With all their attributes and varieties of usage, trails and pathways are high priorities for many people, including the citizens of Utah. Trails provide access to Utah's outstanding public lands, opportunities for physical fitness and better health, economic benefit for local communities, and contribute to overall quality of life. In fact, Utahns are demanding more and better trails and pathways, as their use is a significant part of recreational activity, tourism, and lifestyle in Utah.

As part of his Quality of Life endeavor, former Utah Governor Michael Leavitt responded to this demand by initiating an effort to create a statewide trails initiative, the "Olympic Legacy of Trails in Utah," with the aim of developing a framework for future funding processes, planning, development, and maintenance for both motorized and non-motorized trails in Utah. Major objectives of the initiative include: 1) improving the quality of life in Utah; 2) encouraging business growth and vitality; 3) improving economic benefits for rural communities and improving statewide tourism; 4) encouraging local planners and developers to incorporate innovative open space and pathways design into developments; 5) increasing "walkability" in communities; 6) improving health and fitness of citizens; 7) ensuring and improving public access to public lands; and 8) identifying at least three priority trail projects in each of the seven Planning Districts in the state—urban and rural/motorized and non-motorized (State Division of Parks and Recreation, 2002).

At the request of the Governor's office, the State Division of Parks and Recreation facilitated the formation of the Governor's Trails Initiative Steering Committee, a collaborative partnership comprised of stakeholder groups represented by community leaders and planners, recreation professionals, and representatives from cities, towns, counties, and state and federal agencies, in order to guide development of the initiative. From July, 2001, through September, 2003, the Steering Committee held a number of meetings, provided general direction, and developed vision and mission statements for the initiative. Additionally, the Steering Committee identified six major issue categories for consideration and prioritization: 1) a list of trails for priority development; 2) new and expanded funding sources; 3) effective coordination and cooperation among government agencies at different levels; 4) protecting access to public lands by overcoming access and trail closures and developing alignments for linkages on public and private lands; 5) ensuring adequate access and trails opportunities for all citizens and visitors, including access for people with disabilities; and 6) enhancing natural, wildlife, cultural, and heritage resources (State Division of Parks and Recreation, 2002).

At its first meeting, the Steering Committee authorized Utah State University's Institute for Outdoor Recreation and Tourism (IORT) to conduct a statewide telephone survey of Utah residents in order to substantiate their opinions on the values and benefits of recreational trails, their awareness and use of trails, and their perception of needs and preferences related to trails in the state, with the intent that resulting information generated from this survey would provide supporting elements for the Governor's Trails Initiative. From September 6-17, 2001, research scientists affiliated with IORT telephone interviewed 2,590 adults living in Utah's seven Planning Districts throughout the state. This paper reports summary results of this telephone survey research on trails (Blahna, Burr, Reiter, & Butkus, 2001 September), along with subsequent actions associated with the Utah Trails Initiative that included seven, regional Trails Workshops, the development of a web-based "Trails Toolbox," and a 2003 Utah Trails and Pathways Conference—"Coming Together for Trails."

Generally, there are three broad types of trails in Utah: 1) recreation trails, where the primary purpose of use is for recreational activity such as hiking, biking, Off Highway Vehicle (OHV) driving, snowmobiling, cross-country skiing, horseback riding, and other activities; 2) transportation trails, located primarily in urban/suburban areas, where the primary purpose of use is travel to get from one point to another, although oftentimes such trails are also used for recreation (walking for pleasure, running/jogging, skating, etc.); and 3) historic or heritage trails, where the primary purpose is to preserve important travel routes of historic significance, such as the Mormon Pioneer Trail, Spanish Trail,

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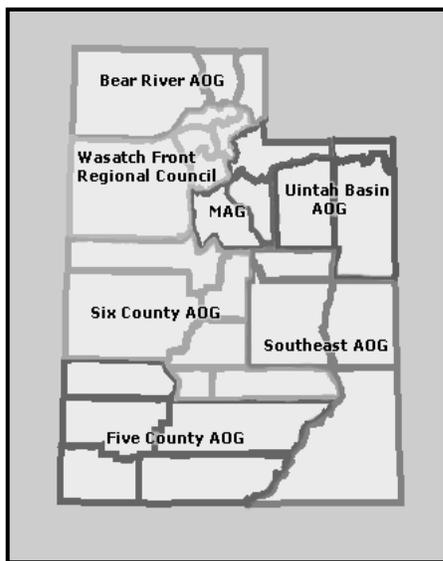
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and Pony Express Trail, although again, such trails are also used for recreation, especially automobile touring and driving for pleasure. *Motorized Trails* are specifically designated or allow for motorized recreational activities such as OHV driving, Jeep touring, All Terrain Vehicle (ATV) driving, motorcycling, dirt biking, snowmobiling, and automobile touring. *Non-Motorized Trails* are specifically designated or allow for non-motorized recreational activities such as walking, hiking, jogging/running, in-line skating, skateboarding, backpacking, cycling, mountain biking, horseback riding/horse packing, cross-country skiing, and snowshoeing.

