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Valuation of environmental quality and eco-cultural attributes in Northwestern Idaho: Native Americans are more concerned than Caucasians

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Abstract

Valuation of features of habitats and ecosystems usually encompasses the goods and services that ecosystems provide, but rarely also examine how people value ecological resources in terms of eco-cultural and sacred activities. The social, sacred, and cultural aspects of ecosystems are particularly important to Native Americans, but western science has rarely examined the importance of eco-cultural attributes quantitatively. In this paper I explore differences in ecosystem evaluations, and compare the perceptions and evaluations of places people go for consumptive and non-consumptive resource use with evaluations of the same qualities for religious and sacred places. Qualities of ecosystems included goods (abundant fish and crabs, butterflies and flowers, clean water), services (complexity of nature, lack of radionuclides that present a health risk), and eco-cultural attributes (appears unspoiled, scenic horizons, noise-free). Native Americans and Caucasians were interviewed at a Pow Wow at Post Falls, Idaho, which is in the region with the Department of Energy's Hanford Site, known for its storage of radioactive wastes and contamination. A higher percentage of Native American subjects engaged in consumptive and religious activities than did Caucasians. Native Americans engaged in higher rates of many activities than did Caucasians, including commune with nature, pray or meditate, fish or hunt, collect herbs, and conduct vision quests or other ceremonies. For nearly all attributes, there was no difference in the relative ratings given by Native Americans for characteristics of sites used for consumption/non-consumptive activities compared to religious/sacred places. However, Caucasians rated nearly all attributes lower for religious/sacred places than they did for places where they engaged in consumptive or non-consumptive activities. Native Americans were less concerned with distance from home for consumptive/non-consumptive activities, compared to religious activities.

Keywords

Evaluation; Consumptive; Non-consumptive; Cultural and religious; Eco-cultural attributes; Sacred; Native Americans; Caucasians; Idaho

1. Introduction

Management of ecosystems is an important societal goal, whether that management is of pristine wilderness areas, man-influenced environments, or highly-impacted habitats. Several disciplines are devoted to the preservation and maintenance of ecosystems, including ecology, environmental science, conservation, and wildlife management, among others. Two major goals are to maintain a healthy ecosystem within the constraints of existing human-dominated activities, and to maintain the capacity of ecosystems to sustain human well-being (Folke, 2006). Intact, functioning ecosystems provide the goods and services that healthy human populations require, not only clean air and water, food and fiber, medicines, other products, and protection from storms and inclement weather, but also recreational opportunities, aesthetic pleasures, cultural and religious experiences, and existence values (Bridgen, 2005; Burger et al., 2008; Harper and Harris, 2008; Harris, 2000; Harris and Harper, 2000; Stumpff, 2006; Zender et al., 2004).

Ecologists and economics have separately and jointly examined the value of goods and services that ecosystems provide (Costanza et al., 1997; deGroot et al., 2002). Without explicit measurement of nonuse values, benefits of natural resources and ecosystems may be undervalued (Whitehead, 1993). Often the method used to monetize resources or nonuse aspects is contingent valuation, whereby people are asked about the economic value they place on a change in the quality or quantity of a good or service (Kotchen and Reiling, 2000), even for nonuse values (Arrow et al., 1993). Some authors, however, have challenged the ability of contingent valuation to measure existence values (Johansson-Stenman, 1998; Kotchen and Reiling, 2000; Larson, 1993). Clearly underlying beliefs influence the values people place on ecological goods and services (Johansson-Stenman, 1998), including ethical beliefs (Kotchen and Reiling, 2000). Spash and Hanley (1995) found that up to 25% of contingent value responses about wildlife and ecosystems were motivated by ethical beliefs. Information about particular species or ecological problems also influences valuation; people value more highly the things they know about and appreciate (Tisdell and Wilson, 2006).

While monetization of natural resources (both goods and services) is useful for a wide range of environmental management decisions, it is also important to understand how people value different aspects of habitats or ecosystems, as well as how they value tradition. In a comparison of tribal and non-tribal values with respect to tradition and waste site pollution, tribal members clearly valued traditional values and activities higher than concepts of human health risk (Zender et al., 2004).