**Methods**

The telephone survey was developed with input from the Trails Initiative Steering Committee. In September of 2001, after pilot testing the survey instrument, research scientists affiliated with IORT implemented the telephone surveying. A random sample of household telephone numbers was selected for the telephone survey, stratified by the seven, multi-county Planning Districts in the state (Figure 1).

In each household contacted, an adult, 18 years or older, was asked to participate in an interview as part of the telephone survey. In each Planning District, 370 telephone interviews were conducted, proportionately divided based on individual counties’ population percentage within the district. This sampling approach was selected in order to facilitate data analysis at both a statewide and Planning District level. Of 4,346 personal telephone contacts made to households in Utah, 2,590 adults agreed to participate and completed the telephone survey, for a response rate of 59.6%.



**Figure 1-** Utah’s Seven Planning Districts  
 AOG stands for Association of Governments. MAG stands for Mountainland Association of Governments.

**Results**

Among trail users, those individuals who had used a trail in Utah in the past 12 months, the proportion of males (51.5%) to females (48.5%) was close to even. However, for non-users of trails, there were many more females (64.2%) than males (35.8%). The average age of trail users was almost 40 years old, while the average age of non-users of trails was almost 48 years old.

Based on the telephone survey results, it is clear the use of trails in Utah by residents is significant, as statewide, almost half of the respondents (49.7%) indicated they had used trails in Utah in the previous 12 months. Slightly over half of the respondents in the Mountainland (51.4%), Six County (52.2%), and Five County (50.8%) Planning Districts are Trail Users, while somewhat less than half of the respondents are Trail Users in the Wasatch Front (49.7%), Bear River (46.8%) and Southeastern (45.9%) Planning Districts. Interestingly, only 37.8% of respondents in the Uintah Basin Planning District reported using trails in Utah in the previous 12 months.

Trail Users indicated a wide range of trail use with an average of slightly over 20 times and a median of six times in the past 12 months. Statewide, three of five Trail Users indicated their use from 2-4 times to 5-10 times in the past 12 months, almost one-quarter used trails from once a month to 2-4 times a month, and another 10% of Trail Users indicated their use as being from once a week to more than once a day. Thus, the use of trails appears to be a significant part of

these Trail Users' recreational activity and lifestyle. In addition, the use of trails in Utah appears to be a family affair, as over three-quarters of Trail Users statewide indicated there are other members of their household who have used trails in Utah in the past 12 months, with an average of three other members in each household using trails.

Trail Users were able to identify any number and variety of activities in which they participated on trails in Utah. Statewide, Hiking was the most frequently mentioned trail activity with slightly over 71% of Trail Users indicating this as an activity they participated in on trails in Utah. Hiking was followed by Biking/Mountain Biking at 23%, Walking at slightly over 18%, All Terrain Vehicle (ATV) Driving at slightly over 13%, Horseback Riding and Backpacking at almost 7%, and Jogging/Running at 5%. A number of other pedestrian, motorized and non-motorized conveyance, and educational/cultural trail activities were identified by less than 4% of Trail Users.

There is a high level of awareness of trails among residents in Utah. Statewide, slightly over 86% of Trail Users and almost 60% of Non-Users of Trails, those who had not used a trail in Utah in the previous 12 months, said they knew of a trail within 15 minutes of their home or workplace. Over one-quarter of Trail Users used this particular trail from 2-4 times a year, and over one-quarter used this trail from once a week to more than once a day. Well over one-third (37.7%) of Trail Users statewide indicated their favorite trail is within 15 minutes of home, almost two-thirds (65%) said within 30 minutes of home, and over four-fifths (82.7%) said within one hour of home. Over 60% of Trail Users said use of their favorite trail was between one and 10 times a year, almost 16% of Trail Users use their favorite trail from one to four times a month, and another 16% use their favorite trail from once a week to once a day.

Both Trail Users and Non-Users of Trails indicated they would like to use trails in Utah more than they did in the past 12 months. Statewide, almost four of five Trail Users indicated they would like to use trails more. The main reason slightly over two-thirds of Trail Users did not use trails as much as they would have liked is not enough time and/or too busy with other activities. Even a substantial majority of Non-Users of Trails (almost 60%) indicated their desire to use trails more. More than half of these Non-Users of Trails said they did not use trails more was because they did not have enough time and/or were too busy with other activities. However, a substantial proportion of Non-Users of Trails (13%) said they did not use trails more because of personal constraints associated with health concerns, age, and/or disability.

Statewide, although Trail Users are fairly evenly split on their support for the use of additional public funds for motorized trails in Utah, support for the use of additional public funds for non-motorized trails is significantly greater (almost 86%). Although almost half of Non-Users of Trails would not support the use of additional public funds for motorized trails, still slightly over 43% would. An even greater percentage of Non-Users of Trails, slightly over 66%, would support the use of additional public funds for non-motorized trails. Almost 51% of Trail Users would support a tax increase if the additional money would be used to enhance their use and enjoyment of trails in Utah. However, a clear majority of Non-Trail Users, slightly over 60%, would not support such a tax increase for trails.

Statewide, almost 95% of Trail Users and 66% of Non-Users of Trails strongly agreed or agreed having quality trails in Utah was personally important to them. Almost 90% of Trail Users and over half of Non-Users of Trails recognize they personally receive benefits from trails. Among Trail Users, almost two-thirds strongly agreed or agreed having trails in their area results in economic benefits for local communities, and slightly less than half of Non-Users of Trails also strongly agreed or agreed. Preservation of historic trails in Utah is important to both Trail Users (slightly over 90%) and Non-Users of Trails (slightly over 77%). Also, more than nine of ten Trail Users and slightly over two-thirds of Non-Users of Trails strongly agree or agree having trails in or near their community allows them to be physically active and lead a healthy lifestyle. Finally, almost nine of ten Trail Users and seven of ten Non-Users of Trails recognize having trails in or near their community contributes much to their quality of life.

## **Discussion and Implications**

About half of Utah residents used trails in the state during the last year, but a majority of both Trail Users and Non-Users of Trails would like to use trails more than they currently do. Large majorities of respondents feel trails provide important benefits and add to their quality of life. A majority also feels trails provide local economic benefits. Utahns are also willing to use additional public funds for trails, but only about one-third of Non-Users of Trails to one-half of Trail Users said they would support a tax increase to provide additional funding for trails. Thus, while there is strong demand and basis of support for trails and trail funding, the support for a tax increase for trails is more marginal. Increasing support will require political and educational outreach to increase awareness of lesser-known values of trails, such as open space, watershed, and wildlife habitat benefits, while still allowing for public use and access. There is also less support for funding motorized trails, indicating that getting political and economic support for OHV-designated trails may be more difficult than for non-motorized or mixed-use trails. Strategies could include increasing collaborative relationships and providing matching funding with OHV groups, emphasizing the benefits of OHV trails for open space protection and providing access, and additional hiking and biking opportunities. Also, the environmental costs and

benefits of on-trail versus off-trail driving need to be examined more. Finally, the many differences in the findings among the seven Planning Districts and in urban and rural areas indicate different approaches to planning and development will be necessary throughout the different regions of Utah.

Results from the Statewide Telephone Survey of Resident Attitudes Toward Recreational Trails were utilized in seven regional Trails Workshops, held between November 27<sup>th</sup> and December 12<sup>th</sup>, 2001, in each of the seven Planning Districts. The purpose of the Trails Workshops was to gather stakeholder input for the Utah Trails Initiative at the regional level. Participants received background information on the Trails Initiative, viewed graphics and maps of different trails systems in their region, and the importance of their regional and local participation and input was emphasized. Specific Planning District results of the Statewide Telephone Survey gave participants a better picture of trail users, trail preferences, and attitudes toward recreational trails in their region, while allowing them to make comparisons with other regions and the statewide results. Participants also were involved in breakout sessions to map priority trails, prioritize trails issues, and develop suggestions for a “Trails Toolbox.” The Trails Workshops confirmed some regional differences and some statewide similarities, while also validating the results of the Statewide Telephone Survey. More importantly, the Trails Workshops connected with and informed a knowledgeable, experienced, motivated, and representative constituency for trail advocacy in Utah. With three priority trails projects identified by participants in the Trails Workshop in each Planning District, a total of 21 different trails and trail segments of approximately 715 total miles (38% motorized and 62% non-motorized trails) were documented. Interestingly, this only represents 20% or less of many potential, desired, and lesser trail projects identified in the regional Trails Workshops.