In this paper I explore differences in ecosystem evaluations between Native Americans and Caucasians interviewed in Northwestern Idaho, and compare the perceptions and evaluations of places people go for consumptive and non-consumptive resource use with evaluations of

the same qualities for religious and sacred places. Qualities of ecosystems included goods (abundant fish and crabs, butterflies and flowers, clean water), services (complexity of nature, lack of radionuclides that present a health risk), and eco-cultural attributes (appears unspoiled, scenic horizons, noise-free). Eco-cultural attributes refer to the valuation of natural resources to include those cultural resources which derive from, and indeed require, intact and unspoiled natural ecosystems or settings for their cultural value (Burger et al., 2008). Consumptive is defined as actual use or extraction of resources (e.g. fish, wildlife, plants), and non-consumptive refers to the passive use of environments or habitats without extraction (e.g. hiking, camping, walking, bird watching).

I made the following predictions: (1) Native Americans would engage in higher levels of consumptive and non-consumptive activities because hunting and fishing play a key role in their culture, and hiking and camping are integral to these activities, (2) there would be no ethnic differences in the percentage of people engaging in religious activities (although the types might vary), and (3) Native Americans would rate the importance of ecosystem goods and services, and eco-cultural attributes equally for all their activities while Caucasians would be less concerned about these features for religious places (based on the location of churches in urban and suburban environments). One premise of the research is thus that ecological values are critical aspect of the valuation of religious or sacred places for Native Americans, and may be less so for Caucasians (Burger et al., 2008).

Indigenous and tribal people view conservation and management knowledge as emanating from a spiritual base (Posey, 2002). That is, the secular and sacred are inseparable, much in the same way as human needs and values are not separable from the ecosystem of which they are a part (Burger et al., 2008, Harris and Harper, 2000). Further, their information base has accumulated through observations from generation to generation, and thus involves knowledge, practice, and belief intertwined (Gadgill, 1993), that often results in an adaptive management strategy that can be practiced over several generations (Long et al., 2003).

2. Methods

The research design was to examine how people evaluate the importance of various aspects of the goods and services, and eco-cultural attributes that ecosystems provide to the places where Native Americans and Caucasians go to participate in consumptive activities, non-consumptive activities, and religious/sacred activities. We used the phrase religious/sacred to embody the full range of spiritual feelings, and note that some subjects considered that they did both, and actually gave us frequency of church attendance and frequency of “sacred” activities.

People were interviewed at the Julyamish Pow Wow in Post Falls, Idaho (Fig. 1). This event was selected because it was attended by both Native Americans and Caucasians, the site is in the Northwest where people might be expected to engage in hunting/fishing and other outdoor activities, it is in a region with well-known contaminated sites (the Department of Energy’s Hanford Site in Washington and Idaho National Laboratory in Idaho), the event attracted a general public and not just people interested in natural resources, and the event was several days long, providing enough subjects to ensure no overlap. Close proximity to

Hanford was avoided because people living close to a known contaminated site may well over-represent the concerns about contaminants. However, the event was within a region where people might be aware of the problem of contamination.

It should be noted, however, that the data represent those that attended the event, and not necessarily the people of Idaho or the Northwest. Interviewing at such an event introduces some bias in that people who would not attend such an event may be less interested in the outdoors, less interested in environmental issues, and/or attuned to the characteristics that define wild environments. This requires further study with a random sample of people. This study, however, was specifically designed to examine Native American and Caucasian evaluations, and thus interviews were conducted where both groups gather.

The Julyamish was an event in which hunting, fishing, camping or other outdoor activities were not featured, and a cross-section of people might be expected to attend (albeit people interested in Native American culture). The site was far enough away from Hanford to not be swamped with local residents who might have an overwhelming economic interest in the site (Greenberg et al., 2001), or a great personal concern for health risks, but was close enough for people to be concerned about contamination issues. The Julyamish Pow Wow organizational committee, and associated Coeur d'Alene tribal committee gave permission to conduct these interviews, after reviewing the questionnaire and protocol. We checked in daily with the organizers.

A questionnaire was developed as a basis for interviews to assess resource uses, frequency of consumptive, non-consumptive and religious activities, and perceptions about attributes of ecosystems (goods, services, eco-cultural attributes) for places they engage in consumptive, non-consumptive, and religious activities. I developed the questionnaire based on literature descriptions of the importance of attributes of the environmental that are important to people (Harper et al., 2008; Harris and Harper, 1997, 2000; Harris, 2000), discussions of eco-cultural dependency webs and eco-cultural attributes (Harris and Harper, 2000; Burger et al., 2008), and my own work with Aleuts and tribes in the northwest.