The Trails Initiative Steering Committee also approved a proposal by Utah State University's Institute for Outdoor Recreation and Tourism to develop a web-based Trails Toolbox. The Steering Committee identified the development and provision of a “dynamic trails toolbox” as an important step in establishing an Olympic Legacy for Trails in Utah. This Trails Toolbox is designed to provide a variety of information and resources related to trails, including such topics as planning, design, construction, funding, social benefits, and much more, in order to provide useful and relevant information to communities and trails advocates as they plan, design, construct, and maintain trails. “Trails 101” guides trail planners through the planning process from beginning to end. The website also provides valuable information on how to gain community support, find funding, handle legal issues, and acquire new lands for trails. Once such preparations are complete, the website also offers information on construction techniques, use of materials, and how to maintain trails. One of the goals of the website is to provide trail advocates, planners, sponsors, and communities with the most accurate and up-to-date information available.

An additional result of the Utah Trails Initiative was the 2003 Utah Trails and Pathways Conference—“Coming Together for Trails,” held in Park City, Utah, September 18-19, 2003. Over 200 participants from throughout Utah attended to hear a number of keynote speakers and participate in concurrent session tracks on 1) Community Support, Planning, and Benefits, 2) Trail Design, Construction, and Maintenance, and 3) Funding and Partnerships. This conference was extremely well received, and plans are in the making for a 2004 Trails Conference to be held in St. George, Utah, this coming fall.

The results of the Utah Trails Initiative are many, but especially important are the connections and partnerships that have been made with a representative and motivated constituency of Utah trails advocates and stakeholders. A substantive base has now been provided for the clarification of trails-related issues, determination of user-group preferences, and identification of trail project priorities. Furthermore, a strong political foundation is now established for current and future trails-related proposals. Most of Utah’s citizens realize the benefits of trails. The Utah Trails Initiative has assisted in bringing those benefits closer to home. There is great momentum, and the future outlook for trails in Utah appears bright.

### For More Information

The full report cited above, along with other publications and reports are available through Utah State University’s Institute for Outdoor Recreation and Tourism (IORT), and can be accessed on IORT’s website at [www.cnr.usu.edu/iort](http://www.cnr.usu.edu/iort).

### Literature Cited

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# An Analysis of Participation in Bird Watching in the United States

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## Introduction

Wildlife-based recreation continues to be popular in the United States (U.S. Fish and Wildlife Service, 2002), long recognized for its rich array of biodiversity that supports a wide range of outdoor recreation activities. Wildlife-based recreation includes consumptive activities (such as fishing and hunting) and nonconsumptive or wildlife watching activities (such as observing, feeding, and photographing wildlife).

According to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, 82 million U.S. residents 16 years old and older participated in wildlife-based recreation activities such as fishing, hunting, and wildlife watching. More than 66 million Americans participated in wildlife watching and spent \$38.4 billion, while almost 46 million U.S. residents participated in observing, photographing, or feeding birds and spent \$31.7 billion in 2001 (U.S. Fish and Wildlife Service, 2002).

According to the 1991, 1996, and 2001 National Surveys of Fishing, Hunting, and Wildlife-Associated Recreation, participation in residential bird watching decreased from 51.3 million in 1991 to 42.2 million in 1996, and in 2001 to 40.3 million. Participation in nonresidential bird watching decreased from 24.7 million in 1991 to 17.7 million in 1996, but slightly increased to 18.5 million from 1996 to 2001 (U.S. Fish and Wildlife Service, 1993, 1997, 2002).

Bird watching, that form of nature-based tourism drawing specific attention to the avian kingdom, remains popular for many diverse reasons: scientific research, personal pleasure, family outings, social interaction, and so forth. Bird watching activities rely on natural environmental attributes to attract participants to an area, who use its bird resources and their habitats as the focal point of the activities.

Although participants in bird watching number in the millions, little is known about the linkage between landscape characteristics and individual participation behavior. The purpose of this study is to analyze bird watching participation in order to contribute to a better understanding of current and future individual bird watching participation in the United States.

The remainder of this paper is divided into four sections. The following section presents a conceptual model that shows relationship between participation behavior and bird attributes, an empirical model and the data used in this study, respectively.

## Methods

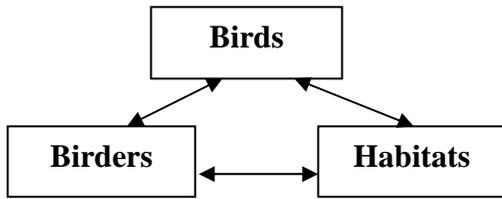
### Conceptual Model

A conceptual model of bird watching participation was developed by integrating three components (Figure 1): bird watchers, bird resources, and bird habitats. This conceptual model demonstrates the context of the human-bird interaction and provides a framework that identifies utility maximization as the ultimate objective for the participants in bird watching in terms of their participation decisions. Bird watching can be viewed as an intermediate interface between the bird watcher and bird and its habitat. Without adequate bird resources and habitats, there would be far fewer or no participants in bird watching activities.

Based on identified participation patterns, bird watching activities can be identified as either residential (taking place less than one mile from home) or nonresidential (for trips of at least one mile from home with the specific intent of observing, feeding, or photographing birds). The choice of explanatory variables selected for empirical analysis is based on the conceptual model as described.

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**Figure 1** – The Conceptual Model of Bird Watching Participation

Because the nature and purpose of residential and nonresidential bird watching are distinct, the participation factors will likely differ. The residential bird watching participation equation estimated in this study is expressed as:

Participation =  $f(\text{Income, Age, Gender, Marital Status, Education Level, Ethnicity, Bird List, Bird No, Parks, Maintain, Plants, } \mu_1)$ ;

The nonresidential bird watching participation equation estimated in this study is expressed as:

Participation =  $f(\text{Income, Age, Gender, Marital Status, Education Level, Ethnicity, Prey, Waterfowl, Water Bird, Songbird, Others, Public Land, Private Land, Ocean, Lake, Marsh, Forest, Brush, Open Field, Man-Made, } \mu_2)$ ; where  $\mu_1$  and  $\mu_2$  are error terms for residential and nonresidential bird watching participation equations, respectively. Definition of explanatory variables used in the empirical models is provided in Table 1 and Table 3, respectively.

### Empirical Model

The foundation of the modeling technique, known as the random utility model, is based on the assumption that an individual makes choices to maximize his or her utility when facing alternatives. While utility is not observable, the choices are. Since the selected choices are indicative of the utility, it is possible to model the individual perception based on these choices. Assume that the individual behaves so as to maximize his or her utility when choosing between two alternatives. Also, assume that the binary decision by the  $i^{\text{th}}$  individual can be conveniently represented by a random variable  $Y_i$  that takes the value one if one choice is made and the value zero if another option is chosen.

The Logit model is a commonly used technique to estimate binary choice models. This technique is very convenient to model the choice behavior of individuals when two alternatives are available and one must be chosen. The Logit model is selected in this analysis because its asymptotic characteristic constrains the predicted probabilities to a range of zero to one. It is also favored for its mathematical simplicity and is often used in a setting where the dependent variable is binary (Judge, et. al., 1988; Greene, 1997).

Consider an individual participant  $i$  who is faced with the choice problem of whether or not participate in a particular event. The Logit model can be specified statistically as:

$$\begin{aligned} y_i &= 1 && \text{if } y_i^* = x_i\beta + \varepsilon_i > 0 \\ y_i &= 0 && \text{if } y_i^* = x_i\beta + \varepsilon_i \leq 0 \end{aligned} \quad (1)$$

where  $y_i$  is a vector of binary dependent variables which take on the values of 1 for a “yes” answer and 0 for a “no” answer,  $y_i^*$  is a vector of unobservable latent variables measuring the degree of participants willingness to participate in bird watching in this case,  $x_i$  is a vector of observed explanatory variables that influence participation,  $\beta$  is a vector of unknown parameters, and  $\varepsilon_i$  is a vector of error components.

The probability of participation to be estimated can be represented as:

$$\text{Prob}(y_i = 0 \mid x_i) = \text{Prob}(\varepsilon_i \leq -x_i\beta) = F(-x_i\beta) \quad (2)$$

And also,

$$\text{Prob}(y_i = 1 \mid x_i) = \text{Prob}(\varepsilon_i > -x_i\beta) = 1 - F(-x_i\beta) \quad (3)$$

where  $F(\cdot)$  is the cumulative distribution function for  $\varepsilon_i$ .

The Logistic distribution for the error term,  $\varepsilon_i$ , can be expressed as:

$$F(-x_i\beta) = \exp(-x_i\beta) / [1 + \exp(-x_i\beta)] \quad (4)$$

and also,

$$1 - F(-x_i\beta) = 1 / [1 + \exp(-x_i\beta)] \quad (5)$$

Therefore, the log likelihood function for a given sample of  $y_i$ 's and  $x_i$ 's can be written as:

$$\text{Log-L} = \sum_0 \ln F(-x_i\beta) + \sum_1 \ln [1 - F(-x_i\beta)] = \sum_0 \ln \left\{ \frac{\exp(-x_i\beta)}{1 + \exp(-x_i\beta)} \right\} + \sum_1 \ln \left\{ \frac{1}{1 + \exp(-x_i\beta)} \right\} = \sum_0 \ln(-x_i\beta) - \sum_1 \ln[1 + \exp(-x_i\beta)] \quad (6)$$

Due to the discrete nature of the dependent variable,  $y_i$ , the classical least squares method is not an appropriate technique to estimate this type of model (Amemiya, 1981). The maximum likelihood coefficients are asymptotically consistent, efficient, and normally distributed, and the t-test is a valid test of significance (Greene, 1997).