The questionnaire also included items about Natural Resource Damage Assessment, resource restoration, perceptions of who should restore natural resources, and perceptions about the Department of Energy's Hanford Site, although these are not discussed in this paper (see Burger and Gochfeld, in press). In this paper I report only differences among Native Americans and Caucasians on evaluations and perceptions about places where people engage in consumptive/non-consumptive and religious/sacred activities, and frequencies of engagement in these activities.

All interviews were conducted by trained personnel who had conducted these interviews in the past at other events, including other Native American Pow Wows. Training consisted of going over the questionnaire extensively with the interviewers, having the interviewers practice on each other, having the interviewers take interviews with local people who provided feedback (and we modified the questionnaire accordingly to reduce time and increase clarity), and practice interviews at the Julyamish before we began the formal

interviews (I observed from a distance). All personnel had conducted these interviews before over several years.

At the beginning and end of each day we checked in at the entrance booth to report on our activities, answer questions, and provide information on our progress. Our protocol was approved by the Rutgers University Institutional Review Board, and the questionnaire was sent to the Coeur d'Alene tribal committee for approval to conduct the interviews. The tribal committee suggested minor changes in the questionnaire before it was administered (e.g. adding subjects home location, being sensitive to tribal affiliation versus not being from a recognized tribe).

People were interviewed while they waited in lines or for activities to begin, stood around in small groups talking or watching, or sat in bleachers before events; few people declined to be interviewed, but we were sensitive to on-going activities and did not seek interviews during critical events. We randomly selected a person for the interview, and then moved two to three meters along a transect across the fairgrounds to select the next interviewee. In some cases we moved along a waiting line in this manner, and in other cases we moved through the crowd. Although subjects were not selected completely randomly, there is no reason to assume a bias in our selection process. Interviewers first introduced themselves as from Rutgers University, showed them their identification, and explained the overall purpose of the survey.

The questionnaire had two types of questions: open-ended in which the respondent was asked the frequency of certain activities, and evaluation questions where subjects were asked to rate the importance of resources of environmental quality on a Likert scale of 1 (less important) to 5 (most important). Open-ended questions on a given topic were asked before we asked any questions that relied on a Likert scale and where we gave them choices to consider. When asked, interviewers identified the tribal person who had given permission to conduct the survey. The interviews themselves required between 20 and 40 min, depending upon how many activities subjects engaged in, how many questions subjects asked, and how much they wanted to talk about environmental issues. Many subjects discussed changes in availability of fish or wildlife, or in the cultural interest in these activities.

The relevant survey information for this paper included demographics, frequency of engagement in certain non-consumptive/consumptive, and religious activities, and evaluations of features that might be important for the places people perform each of these activity types. Demographic information included age, gender, education, family income (asked at the end of the interview), self-identified ethnicity, self-identified tribal affiliation, and whether they had ever worked for the Department of Energy or at Hanford. The list of resources we included were those used on previous studies (Burger and Gochfeld, in press), and that were of interest to people from the northwestern United States, including tribal sacred ground and cultural resources.

Kruskal–Wallis X^2 non-parametric analysis of variance was used to compare responses between Caucasians and Native Americans (SAS, 1995). I considered $P < 0.05$ as significant, and give means and standard errors in the text and figures. There were few differences in the

relative ratings for consumptive and non-consumptive activities, and these are combined for the analyzes below.

3. Results

There were significant differences in the mean age of those interviewed, educational level achieved, and income (Table 1). Caucasians had achieved higher grades in school, and had higher mean incomes than did Native Americans. The tribal affiliations of Native Americans that were interviewed are given in Table 2.

3.1. Frequency of activities

There were significant ethnic differences in the percent of people who engaged in any consumptive activities and any religious activities, but there were no difference in the percent who engaged in non-consumptive activities (Fig. 2). Over 80% of Native Americans engaged in all three types, while far fewer Caucasians engaged in consumptive and religious activities.

The relative rates of engaging in a given activity were similar among Native Americans and Caucasians. That is, communing with nature was the most frequently engaged in activity, followed by praying or meditation, and then hiking, walking or biking (Table 3). Where there were significant differences in frequency of activities, Native Americans had higher rates than did Caucasians (Table 3). The greatest ethnic difference was in praying and meditation; rates were nearly twice as high for Native Americans compared to Caucasians. Engagement in non-consumptive activities was higher than for consumptive activities (Table 3).

3.2. Evaluation of characteristics important for ecosystem use

The environmental attributes or aspects that were evaluated as most important for all three types of activities were unpolluted water, clean air, no visible smog in the air, and lack of radionuclides that present a human health risk (Fig. 3). More complex eco-cultural attributes (e.g. natural tidal flow, complexity of nature) were rated intermediate. The human dimensions were generally rated the lowest by both Native Americans and Caucasians (distance from home, roads, lack of people, buildings).

There were significant differences in the relative rating for consumptive/non-consumptive between Native Americans and Caucasians (X^2 values over 4.2, $P < 0.04$). Further, there were almost no differences in how Native Americans rated environmental attributes for places they engaged in consumptive/non-consumptive activities and religious activities (X^2 values all below 4.1, $P > 0.06$, except for no buildings and distance from home), but there were significant differences for Caucasians (Fig. 3, X^2 values all greater than 10.2, $P < 0.001$).

4. Discussion

4.1. Frequency of activities

A higher percentage of Native Americans engaged in consumptive and religious activities than did Caucasians, and they did so at higher frequencies for all activities (where there was

a significant difference). Given the holistic approach Native Americans have for consumptive, non-consumptive, and religious activities to their life ways (Bridgen, 2005; Burger et al., 2008; Harper and Harris, 2008; Harris, 2000; Harris and Harper, 2000; Stumpff, 2006; Zender et al., 2004), this finding was not surprising. The relatively high rate of resource use of environments (including consumptive use) by Native Americans has led to concerns for exposure and risk from contaminants (Puukka et al., 2005; Harper et al., 2008; Harris and Harper, 1997). While risk assessors have primarily focused on consumptive uses (and exposures), non-consumptive, and religious exposures from these activities are equally important to consider (Harper et al., 2008). Indeed, such exposures result from the eco-cultural dependency webs and eco-cultural attributes of Native American cultures (Burger et al., 2008; Harris and Harper, 2000).

The discrepancy in the determination of exposure from consumption, versus exposures from non-consumptive and religious activities, bears further examination, both in the present study and in future work. Risk assessment for Native American cultures requires a more holistic approach that integrates all forms and routes of exposure (Donatuto and Harper, 2008; Harper et al., 2008; Harris and Harper, 1997). The Caucasians engage in religious activities in churches (usually buildings in towns, suburbs or cities), while Native Americans engage in these activities in sacred places that are outdoors or in natural ecosystems which increases the exposure for Native Americans.

For both Native Americans and Caucasians, communing with nature, praying and meditating, and hiking, walking or biking were engaged in more frequently than consumptive activities (hunting, fishing). This also suggests that exposure from these non-consumptive activities is a critical aspect of exposure assessment, as well as being of importance when considering the relative value of ecosystems, and the management of ecosystems for human use. That is, the population studied clearly use ecosystems for non-consumptive activities more frequently than for hunting, fishing, or gathering herbs.

4.2. Evaluation of environmental features

There were 4 main conclusions from these data: (1) not all attributes were rated equally, (2) the relative evaluation of attributes was fairly similar for the preferred places for consumptive/non-consumptive, and religious activities, that is, those rated the highest for one were also rated the highest for another, (3) Native Americans evaluated most attributes similarly for consumptive/non-consumptive and religious places, and (4) Caucasians rates most attributes lower for religious activities than they did for consumptive/non-consumptive places.

The data clearly indicate that Native Americans and Caucasians rated the goods, services, and eco-cultural attributes similarly (e.g. the order of rating was similar). However, Native Americans made no distinction between whether they were going to use a place for consumptive/non-consumptive uses, or for religious activities. This no doubt reflects the difference in place for these activities. That is, many Native American religious and sacred places are in nature, and may not involve any buildings or structures, while for most Caucasians, churches or other religious activities are performed in structures, often within towns or cities. Even so, the data confirm that to Native Americans, the quality of the

environment, and whether it provides goods, services or eco-cultural attributes, is as important for religious activities as it is for any other activity performed in nature.