## Data

Data used in this study were extracted from the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, which is conducted by the U.S. Census Bureau for the U.S. Fish and Wildlife Service, of 15,300 wildlife watchers (U.S. Fish and Wildlife Service, 2002). Data include participation, expenditures, and personal characteristics selected from detailed interviews in 2001.

The primary questions used in this study were “Did you observe, photograph, or feed wild birds during 2001 in the United States around your home?” for residential bird watching participation, and “Did you observe, photograph, or feed wild birds during 2001 in the United States at least a mile from home?” for nonresidential bird watching participation, respectively. In addition, information on individual characteristics including total household income, age, gender, marital status, education, ethnicity, and information on birding characteristics and landscape characteristics were used in this study.

## Results

Based on descriptive statistics, respondents were on average 48 years old, had an average of 14 years of school and an average household income of \$39,450. Ninety-three percent of respondents identified themselves as white, and most respondents were female (53%) and married (70%). Residential and nonresidential bird watching participation equations were estimated independently using the LIMDEP (Version 7.0) LOGIT procedure (Greene, 1995).

### Residential Bird Watching Participation Model

Empirical results of the residential bird watching participation model are presented in Table 2. In the case of the dependent variable, approximately 72% of respondents reported that they observed, photographed, or fed wild birds during 2001 in the United States around their home. As hypothesized, the independent variables INCOME, AGE, FEMALE, MARRIED, HIGHSCHOOL, WHITE, BIRDLIST, BIRDNO, PARKS, MAINTAIN, and PLANTS were all positively and significantly related to residential bird watching participation.

**Table 1** - Explanatory Variables for Residential Bird Watching Participation

Variables	Definition
PARTICIPATION	1 if respondent participated in residential bird watching; 0 otherwise.
INCOME	Respondent's total household income during 2001.
AGE	Respondent's age (in years) (16 years old and older).
FEMALE	Respondent's gender; 1 if female; 0 otherwise.
MARRIED	Respondent's marital status; 1 if married; 0 otherwise.
HIGHSCHOOL	Respondent's education level; 1 if attended high school; 0 otherwise
WHITE	Respondent's ethnicity; 1 if white; 0 otherwise.
BIRDLIST	1 if respondent kept a birding life list; 0 otherwise.
BIRDNO	Respondent's ability to identify different kinds of birds by sight or sound.
PARKS	1 if respondent visited any public parks or public-owned natural areas near home; 0 otherwise
MAINTAIN	1 if respondent maintained any natural areas for wildlife around home; 0 otherwise.
PLANTS	1 if respondent maintained any plantings as food or cover plants for wildlife around home; 0 otherwise.

**Table 2** - Empirical Results for Residential Bird Watching Participation

Variable	Parameter Estimate	Standard Error	Marginal Probability
CONSTANT	-0.37763*	0.19989	-----
INCOME	0.165E-05*	0.706E-06	0.220E-06
AGE	0.05572*	0.00812	0.00742
FEMALE	0.29499*	0.04603	0.03927
MARRIED	0.15040*	0.05407	0.02002
HIGHSCHOOL	0.24264*	0.08669	0.03230
WHITE	0.66311*	0.08076	0.08827
BIRDLIST	0.85464*	0.34283	0.11377
BIRDNO	0.00288*	0.00006	0.00038
PARKS	0.48196*	0.08938	0.06416
MAINTAIN	0.55666*	0.11947	0.07410
PLANTS	1.78160*	0.14116	0.23716
Log-Likelihood		-5947.518	
Chi-Squared		6175.174	

\*The critical t-statistic at the 95 percent confidence level is 1.645

The positive and significant coefficient of INCOME showed that the demand for residential bird watching activities increased with income. The coefficient of AGE indicated that a respondent's age had a positive and significant impact on the likelihood to participate in bird watching around home. The FEMALE variable was estimated to be positive and significant, indicating that women were 4% more likely to participate in residential bird watching activities than men.

The positive and significant coefficient of MARRIED indicated that married individuals were 2% more likely to participate in residential bird watching than unmarried individuals. The HIGHSCHOOL variable was estimated to be positive and significant, with the interpretation that respondents with high school education were 3% more likely to

participate in bird watching activities around home than those with lower or higher levels of education. The positive and significant coefficient of WHITE when compared to other ethnic categories, with the interpretation that whites were about 9% more likely to participate in residential bird watching activities than individuals of other ethnic backgrounds. The BIRDNO variable was positive and statistically significant as expected, indicating that the demand for residential bird watching activities increased with the ability to identify different kinds of birds by sight or sound without the use of an identification book. The BIRDLIST variable was estimated to be positive and significant, with the interpretation that respondents with keeping a bird life list were 11% more likely to participate in bird watching activities around home.

The positive and significant coefficient of PARKS showed a link between at-home bird watching and outdoor recreation activity away from home. Respondents who visited parks and other public natural areas were 6% more likely to participate in bird watching activities at home than those who did not visit such facilities.

Residential landscaping practices were also related to bird watching participation. The variable MAINTAIN was estimated to be positive and significant as expected, indicating that respondents who like to maintain any natural areas for wildlife around home were 7% more likely to participate in residential bird watching activities. The coefficient for PLANTS indicated that respondents maintained any plantings as food or cover plants for the primary purpose of benefiting wildlife around home had a positive and significant effect, with 24% more likely to participate in bird watching around home.

In summary, empirical results show participation in residential bird watching increases with income and age. Women are more likely than men, married people are more likely than non-married people, and whites are more likely than non-whites to participate in bird watching activities at home. Individuals who can identify a number of different kinds of birds or keep a birding life list are more likely to participate in at-home bird watching than those who do not. Visiting public parks or public-owned natural areas and maintaining natural areas or plantings for wildlife around home also affected participation significantly.

#### Nonresidential Bird watching Participation Model

Empirical results of the residential bird watching participation model are presented in Table 4. Approximately 24% of respondents reported that they observed, photographed, or fed wild birds during 2001 in the United States at least a mile from home. The independent variables included categories of encountered birds (PREY, WATERFOWL, WATER BIRD, SONGBIRD, and OTHERS), land-ownership categories (PUBLIC LAND and PRIVATE LAND), and landscape categories (OCEAN, FOREST, MARSH, and MAN MADE).

The variables PREY, WATERFOWL, WATER BIRD, SONGBIRD, and OTHERS were all estimated with the hypothesized positive sign and were all statistically significant, but to a varying degree of magnitude. Participation in nonresidential bird watching was more noticeably pronounced among respondents reporting encounters (observing, photographing, or feeding) with waterfowl, songbirds, and birds of prey. Those who had encountered waterfowl in the previous year were 32% more likely to bird watch away from home than those who had not. Nonresidential bird watching activities rose 32% if the respondent encountered waterfowl, 26% if the respondent had observed, photographed, or fed songbirds and 20% if he or she had encountered birds of prey in the last 12 months. Observing, photographing, or feeding water birds (such as shorebirds, herons, pelicans, or cranes) prompted only a modest (7%) increase in nonresidential bird watching participation.

The variable PUBLIC LAND was estimated to be positive and statistically significant as expected, indicating that respondents were 31% more likely to participate in nonresidential bird watching at any areas on land owned by the Local, State, or Federal Government. Similarly, the positive and significant coefficient of PRIVATE LAND indicated that respondents were 13% more likely to participate in bird watching at any areas on privately owned land at least a mile from home.

**Table 3** - Explanatory Variables for Nonresidential Bird Watching Participation

Variables	Definition
PARTICIPATION	1 if respondent participated in nonresidential bird watching ; 0 otherwise.
MIDINCOME	Respondent's total household income during 2001; 1 if between \$25,000 and \$49,999; 0 otherwise.
AGE	Respondent's age (in years) (16 years old and older).
FEMALE	Respondent's gender; 1 if female; 0 otherwise.
MARRIED	Respondent's marital status; 1 if married; 0 otherwise.
COLLEGE	Respondent's education level; 1 if attended college; 0 otherwise
MINORITY	Respondent's ethnicity; 1 if minority; 0 otherwise.
PREY	1 if respondent observed/photographed/fed birds of prey; 0 otherwise.
WATERFOWL	1 if respondent observed/photographed/fed waterfowl; 0 otherwise.
WATER BIRD	1 if respondent observed/photographed/fed other water birds; 0 otherwise.
SONGBIRD	1 if respondent observed/photographed/fed songbirds; 0 otherwise.
OTHERS	1 if respondent observed/photographed/fed other birds; 0 otherwise.
PUBLIC LAND	1 if respondent visited any areas on land owned by the Local, State, or Federal Government; 0 otherwise.
PRIVATE LAND	1 if respondent visited any areas on privately owned land; 0 otherwise.
OCEAN	1 if respondent visited an ocean side to observe, photograph, or feed wildlife; 0 otherwise.
LAKE	1 if respondent visited a lake or stream side to observe, photograph, or feed wildlife; 0 otherwise.
MARSH	1 if respondent visited a marsh/wetland/swamp to observe, photograph, or feed wildlife; 0 otherwise.
FOREST	1 if respondent visited a woodland to observe, photograph, or feed wildlife; 0 otherwise.
BRUSH	1 if respondent visited a brush-covered area to observe, photograph, or feed wildlife; 0 otherwise.
OPEN FIELD	1 if respondent visited an open field to observe, photograph, or feed wildlife; 0 otherwise.
MAN MADE	1 if respondent visited a man-made area to observe, photograph, or feed wildlife; 0 otherwise.