Two human dimensions were rated differently by Native Americans, depending upon whether they were considering places they use for consumptive/non-consumptive or for religious activities (no buildings around, distance from home). For spiritual activities Native Americans felt the presence of buildings was less important, and for consumptive/non-consumptive they felt that the distance from home was less important. The former reflects their notion (as expressed by many of those interviewed) that sweat lodges and other similar temporary buildings were important for their sacred activities, and for the latter, some subjects noted that they would travel a great distance to good hunting or fishing grounds (often traditional grounds).

4.3. A comment on the ethics of research in Native American communities

Some Native American communities have expressed concern about research performed by outside groups, especially for biomedical research whereby some studies do not consider the goals, values or interests of those who become research subjects, nor see them as social beings (Wax, 2009). In many cases, these studies are conducted entirely within Native American communities or reservations, and results may not be transmitted back to the communities.

Trust (or lack thereof) in scientific research is not a commodity limited to Native Americans (Wax, 1991) or to other minority groups (Greenberg and Crossney, 2006). However, when dealing with all groups, whether Native American or environmental justice communities, appropriate attention and sensitivity to cultural mores and needs should be an important research goal. At the least, appropriate permissions should be secured, subjects should be aware of the study's objectives, no undue persuasion should be used to recruit subjects, and people should have access to the results.

In the present study permission to conduct the interviews was obtained from the tribal people running the event, people who were approached for interviews could clearly refuse (and some did so), and the individual identity of subjects was not recorded on any survey form. All questions asked by subjects were answered, and the information is to be provided to the Coeur d'Alene tribe that sponsored and ran the event, as well as others in the tribes who expressed an interest in learning of the results. Many people who were being interviewed expressed the sentiment that the study was important, and that they hoped the appropriate agencies would listen to the results, and understand their point of view.

The study clearly brings to light the importance of eco-cultural attributes to the religious/cultural aspects of Native American life (Burger et al., 2008; Harris and Harper, 2000). The data suggests that while both Caucasians and Native Americans rate rather highly many aspects of ecosystems that reflect goods/services and eco-cultural attributes for consumptive/non-consumptive uses, Native Americans consider all these aspects equally important for their religious/sacred places. The research further suggests that public policy makers, managers, risk assessors, and those involved with remediation and restoration of

contaminated sites should take into account the integration of resource use, environmental health, human health, and Native American life ways.

The next steps are to report all findings to the Coeur d-Alene tribe, seek their advice on additional analyzes they would like, conduct additional analyzes, and solicit ideas on the next research steps. Information from the study will be available on web sites, which allow responses. At present these data are useful to communities, public policy makers, and regulators (see below), but further tribal-initiated analysis will bring to light other questions and ideas. Increasingly, research is moving toward interactive community dialogs, where research findings are reported, re-examined, and re-evaluated to fit more specific goals. This is the first paper in this process.

4.4. Implications for communities, public policy makers, and regulators

While the findings obviously relate to those people who were interviewed, there were some generalizations that will help communities and public policy members deal with both activity rates and environmental evaluations or values. While the participation rate in consumptive activities differed between Native Americans and Caucasians, the participation in non-consumptive activities did not. For communities with Native Americans, this means that opportunities for hunting and fishing may be required in excess of what is usually provided. However, the rate of participation in non-consumptive activities did not differ ethnically, and it was over 80%. That means that communities and public policy makers need to provide people with places to perform these outdoor activities, and they may need to be separated from places where people are hunting extensively (especially for subsistence or tribal uses, which may occur all year, as opposed to only during hunting seasons). Further, the high rate of participation by Native Americans in consumptive activities (such as hunting, fishing, collecting herbs) means that places to perform these activities need to be provided because these are traditional activities protected by treaty rights. Regulators likewise need to take these into consideration when making land use decisions.

The obvious differences in the evaluation of environmental characteristics or features by Native Americans and Caucasians for resource use vs. spiritual uses bears comment. Native Americans valued them similarly regardless of whether they intended to use the resources or engage in spiritual activities. This suggests that communities and public policy makers need to carefully consider preservation of ecosystems, and the protection of eco-cultural values so that Native Americans can continue to use the land for spiritual purposes.