**Table 4 - Empirical Results for Nonresidential Bird Watching Participation**

Variable	Parameter Estimate	Standard Error	Marginal Probability
CONSTANT	-2.9695*	0.13474	-----
MIDINCOME	0.0125	0.08199	0.00200
AGE	-0.0007	0.00216	-0.00012
FEMALE	0.0413	0.07026	0.00660
MARRIED	0.0089	0.07775	0.00143
COLLEGE	0.0102	0.07143	0.00164
MINORITY	0.0747	0.11347	0.01192
PREY	1.2886*	0.12917	0.20575
WATERFOWL	1.9909*	0.12723	0.31789
WATER BIRD	0.4459*	0.15809	0.07119
SONGBIRD	1.6513*	0.13034	0.26366
OTHERS	0.6380*	0.15651	0.10187
PUBLIC LAND	1.9551*	0.11388	0.31217
PRIVATE LAND	0.8209*	0.13414	0.13107
OCEAN	0.6408*	0.16885	0.10232
LAKE	0.1287	0.12311	0.02054
MARSH	-0.2344*	0.14093	-0.03742
FOREST	0.3482*	0.13600	0.05560
BRUSH	-0.1708	0.14078	-0.02728
OPEN FIELD	0.0743	0.13250	0.01186
MAN MADE	-0.2694*	0.15097	-0.04302
Log-Likelihood		-1287.856	
Chi-Squared		14173.51	

\*The critical t-statistic at the 95 percent confidence level is 1.645

The variables OCEAN and FOREST were estimated to be positive and significant, with the interpretation that respondents were 10% and 5% more likely to observe, photograph, or feed bird at ocean sides and woodlands, respectively. Inversely, the negative and significant coefficients of MARSH and MAN MADE variables showed that respondents were 2% and 4% less likely to observe, photograph, or feed bird at lake or stream sides and man-made areas, respectively.

## Discussion and Implications

This research presented a conceptual model that considers the relationship between humans and birds, used in the empirical analysis of determinants of bird watching participation behavior. Biodiversity is assumed to be the foundation upon which a sound nature-based tourism can be built.

The conservation of biodiversity has become an important objective for a number of public land managers and private landowners in the United States, working through a cooperative, coordinated framework of action. The efficacy of this effort in decelerating the loss of biodiversity in the United States faces at least one significant impediment: a lack of knowledge about biodiversity and its susceptibility to human activities.

Effective planning and management of natural resources may improve the quality of outdoor recreation experiences for participants while enhancing its contribution to a community's economy. From a nature-based tourism promotion perspective, a successful marketing campaign for bird watching must not only target to those who already have a strong interest in participating in bird watching activities, but also reach out to potential participants unfamiliar with this nature-based concept.

The results of this study are multi-dimensional. First, gender does not appear to be a distinguishing factor in residential and nonresidential bird watching activities. Thus, natural resource managers have an opportunity to include a previously excluded user group in their management plans, expanding a shrinking constituency. Second, though public parks or public-owned natural areas are important to the provision of opportunities for environmental education, especially for individuals in the urban environment, people should not overlook the role of private land in providing opportunities for bird watching activities. Third, the availability of a diversity of species and ecosystem plays an important role in bird watching. Resource managers should educate the public about the availability or location of diverse habitats to generate continued interest and increased participation in nonresidential bird watching.

The finding of this study points out that a healthy natural environment supports a diverse array of processes that provide both goods and services to human beings. Also, the empirical results of this study provide insight into the determinants of participation in bird watching, which can be used in analyzing the social and economic impacts of bird resources and habitat planning and management.

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