Further, communities, public policy makers, and regulators should all note that eco-cultural aspects, such as no visible smog in the air and appear unspoiled, were rated highly by all. Thus, although unpolluted water, clear air, and unpolluted groundwater (goods and services provided by ecosystems) were rated highly, the appearance of ecosystems was also rated very highly.

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Fig. 1.
Map showing the location of the Post Falls survey, and of the Department of Energy sites (Hanford in Washington, and INL in Idaho).

Fig. 2. Percent of respondents engaging in different types of activities, and the types of religious/sacred activities engaged in, as a function of Ethnicity (Native American and Caucasian).

Fig. 3. Relative ratings (1=least important, 5=most important) for environmental attributes where Native Americans and Caucasians prefer to conduct consumptive/non-consumptive activities compared with religious/sacred activities. Given are means+standard errors.

Table 1

Demographics of study population in Post Falls, Idaho (2009). Given are means $\pm$ standard error and range for age and income ($N=401$).

	<i>N</i>	Overall <i>n</i> =401 ^a	Caucasian <i>n</i> =177	Native American <i>n</i> =209	χ^2
Age	401	46.5 $\pm$ 0.82	52.5 $\pm$ 1.1 18–86	41.8 $\pm$ 1.1 16–87	39.6 (<0.0001)
Gender (% women)		55%	58%	50%	3.0 (NS)
Education					
Less than high school		9%	2%	15%	35.0 (<0.0001)
High school graduate	35	28%	22%	33%	
Some college	113	22%	24%	20%	
College graduate	90	35%	45%	28%	
Graduate level education	140	6%	8%	3%	
Income (thousands of dollars)		48.5 $\pm$ 2.6 0–500	53.6 $\pm$ 3.3 6–300	43.3 $\pm$ 4.1 0–500	16.9 (<0.0001)
% household income below mean (\$48,500)		63%	55%	70%	
% from Idaho		42%	49%	36%	18.9 (<0.0001)
% from Washington		37%	39%	34%	
% from elsewhere	378	21%	12%	31%	

^aThere were 15 people of other ethnicities.

Table 2

Tribal affiliations of Native Americans interviewed (given are percents).

<i>Are you in a recognized Tribal Nation</i>	98%
What Nation?	
Coeur d'Alene	17%
Navajo	13%
Other	21%
Colville	11%
Cherokee	6%
Flathead	4%
Nez Perce	4%
Yakama	4%
Blackfoot	4%
Chippewa	4%
Salish	3%
Sioux	2%
Spokane	2%

Table 3

Mean number of times per month respondents participate in activities. Given are means $\pm$ standard error and Kruskal–Wallis X^2 (p).

Overall	Caucasian	Native American	Other	X^2
How many times a month activity is done in natural area				
Commune with nature	15.0 $\pm$ 0.66	12.7 $\pm$ 0.97	17.3 $\pm$ 0.91	9.5 (0.002)
Pray or meditate	13.7 $\pm$ 0.73	9.6 $\pm$ 1.03	18.2 $\pm$ 0.99	40.4 (< 0.0001)
Hike, walk, or bike	9.8 $\pm$ 0.56	9.0 $\pm$ 0.79	10.5 $\pm$ 0.80	1.0 (NS)
Bird-watch	7.4 $\pm$ 0.64	7.9 $\pm$ 0.95	7.3 $\pm$ 0.90	0.4 (NS)
Picnic or feast	3.7 $\pm$ 0.29	3.6 $\pm$ 0.48	3.7 $\pm$ 0.38	2.5 (NS)
Fish, crab, or hunt	2.5 $\pm$ 0.22	1.6 $\pm$ 0.20	3.5 $\pm$ 0.38	14.6 (0.0001)
Collect herbs, berries, etc.	1.7 $\pm$ 0.21	1.2 $\pm$ 0.27	2.2 $\pm$ 0.32	23.4 (< 0.0001)
Vision quest or other ceremony	0.9 $\pm$ 0.17	0.3 $\pm$ 0.18	1.4 $\pm$ 0.28	50.5 (< 0.0001)
Other (name it) ^a	0.7 $\pm$ 0.20	1.2 $\pm$ 0.40	0.2 $\pm$ 0.11	2.9 (NS)

^aThis includes biking, camping, gardening, swimming and boating.